

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ASHWORTH BROS., INC.,  
Petitioner,

v.

LAITRAM, L.L.C.,  
Patent Owner.

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Case IPR2020-00593  
Patent No. 10,023,388 B2

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**PETITIONER'S NOTICE OF APPEAL**

Please take notice that under 35 U.S.C. §§ 141(c), 142, and 319 and 37 C.F.R. §§ 90.2–3, Petitioner Ashworth Bros., Inc., (“Ashworth”) appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision of the Patent Trial and Appeal Board (“Board”) entered on August 23, 2021 (Paper 63) in IPR2020-00593 (the “Final Written Decision”) regarding U.S. Patent No. 10,023,388 (the “’388 Patent”). A copy of the Final Written Decision is attached. This notice is timely filed within 63 days of the Final Written Decision. 37 C.F.R. § 90.3(a)(1).

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Petitioner’s issues on appeal pertain to the following, as well as any underlying findings, determinations, rulings, decisions, opinions, or other related issues:

1. The Board’s determination that Petitioner has not demonstrated by a preponderance of the evidence that claims 9 and 10 of the ’388 Patent would have been obvious based on U.S. Patent No. 4,741,340 (Roinestad2) and U.S. Patent No. 3,348,659 (Roinestad);
2. The Board’s determination that Petitioner has not demonstrated by a preponderance of the evidence that claim 10 of the ’388 Patent would have been obvious based on U.S Patent No. 6,062,375 (“Pupp”) and Roinestad;
3. Any Board finding, determination, judgment, or order supporting or related to the Final Written Decision and decided adversely to Ashworth.

In accordance with 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), Petitioner is filing copies of this Notice of Appeal with the Director of the United States Patent and Trademark Office and with the Clerk of the United States Court of Appeals for the Federal Circuit along with the required docketing fees as set forth in the accompanying Certificate of Filing.

Respectfully submitted,

Date: October 22, 2021

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## CERTIFICATION OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through PTAB E2E, a true and correct copy of the above-captioned **PETITIONER'S NOTICE OF APPEAL** is being filed by FedEx with the Director on October 22, 2021 at the following address:

Director of the United States Patent and Trademark Office  
c/o Office of the General Counsel  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

The undersigned also hereby certifies that a true and correct copy of the above-captioned **PETITIONER'S NOTICE OF APPEAL** and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on October 22, 2021 .

Date: October 22, 2021

/Robert F. Altherr, Jr./

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*Attorney for Ashworth Bros., Inc.*

## CERTIFICATE OF SERVICE

The undersigned certifies service on the Patent Owner, pursuant to 37 C.F.R. § 42.6(e), by electronic (e-mail) delivery of a true copy of the foregoing **PETITIONER'S NOTICE OF APPEAL** to lead and back-up counsel of record for Petitioner as follows:

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Dated: October 22, 2021

By: /Carlos Goldie/

Carlos Goldie

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ASHWORTH BROS., INC.,  
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v.

LAITRAM, L.L.C.,  
Patent Owner.

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IPR2020-00593  
Patent 10,023,388 B2

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Before SHERIDAN K. SNEDDEN, MITCHELL G. WEATHERLY, and  
ERIC C. JESCHKE, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

JUDGMENT  
Final Written Decision  
Determining Some Challenged Claims Unpatentable  
*35 U.S.C. § 318(a)*  
Denying Patent Owner's Motion to Exclude  
*37 C.F.R. § 42.64*

## I. BACKGROUND

Ashworth Bros., Inc. (“Petitioner”) challenges claims 9–13 (the “challenged claims”) of U.S. Patent No. 10,023,388 B2 (Ex. 1001, “the ’388 patent”), which is assigned to Laitram, L.L.C. (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we conclude that Petitioner has proven, by a preponderance of the evidence, the unpatentability of claims 9 and 11–13, but has not proven, by a preponderance of the evidence, the unpatentability of claim 10.

### *A. Procedural History*

Petitioner filed a Petition seeking *inter partes* review of the challenged claims. Paper 2 (“Pet.”). Patent Owner did not file a Preliminary Response.<sup>1</sup> We instituted a trial as to all challenged claims. Paper 8 (“Decision on Institution” or “Dec. Inst.”).

During the trial, Patent Owner filed a Response (Paper 21, “PO Resp.”), Petitioner filed a Reply (Paper 32, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 41, “PO Sur-reply”).<sup>2</sup> Patent Owner filed a motion to exclude evidence (Paper 47; *see also* Paper 50 (Patent Owner’s reply brief)), which Petitioner opposed (Paper 48).

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<sup>1</sup> Under our rules, filing a Preliminary Response is optional. *See* 37 C.F.R. § 42.107(a) (2019) (“The patent owner *may* file a preliminary response to the petition.” (emphasis added)).

<sup>2</sup> Paper 36 is a public version of the Petitioner’s Reply.

Petitioner relies on the declaration testimony of Mr. Philip O’Keefe, P.E., filed with the Petition (Ex. 1006<sup>3</sup>, “O’Keefe Pet. Decl.”) and the Reply (Ex. 1031, “O’Keefe Reply Decl.”). Patent Owner relies on the declaration testimony of Mr. Michael R. Straight, filed with the Response. Ex. 2013 (“Straight Decl.”). A consolidated oral argument in this proceeding and related IPR2020-00594 was held on June 1, 2021, and a copy of the transcript of that argument was entered into the record. Paper 55 (“Tr.”).

*B. Related Proceedings*

The parties identify a proceeding in the U.S. District Court for the District of Delaware involving the ’388 patent: *Laitram, L.L.C. v. Ashworth Bros., Inc.*, No. 19-cv-01130-LPS (D. Del.), filed June 19, 2019 (the “Delaware Litigation”). Pet. 1; Paper 3 (Patent Owner’s Mandatory Notices) § II. The Delaware Litigation also involves U.S. Patent No. 10,189,645 B2 (“the ’645 patent”). See IPR2020-00594, Paper 2 at 1; Paper 3 § II. The Delaware Litigation is stayed pending the final disposition of this proceeding and related IPR2020-00594. See Stipulation and [Proposed] Order to Stay Action, *Laitram, L.L.C. v. Ashworth Bros., Inc.*, No. 19-cv-01130-LPS (D. Del. Sept. 16, 2020), ECF No. 51.

On the same day as the filing of the Petition in this proceeding, Petitioner filed a petition for *inter partes* review of claims 1–4 of the ’645 patent, in IPR2020-00594. See IPR2020-00594, Paper 2. We granted institution in that proceeding. See IPR2020-00594, Paper 6.

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<sup>3</sup> Petitioner filed a corrected version of Exhibit 1006 on April 28, 2020. The original version was expunged. See Paper 7 (Order Granting Petitioner’s Motion to Expunge).



*C. The '388 Patent*

The '388 patent “relates . . . to spiral conveyors in which a conveyor belt is positively driven in a helical path around a rotating drive tower.” Ex. 1001, 1:5–8. According to the '388 patent, in prior systems known as “overdrive systems,” “the conveyor belt is driven by frictional contact between the inside edge of the belt and the faster-rotating outer surface of the rotating drum about which the belt is helically wrapped.” *Id.* at 1:22–26. The '388 patent describes certain alleged shortcomings of these systems, including (1) high belt tension, (2) wear at the belt edge and the outer drum surfaces due to the frictional engagement, and (3) high motor and power requirements. *Id.* at 1:26–37.

The '388 patent states that “[p]ositively driven spiral systems, in which drive structure on the outside of a rotating cage engages structure on the inside of a conveyor belt, have been used to overcome some of the shortcomings of overdrive systems.” Ex. 1001, 1:38–41. In such systems, “[b]ecause there is positive engagement between regularly spaced drive

structure on the cage and regularly spaced edge structure on the inside edge of the belt, there is no slip as in overdrive systems.” *Id.* at 1:41–45.

Figure 1 is reproduced below:

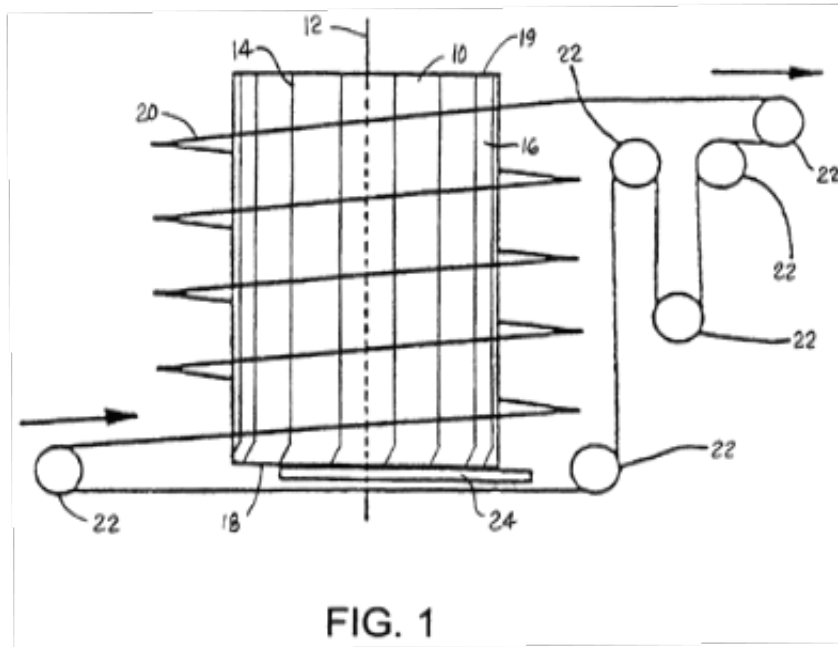
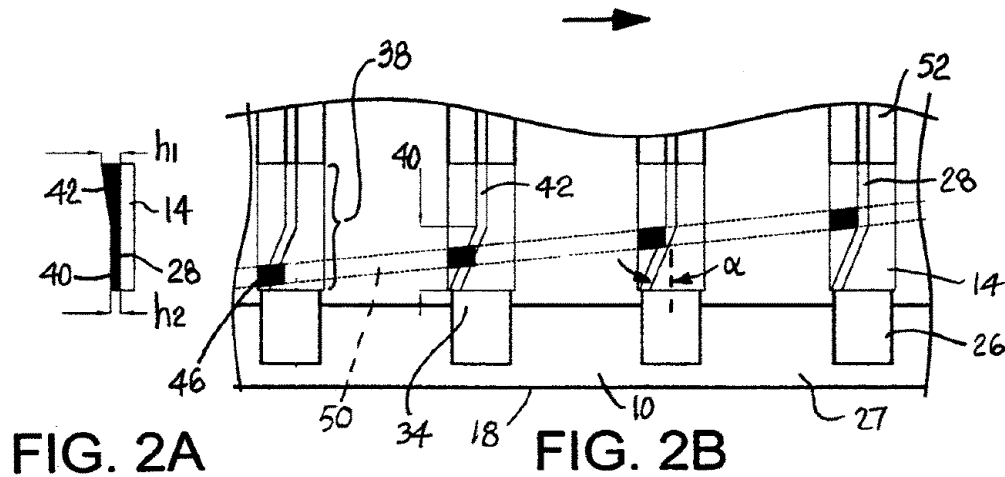


Figure 1 is “a side elevation schematic of a spiral conveyor system.” Ex. 1001, 2:11–12. The depicted system includes “drive tower 10 in the form of a cylindrical drum or cage” and conveyor belt 20, which “follows a multi-tiered helical path around the tower” via “various take-up, idle, and feed sprockets 22.” *Id.* at 2:65–3:13.<sup>4</sup> “The rotating tower has a plurality of parallel, generally vertical drive members 14 spaced apart regularly around its periphery 16.” *Id.* at 3:1–3. The ’388 patent states that “[t]he inside edge of the belt positively engages the drive members, which drive the belt up the tower as it rotates.” *Id.* at 3:8–10.

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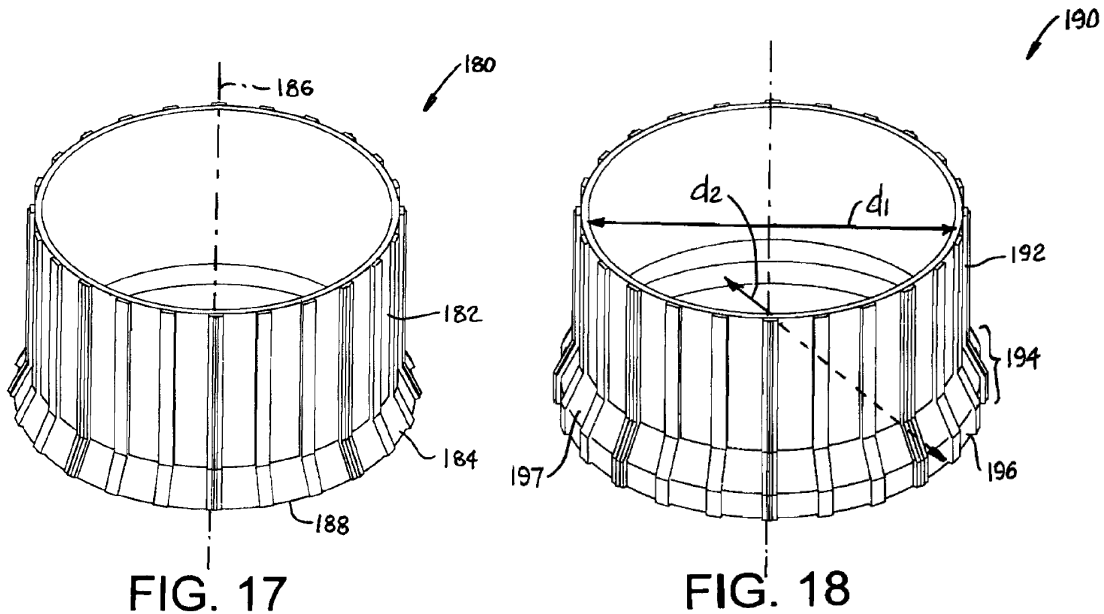
<sup>4</sup> Throughout this Decision, we omit any bold emphasis of reference numerals in quotations from the ’388 patent and from prior art references.

Figures 2A and 2B are reproduced below:



Figures 2A and 2B “are profile and head on views of a lower segment of the drive members [14] of the drive tower” shown in Figure 1. Ex. 1001, 2:13–14. As shown in these figures, “[i]n a lower segment 38 of each drive member [14], the ridge 28 includes a constant-height region 40 and a tapered region 42.” *Id.* at 3:24–25. The ’388 patent discloses that “[t]he height of the ridge 28 increases from a height  $h_2$  in the constant-height region to a maximum height  $h_1$  at the upper end of the tapered region.” *Id.* at 3:27–30. The low height  $h_2$  of ridge 28 “facilitate[s] the entry of the conveyor belt 20 onto the rotating tower.” *Id.* at 3:35–38.

Figures 17 and 18 are reproduced below:



Figures 17 and 18 “are oblique views of two other versions of drive towers with outwardly extending bottom skirt portions usable with conveyor belts.” Ex. 1001, 2:58–60. In contrast to the purely “cylindrical” drive tower shown in Figure 1 (*id.* at 2:65–67), Figures 17 and 18 depict versions of drive towers with cylindrical portions (such as 182, 192, and 196), but also other features, such as skirt portion 184 in Figure 17, and skirt portion 194 and tapered portion 197 in Figure 18. *See id.* at 6:53–62.

#### D. Challenged Claims

Petitioner challenges claims 9–13, of which claims 9 and 11 are independent. Claim 10 depends from claim 9, and claims 12 and 13 depend from claim 11. Independent claims 9 and 11 are reproduced below, with bracketed letters added to identify each element:

9. [A] A spiral conveyor comprising:  
[B] a drive tower extending from a bottom to a top and rotating about a vertical axis;

[C] a plurality of parallel drive members extending in length from the bottom to the top of the drive tower;

[D] wherein each of the drive members includes an outwardly projecting ridge whose distance from the vertical axis varies from the bottom to the top of the drive tower; and

[E] wherein each drive member includes a lower segment at the bottom of the drive tower and wherein the ridge in the lower segment is tapered along a portion of its length;

[F] a conveyor belt positively driven without slip on a helical path around the drive tower by the ridges of the drive members engaging an inside edge of the conveyor belt.

Ex. 1001, 8:10–24.<sup>5</sup>

11. [A] A spiral conveyor comprising:

[B] a drive tower extending from a bottom to a top and having a vertical axis of rotation;

[C] a plurality of parallel drive members extending in length from the bottom to the top of the drive tower;

[D] wherein each of the drive members includes a ridge projecting radially outward to an outer edge;

[E] wherein each of the drive members includes a lower segment at the bottom of the drive tower and an upper segment extending from the lower segment toward the top of the drive tower;

[F] wherein the distance of the outer edge of the ridge from the vertical axis of rotation is a first

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<sup>5</sup> We adopt Petitioner’s designations for the elements of the challenged claims. *See* Pet. 80–81.

distance in the upper segment and the distance of the outer edge of the ridge from the vertical axis of rotation is a greater second distance in a lower portion of the lower segment;

[G] a conveyor belt positively driven on a helical path around the drive tower by the ridges of the drive members engaging an inside edge of the conveyor belt.

Ex. 1001, 8:28–47.

*E. Instituted Grounds of Unpatentability*

We instituted *inter partes* review of the challenged claims based on the following grounds of unpatentability asserted by Petitioner:

<b>Claim(s) Challenged</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>
9–13	103(a)	Pupp, <sup>6</sup> Roimestad <sup>7</sup>
9–13	102(a)/(b)	Heber <sup>8</sup>
9–13	103(a)	Heber
9–13	103(a)	Heber, Roimestad
9–13	103(a)	Roimestad2, <sup>9</sup> Roimestad

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<sup>6</sup> US 6,062,375, issued May 16, 2000 (Ex. 1003, “Pupp”).

<sup>7</sup> US 3,348,659, issued October 24, 1967 (Ex. 1005, “Roimestad”).

<sup>8</sup> US 7,347,316 B2, issued March 25, 2008 (Ex. 1004, “Heber”). Petitioner identifies Heber as prior art under pre-AIA 35 U.S.C. §§ 102(a) and 102(b). *See* Pet. 14; *see also id.* at 13 n.1 (noting that citations are to the pre-AIA versions of the statutes).

<sup>9</sup> US 4,741,430, issued May 3, 1988 (Ex. 1007). Like Petitioner, we refer to this reference as “Roimestad2.” *See, e.g.*, Pet. 3–4.

## II. DISCUSSION

### *A. The 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 the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *Id.*

Petitioner contends, with accompanying declaration testimony, that a person having ordinary skill in the art “[a]t the time of the alleged invention . . . would have had a bachelor’s degree in mechanical (or similar) engineering with 1–2 years[’] experience in design of mechanical production equipment” or, “[a]lternatively, . . . might substitute several years of actual design experience for the bachelor’s degree.” Pet. 12 (citing O’Keefe Pet. Decl. ¶¶ 18–22). In the Decision on Institution, we adopted Petitioner’s proposed level of ordinary skill in the art, stating that it “appear[ed] consistent with the record at th[at] stage of the proceeding, including the prior art.” Dec. Inst. 9–10.

Patent Owner now proposes a *slightly* different level, stating that one of ordinary skill in the art at the time of the invention “would have had a bachelor’s degree in mechanical (or similar) engineering with at least two years’ experience in the design of spiral conveyor systems” or,

“[a]lternatively, . . . might substitute five years of actual design experience on spiral conveyor systems” in place of the degree. PO Resp. 5 (citing Straight Decl. ¶¶ 18–21).<sup>10</sup> The parties did not further address this issue at trial. *See* Pet. Reply; PO Sur-reply.

Although the level of ordinary skill in the art proposed by Patent Owner (and applied by Mr. Straight (*see, e.g.*, Straight Decl. ¶¶ 18–21)) differs slightly from the level adopted in the Decision on Institution, Patent Owner stated, at the oral argument, that the differences are not “material” and that Patent Owner’s and Mr. Straight’s positions would be the same under either level. *See* Tr. 47:23–49:5. Because we agree that the differences in the two levels are immaterial, in the analysis below, we continue to apply the level of ordinary skill in the art adopted in the Decision on Institution. Moreover, the analysis would be the same under Patent Owner’s proposed level.

### *B. Claim Construction*

In *inter partes* reviews, the Board interprets claim language using the district-court-type standard, as described in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b) (2019). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d

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<sup>10</sup> In the section of the Response with a Statement of Material Facts in Dispute, Patent Owner states *another* alternative, which replaces “at least two years’ experience” with “two years’ experience.” *Compare* PO Resp. x, *with id.* at 5. We focus on the version in the section expressly addressing level of ordinary skill in the art. *See id.* at 5.



at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence should be considered in the context of the intrinsic evidence. *See id.* at 1317–19.

Petitioner does not propose constructions for any claim terms and states that “[n]o claim term has previously been construed by a United States district court in a civil action, or by the United States International Trade Commission (ITC).” Pet. 12. As discussed in the Decision on Institution, however, Petitioner does discuss two alternative constructions of the phrase “without slip” in the context of element 9F. *See Dec. Inst.* 24–27. In the Decision on Institution, we preliminarily construed “without slip,” and determined, at that stage of the proceeding, that the aspects of Pupp identified by Petitioner provided a sufficient showing that Pupp discloses element 9F with the understanding of “without slip” discussed. *Id.* at 27–28.

Patent Owner agrees with the construction of “without slip” preliminarily applied in the Decision on Institution. *See PO Resp.* 10 (discussing Dec. Inst. 27). Petitioner does not further address the issue. *See generally* Pet. Reply. Although the parties do not actively dispute the construction of “without slip,” for completeness, we now repeat much of the prior analysis on this issue.

As the first alternative construction, Petitioner contends that structures that operate “without slip” would have been well understood to one of ordinary skill in the art as referring to a “structure or method of maintaining correct balance of belt tension that eliminates overdrive.” Pet. 25 (citing O’Keefe Pet. Decl. ¶ 54); *see also* O’Keefe Pet. Decl. ¶ 52 (defining “overdrive” as when, “[d]uring the friction drive process, the conveyor belt

slips with respect to the tower”). According to Petitioner, the Background of the ’388 patent discloses “that prior art positively driven spiral conveyor systems were driven ‘without slip’, expressly stating, ‘[b]ecause there is positive engagement between regularly spaced drive structure on the cage and regularly spaced edge structure on the inside edge of the belt, there is no slip as in overdrive systems.’” Pet. 25 (internal citation omitted) (quoting Ex. 1001, 1:38–48).

As the second alternative construction, Petitioner contends that “without slip” limits the system to the “specific orientation and structure shown . . . in Figures 2A, 2B, and 2C.” Pet. 27. In support of this alternative, Petitioner first notes that element 9F was added in response to a rejection of then-pending claim 10 (now issued claim 9), with applicant identifying column 3, lines 51 to 54 of the Specification (as numbered at issuance) as written description support for element 9F. *See* Pet. 25–26; *see also* Ex. 1002 at 124–129 (rejection), 141 (showing the language of element 9F added to then-pending claim 10), 143 (identifying written description support for the amendment).

The alleged written description support states: “In this position, the driving member is engaged with the inside edge of the belt to positively drive it along the helical path 50 without slip.” Ex. 1001, 3:51–54. Petitioner contends: “‘In this position’ expressly refers to the structure and orientation of the ridge in the bottom portion of the lower segment of the drive tower and the conveyor belt ‘as shown in FIGS. 2B AND 2C’” and “also limits the orientation and structure to that shown in Figure 2A, which is a profile view of Figure 2B.” Pet. 26 (citing Ex. 1001, 3:35–54; Ex. 1002 at 14) (then citing Ex. 1001, 2:13–17; Ex. 1002 at 12). Petitioner further

argues that the applicant “admitted in the Background section of the ’388 patent that prior art positively driven spiral systems were driven ‘without slip’” (citing Ex. 1001, 1:38–45) and that adding the “‘without slip’ limitation could not have overcome the Examiner’s prior art rejection unless [that limitation] was limited to the specific orientation and structure shown ‘in this position,’ i.e., in Figures 2A, 2B, and 2C.” Pet. 26–27.

We are not persuaded that the second alternative construction is correct because Petitioner has not demonstrated that the statement relied upon amounts to a disavowal of claim scope, which “must ‘be both clear and unmistakable’ to one of ordinary skill in the art.” *See Elbex Video, Ltd. v. Sensormatic Elecs. Corp.*, 508 F.3d 1366, 1371 (Fed. Cir. 2007) (quoting *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1326 (Fed. Cir. 2003)). Considering the statement in context, we understand it as merely describing the particular configuration disclosed as *including* engagement “without slip”; we do not understand that statement as indicating that engagement “without slip” *can only occur* in that configuration. *See* Ex. 1001, 3:51–54.

Moreover, although element 9F was the only language added to claim 9 before issuance (*see* Ex. 1002 at 139–144 (Reply to Office Action), 153–60 (Notice of Allowance)), Petitioner has not shown that the examiner allowed claim 9 based on interpreting “without slip” as proposed in its second alternative construction. *See* Pet. 27 (contending that “adding the 9[f] ‘without slip’ limitation could not have overcome the Examiner’s prior art rejection unless the 9[f] ‘without slip’ limitation was limited to the specific orientation and structure shown ‘in this position,’ i.e., in Figures 2A, 2B, and 2C”). Instead, the statement in the Notice of Allowability includes

several aspects of element 9F, and indicates that the examiner understood “without slip” as simply “non-slip”:

The following is an examiner’s statement of reasons for allowance: The prior art does not teach or disclose a *non-slip* spiral conveyor utilizing ridges in the edge of a belt in conjunction with a drive tower nor a conveyor belt driven by ridges of drive members engaging an inside edge of the conveyor belt. The combination with the rest of the claim language is not taught or fairly suggested in the prior art.

Ex. 1002 at 158 (emphasis added).

For these reasons, based on the complete record, we construe “without slip” in element 9F as describing a system in which there is essentially no slip between the conveyor belt and the drive tower. This construction is supported by the plain language of element 9F, considered in its entirety, in light of the portion of the Background section of the Specification identified by Petitioner. *See* Ex. 1001, 1:41–45 (“Because there is positive engagement between regularly spaced drive structure on the cage and regularly spaced edge structure on the inside edge of the belt, *there is no slip* as in overdrive systems.” (emphasis added)), *quoted at* Pet. 25, 26. This construction is further supported by the examiner’s Notice of Allowability (*see* Ex. 1002 at 158 (stating: “The prior art does not teach or disclose a *non-slip* spiral conveyor . . . .” (emphasis added))), and generally aligns with Petitioner’s first alternative construction (*see* Pet. 25). Patent Owner agrees with this understanding of “without slip” (PO Resp. 10–11), and Petitioner did not address the issue in the Reply.

*C. Asserted Obviousness of Claims 9–13 Based on Pupp and Roinestad*

Petitioner asserts that claims 9–13 of the ’388 patent are unpatentable under 35 U.S.C. § 103(a) based on Pupp and Roinestad. Pet. 3, 18–40; Pet.

Reply 1–16, 21–30. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 11–41, 59–71; PO Sur-reply 1–32. We begin our analysis with an overview of the asserted prior art and then address the parties’ specific contentions in turn.

*1. Pupp*

Pupp discloses “a belt conveyor comprising a drum, which is rotatably mounted on a vertical center shaft, and an endless conveyor belt, which along part of its length follows a helical path through a plurality of turns around the drum and in contact with the outside of the drum.” Ex. 1003, 1:10–14.

Figures 5 and 6 are reproduced below:

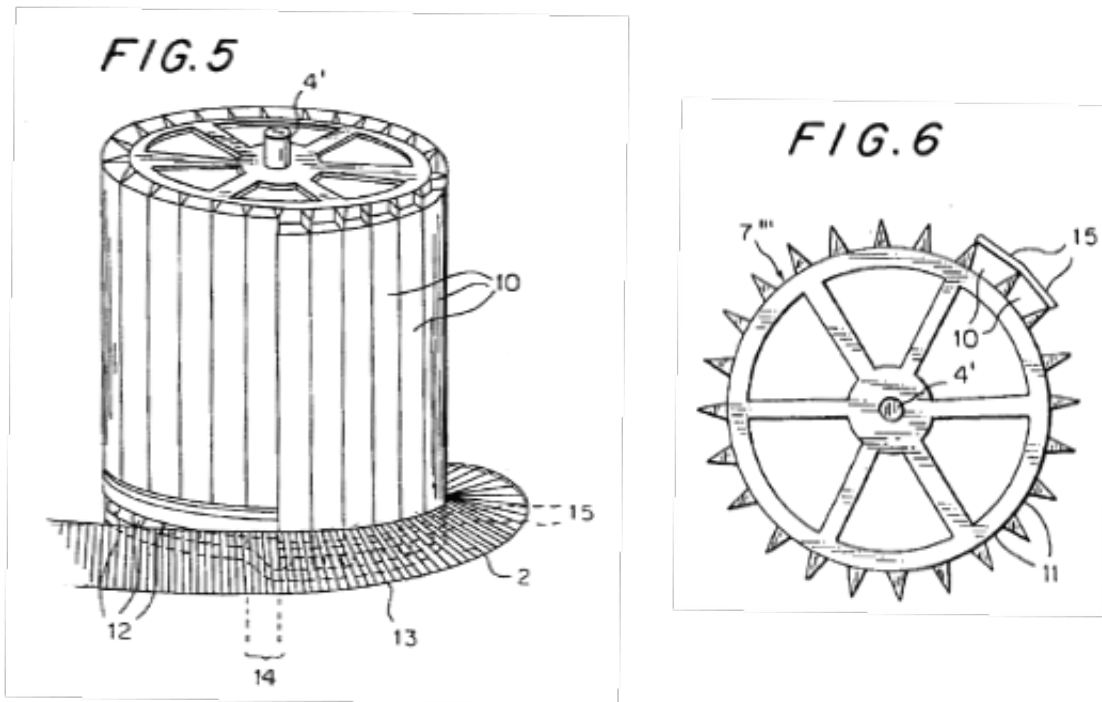


Figure 5 is “a schematic perspective view of a drum in a belt conveyor” and Figure 6 is “a schematic top plan view of the drum” in Figure 5. Ex. 1003, 2:15–18. Drum 1''' shown (but unnumbered) in Figures 5 and 6 has a “plurality of strips 10 around its outside, said strips 10

extending axially along the drum 1'''.” *Id.* at 3:15–17. Pupp discloses that “strips 10 can be kept in place by the conveyor belt 2 which is helically wound around the drum 1 in contact with the strips 10.” *Id.* at 3:18–22.

Figure 8 is reproduced below:

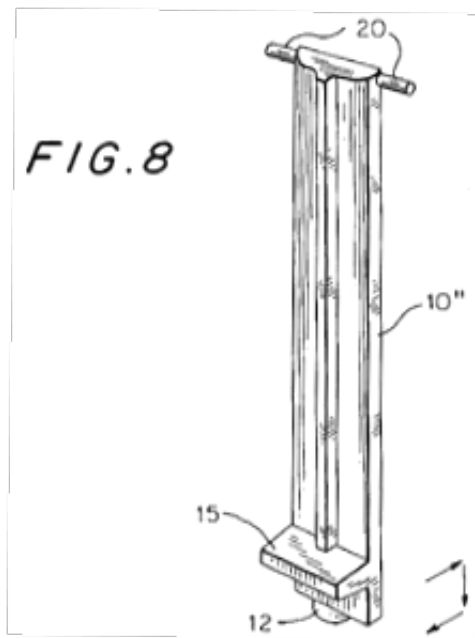


Figure 8 is “a perspective view of an alternative embodiment” of strip 10 shown in Figures 5 and 6. Ex. 1003, 2:23–24. The depicted strip 10” “has a lug 15 for supporting the inside of the lower turn of a conveyor belt, which at its side facing the drum is self-supporting.” *Id.* at 4:27–29. Although not discussed in the text, Figure 8 shows a raised structural feature along the length of the surface on the same side as lug 15—i.e., the side that would face the edge of the conveyor belt.

## 2. Roinestad

Roinestad discloses “[a] conveyor system including an endless flat belt . . . and a supporting and driving assembly which supports the belt in a helical path . . . and frictionally drives the belt at a plurality of locations along the inner edge of the loops.” Ex. 1005, 1:11–16.

Figure 1 is reproduced below:

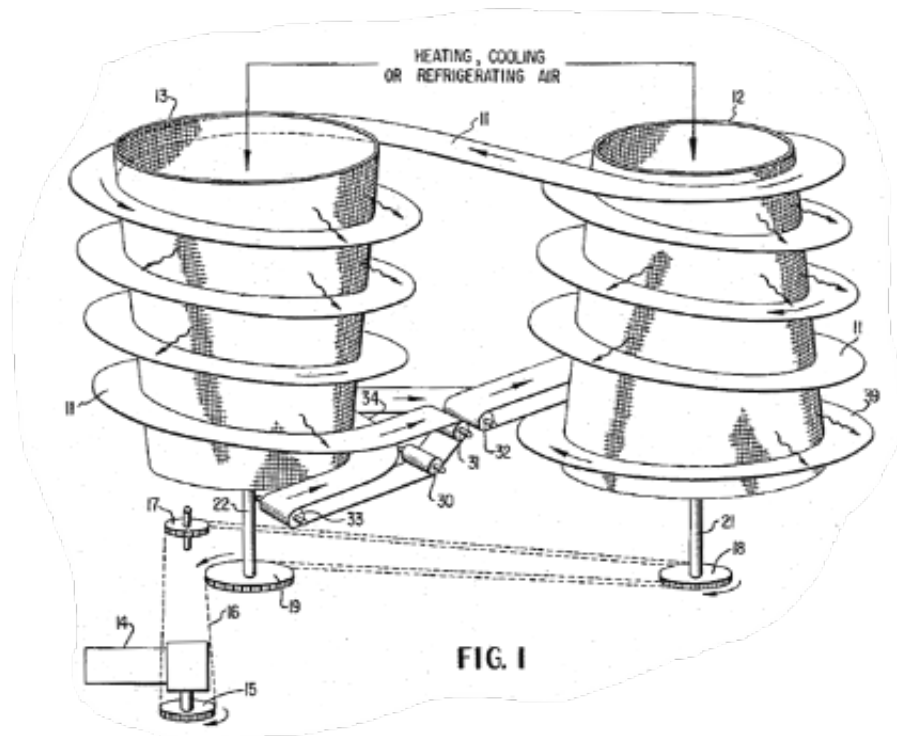


Figure 1 is a “perspective view of a conveyor system.” Ex. 1005, 4:52–53. The conveyor system shown in Figure 1 includes “endless conveyor belt 11,” which is “passed in a helical configuration successively around each of a pair of upright frusto-conical driving drums 12 and 13.” *Id.* at 5:10, 5:23–25. Roinestad discloses that “[e]ach of the drums is tapered in the direction of belt travel axially of the drum.” *Id.* at 5:25–26.

Figure 5 is reproduced below:

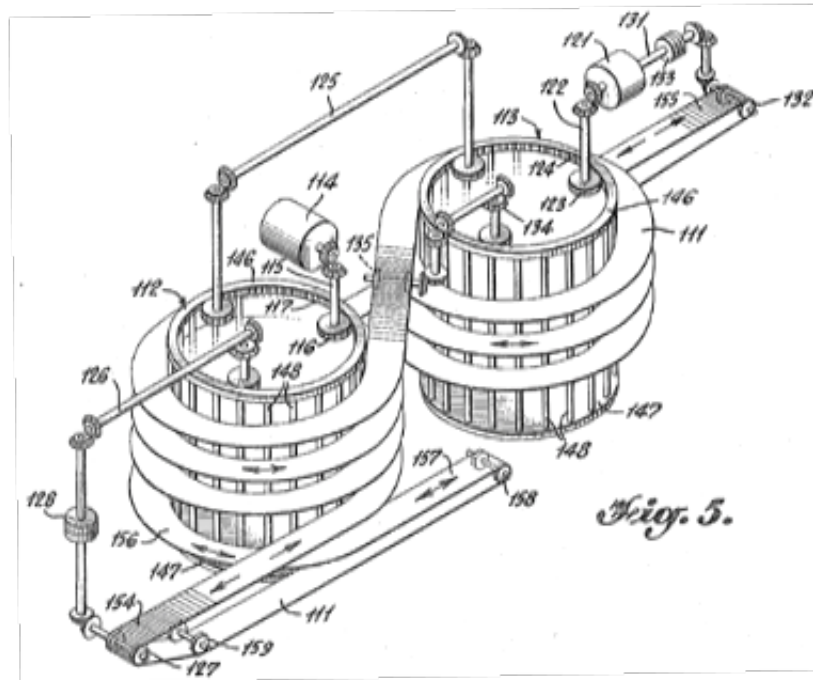


Figure 5 is “a perspective view of a . . . modified conveyor system.” Ex. 1005, 4:61–62. The conveyor system shown in Figure 5 includes “belt 111 . . . passed in a helical configuration successively around each of a pair of upright driving drums 112 and 113.” *Id.* at 8:28–30. Driving drums 112 and 113 include “top and bottom members 146 and 147 respectively, which are connected by a series of vertical driving bars 148 positioned around the periphery of the drum at circumferentially spaced locations.” *Id.* at 9:23–27. Roimestad discloses that “bars 148 engage in [a] frictional driving relationship [with] the radially inner edge of the belt.” *Id.* at 9:30–32 (discussing Fig. 8).



Figure 11 is reproduced below:

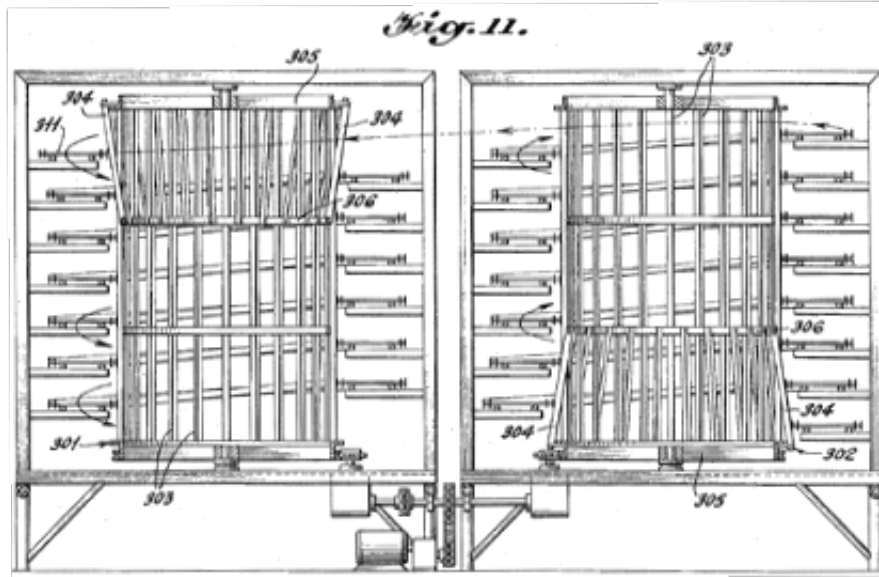


Figure 11 is a “vertical sectional view of [a] modification of the driving drums.” Ex. 1005, 5:4–5. Drums 301 and 302 depicted in the left side and right side, respectively, both include (1) a set of driving bars 303 in a generally cylindrical portion of the drum, and (2) a set of tapered driving rods 304 in a tapered portion of the drum at the “belt entrance ends.” *Id.* at 12:34–40. Drum 301 (on the left) has a tapered upper end, whereas drum 302 (on the right) has a tapered lower end. *Id.* at 12:40–42.

### 3. Analysis

#### a. Independent Claim 9

Petitioner contends that the proposed combination of Pupp and Roinestad satisfies each of the limitations of claim 9. Pet. 18–30. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to combine Pupp and Roinestad and argues that there would have

been a reasonable expectation of success. Pet. 19–23. We address in turn below the subject matter of each limitation in claim 9, then Petitioner’s identified reasons to combine Pupp and Roinestad, and then objective evidence of nonobviousness.

*(1) Element 9A*

In element 9A, claim 9 recites “[a] spiral conveyor comprising.” Ex. 1001, 8:10; *see also* Pet. 80–81 (Claim Listing Appendix). Petitioner states, “[t]o the extent the preamble is limiting,” Pupp discloses this element. Pet. 18 (citing Ex. 1003, 1:10–13, Figs. 1, 5; O’Keefe Pet. Decl. ¶ 75). In the cited passage, Pupp discloses that “[t]he present invention relates to a belt conveyor comprising a drum, which is rotatably mounted on a vertical center shaft, and an endless conveyor belt, which along part of its length follows a helical path . . . .” Ex. 1003, 1:10–13; *see also id.*, Fig. 5. Patent Owner does not present arguments for this element. To the extent element 9A is limiting, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses this element.

*(2) Element 9B*

In element 9B, claim 9 recites “a drive tower extending from a bottom to a top and rotating about a vertical axis.” Ex. 1001, 8:11–12. Referring to Figures 1 and 5 of Pupp, Petitioner contends that “Pupp discloses a drive tower – i.e., drum 1, drum 1[’] – that extends from a bottom to a top and rotates about a vertical center shaft.”<sup>11</sup> Pet. 19 (citing Ex. 1003, 1:10–15, 2:42–43, Figs. 1, 5; O’Keefe Pet. Decl. ¶ 76). Patent Owner does not

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<sup>11</sup> Pupp refers to the drum in Figure 5 as drum 1’ not drum 1”. *See, e.g.*, Ex. 1003, 3:15–18.

present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses this element.

*(3) Element 9C*

In element 9C, claim 9 recites “a plurality of parallel drive members extending in length from the bottom to the top of the drive tower.” Ex. 1001, 8:13–14. Petitioner argues that drum 1''' in Figures 5 and 6 of Pupp “has a plurality of strips 10 around its outside, where the strips 10 extend axially around drum 1['] so as to move axially relative to the drum.” Pet. 19 (citing Ex. 1003, 3:15–22, Figs. 5, 6; O’Keefe Pet. Decl. ¶ 78). Patent Owner does not present arguments for this element.<sup>12</sup> We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses this element.

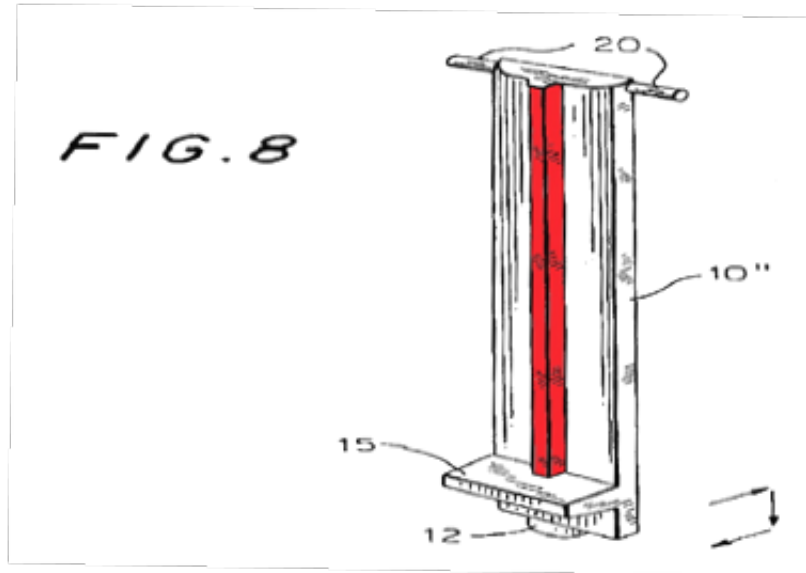
*(4) Element 9D*

In element 9D, claim 9 recites “wherein each of the drive members includes an outwardly projecting ridge whose distance from the vertical axis varies from the bottom to the top of the drive tower.” Ex. 1001, 8:15–17. Petitioner asserts that “[c]ombining Roinestad’s tapered drive tower

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<sup>12</sup> At the oral hearing, Patent Owner argued that Pupp does not disclose element 9C. See Tr. 50:11–51:15, 86:19–23 (Petitioner stating that the argument as to element 9C was new). This argument will not be considered, however, as it was not presented in the briefing in this proceeding. See *Dell Inc. v. Accelaron, LLC*, 884 F.3d 1364, 1369 (Fed. Cir. 2018) (noting that the “Board was obligated to dismiss [the petitioner’s] untimely argument . . . raised for the first time during oral argument”); Consolidated Trial Practice Guide 85–86 (Nov. 2019), <https://www.uspto.gov/TrialPracticeGuide> Consolidated (“TPG”) (discussing how, at the oral hearing, a party “may only present arguments relied upon in the papers previously submitted”); see also PO Resp. x, 30–38 (addressing elements 9D, 9E, and 9F, but not 9C).

geometry with Pupp's drive members" would satisfy this element. Pet. 21; *see also* Pet. 19–23 (entire discussion of element 9D). Petitioner first discusses Pupp, providing the annotated version of Figure 8, shown below:



Pet. 20. Figure 8 shows an alternative embodiment of the strips shown in Figures 5 and 6. Ex. 1003, 2:23–24. In the annotated version of Figure 8, Petitioner added red shading to a structural feature shown on strip 10".

Pet. 20. Referring to this annotated figure, Petitioner states that Pupp discloses "an outwardly projecting ridge (in red) on each of the strips 10" – i.e., the [identified] drive members." Pet. 19 (citing Ex. 1003, 4:14–15, 4:26–27, Fig. 8; O'Keefe Pet. Decl. ¶¶ 79–80). According to Petitioner, because

a substantially cylindrical drive tower also discloses to [one of ordinary skill in the art] a slightly conical or tapered drive tower (Ex. 1008 at 9:10–14), Pupp's strips 10 on a tapered drive tower teach [one of ordinary skill in the art] that the distance of the ridges on the drive members from the vertical axis of the drive tower varies along any section of the drive tower's height from the top to the bottom of the drive tower.

Pet. 20 (citing O’Keefe Pet. Decl. ¶ 79). Petitioner also states that “Roinestad expressly discloses substantially cylindrical drive towers (Fig. 5) as alternatives to conical or tapered drive towers (Fig. 1) and drive towers that combine tapered and cylindrical sections (Fig. 11),” which, according to Petitioner, one of ordinary skill in the art also “would have understood to be disclosed by Pupp’s description of a substantially cylindrical drive tower.” Pet. 20–21.

Although the heading of the section of the Petition addressing element 9D indicates that Petitioner relies on the combination of Pupp and Roinestad to satisfy this element (Pet. 19), based on the block quote above, Petitioner appears to take the *alternative* position that Pupp *alone*—as understood based on Daringer (Exhibit 1008)—satisfies this element. *See, e.g.*, Pet. 19–20 (citing O’Keefe Pet. Decl. ¶ 79 (discussing the same passage from Daringer before concluding that “Pupp therefore, teaches all the limitations of [9D]”)).

In the Decision on Institution, we stated that it was “unclear what aspects of Pupp Petitioner asserts disclose ‘a *substantially* cylindrical drive tower’ as opposed to a *purely* cylindrical drive tower, as in Figure 5.” Dec. Inst. 19 (quoting Pet. 20, with emphasis added). We also stated that Petitioner cites to column 4, lines 14 to 15 and 26 to 27, as well as Figure 8 of Pupp, but these aspects do not indicate that drum 1” is not purely cylindrical. *Id.* (citing Pet. 19).<sup>13</sup>

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<sup>13</sup> To the extent Petitioner relies on Pupp’s disclosure that relied-upon strip 10” in Pupp has a roller 12, which is guided by a “guide means” that “deviates inwardly towards the center shaft of the drum” (Ex. 1003, 4:21–26), Petitioner has not adequately explained how this indicates the drum 1” is not purely cylindrical.

In the Response, Patent Owner summarized and “agree[d]” with our preliminary analysis. PO Resp. 30–32. In the Reply, Petitioner did not address this issue. Because we conclude that the full record does *not* support Petitioner’s position that Pupp teaches “a *substantially* cylindrical drive tower” with strips 10” oriented at an angle to the vertical axis of the tower, we do not address whether, having considered the cited portion of Daringer, one of ordinary skill in the art would have understood the alleged teaching in Pupp to *also* teach a *conical* drive tower (*see, e.g.*, Ex. 1003, Fig. 1). *See In re Burckel*, 592 F.2d 1175, 1179 (CCPA 1979) (“Under 35 U.S.C. § 103, a reference must be considered not only for what it expressly teaches, but also for what it fairly suggests.”).

We turn now to Petitioner’s *alternative* reliance on the combination of Pupp and Roinestad for element 9D. As noted above, Petitioner relies on Pupp as disclosing that “each of the drive members includes an outwardly projecting ridge.” Pet. 20. As to the requirement that the “distance from the vertical axis varies from the bottom to the top of the drive tower,” in this alternative position, Petitioner relies on Roinestad as to the *shape* of the drive tower. Pet. 20–21. In the Decision on Institution, we stated that we understood Petitioner to rely on the shape of the purely conical towers shown in Figure 1 of Roinestad:

Turning to the relied-upon aspects of Roinestad for this claim element, however, we are persuaded, at this stage of the proceeding, by Petitioner’s assertion that a modified system with a drive tower in the shape of the “conical or tapered drive towers” in Figure 1 of Roinestad would satisfy element 9D. Pet. 20–21 (citing O’Keefe ¶¶ 79–80). More specifically, at this stage, we are persuaded that, if strips 10” from Pupp were around a *conical* (rather than *cylindrical*) drive tower, the distance of the identified “outwardly projecting ridges” (*see* Pet. 20 (annotated version of

Pupp, Fig. 8)) “from the vertical axis” would “var[y] from the bottom to the top of the drive tower.”

Dec. Inst. 21. This understanding is supported by the express reference to “Roinestad’s tapered drive tower geometry” in the only statement in the Petition addressing how the combination of Roinestad and Pupp allegedly satisfies the claim language at issue:

Combining Roinestad’s tapered drive tower geometry with Pupp’s drive members having an outwardly projecting ridge to provide positive drive results in outwardly projecting ridges whose distance from the vertical axis varies from the top to the bottom. [O’Keefe Pet. Decl.] ¶¶ 79–80.

Pet. 21. Earlier in the same discussion, Petitioner describes Figure 1 of Roinestad as disclosing “conical or tapered drive towers.” Pet. 20. This understanding is also strongly supported by paragraph 80 of Mr. O’Keefe’s Petition Declaration, which includes and specifically discusses only Figure 1 of Roinestad rather than any other figures. O’Keefe Pet. Decl. ¶ 80.

At the oral hearing, the panel questioned Petitioner at length as to the specific shape of the drive tower in the proposed modified device in the context of claim 9 for this asserted ground. Tr. 25:1–29:7. Petitioner stated that it relied on three *different* drive tower shapes in Roinestad: (1) the purely conical shapes in Figure 1; (2) the mixed conical/cylindrical shape on the left side of Figure 11; and (3) the mixed conical/cylindrical shape on the right side of Figure 11. *Id.* at 27:6–28:7. Although the section of the Petition addressing element 9D mentions Figure 11 (*see, e.g.*, Pet. 20–22), the same statements and citations also mention Figure 1. Moreover, as discussed above, the only statement affirmatively addressing the claim language at issue, and the related testimony of Mr. O’Keefe, clearly relies on “Roinestad’s tapered drive tower geometry” in Figure 1. Pet. 21 (citing

O’Keefe Pet. Decl. ¶ 80). For these reasons, we maintain the understanding that Petitioner relies on the shape of the purely conical towers shown in Figure 1 of Roinestad for element 9D, as well as claim 9 overall.

We turn now to whether Petitioner’s proposed combination, as explained above, satisfies element 9D. Based on the aspects of the record cited by Petitioner, we are persuaded that Pupp’s strips 10” shown in Figure 8, which include the unnumbered projecting ridge shown in red above, are “drive member[s]” that “include[] an outwardly projecting ridge.” Pet. 19 (citing Ex. 1003, 4:14–15, 4:26–27, Fig. 8; O’Keefe Pet. Decl. ¶¶ 79–80). As to the proposed combination of Roinestad’s conical drive tower from its Figure 1 with Pupp’s strips 10”, Patent Owner only argues that “Roinestad FIG. 1 does not teach the use of ridges.” PO Resp. 33.<sup>14</sup> Petitioner, however, relies on Pupp—not Roinestad—for the “outwardly projecting ridge.” Pet. 20; *see In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”).

We turn now to Petitioner’s reliance on Roinestad as to the shape of the modified device. We determine that a modified device with Pupp’s strips 10” on Roinestad’s conical drive tower of Figure 1 would include ridges “whose distance from the vertical axis varies from the bottom to the top of the drive tower” as required in element 9D. Pet. 21 (“Combining

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<sup>14</sup> Although Patent Owner also argues that one of ordinary skill in the art would not have been motivated to combine Figure 1 of Roinestad with the relied-upon structure in Pupp (PO Resp. 32–35), we address that argument below (*see* § II.C.3.a.7).



Roinestad’s tapered drive tower geometry with Pupp’s drive members having an outwardly projecting ridge to provide positive drive results in outwardly projecting ridges whose distance from the vertical axis varies from the top to the bottom.”). This finding is supported by the testimony of Mr. O’Keefe, who states that “the use of the Pupp drive members and the conical drive tower of Roinestad would result in a distance from an outwardly projecting ridge to the vertical axis that varies in length along the height of the drive tower.” O’Keefe Pet. Decl. ¶ 80, *cited at* Pet. 21.

In the Sur-reply, Patent Owner argues that “varies” as used in element 9D means “is different” such that the distance from the ridge to the vertical axis “is different” at the top of the drive tower than at the bottom. PO Sur-reply 30. Patent Owner does not, however, contest that the proposed modified device satisfies element 9D under this relatively broad understanding of “varies.” *Id.* at 30–32. We need not determine whether to apply this or a narrower definition of “varies”—in which, for example, the distance from the ridge to the vertical axis must differ *at every point* along the ridge from the top of the drive tower to the bottom. We determine that, in the context of the modified device, the conical drive towers in Figure 1 of Roinestad would include ridges that satisfy the claim language at issue under either construction. For the reasons above, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that the combination of Pupp and Roinestad discloses the subject matter of element 9D.

*(5) Element 9E*

In element 9E, claim 9 recites “wherein each drive member includes a lower segment at the bottom of the drive tower and wherein the ridge in the

lower segment is tapered along a portion of its length.” Ex. 1001, 8:18–21. Referring to the discussion of element 9D, Petitioner first states that “Pupp discloses to [one of ordinary skill in the art] a drive tower having drive members with ridges in tapered or non-tapered sections anywhere along the height of the drive tower.” Pet. 23–24 (citing Ex. 1003, 4:14–15, 4:26–27, Figs. 5, 8; O’Keefe Pet. Decl. ¶¶ 79–80). Petitioner then states that Roinestad “teaches a spiral conveyor system with drive towers that combine tapered and non-tapered sections” and that, on the right side of Figure 11 (reproduced in full below), “Roinestad discloses drive members (driving rods 304) in a lower segment at the bottom of the drive tower that are tapered along a portion of their length.” Pet. 24.

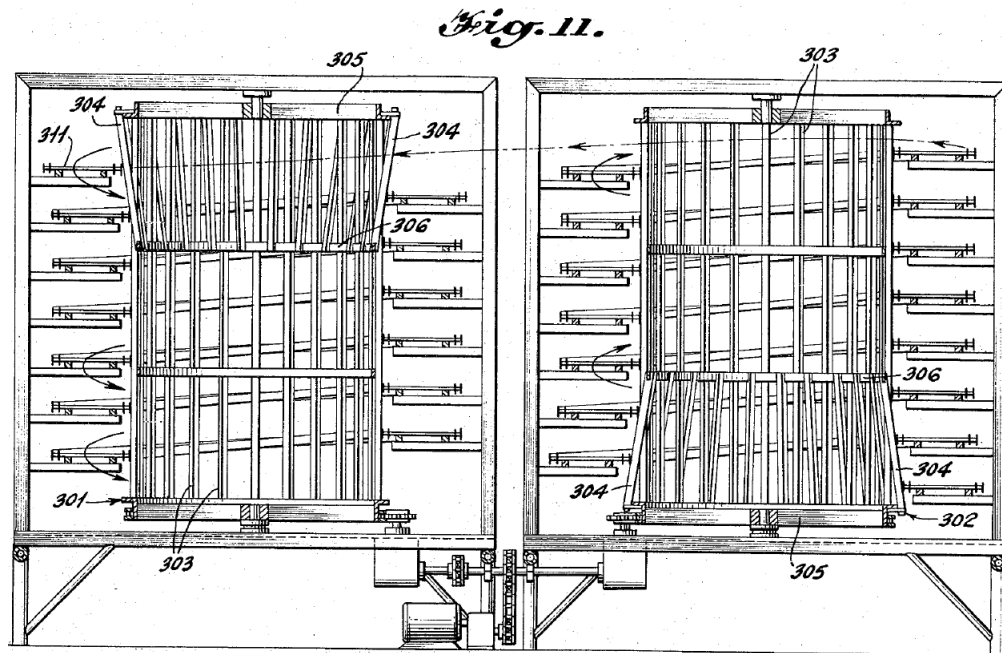


Figure 11 of Roinestad is a “vertical sectional view of [a] modification of the driving drums.” Ex. 1005, 5:4–5. As to the apparent reliance on Pupp *alone* for element 9E, for the same reasons discussed above in the context of element 9D (*see* § II.C.3.a.4), the full record does *not* support Petitioner’s position that, having considered the cited portion of

Daringer, one of ordinary skill in the art would have understood Pupp as disclosing “a drive tower having drive members with ridges in tapered” configurations. *See* Pet. 23 (emphasis added).

We turn now to Petitioner’s alternative reliance on the combination of Pupp and Roinestad for this element. In the Decision on Institution, we stated that, for element 9E, as with element 9D, we understood Petitioner to rely on the shape of the purely conical towers shown in Figure 1 of Roinestad:

Turning to the relied-upon aspects of Roinestad, however, we are persuaded, at this stage of the proceeding, by Petitioner’s assertion that a modified device in the shape of the “conical or tapered drive towers” in Figure 1 of Roinestad—such that the drive tower increased in diameter towards the bottom (as shown in relied-upon Figure 11, right side)—would satisfy element 9E. Pet. 20–21 (citing O’Keefe ¶¶ 79–80). Viewing Petitioner’s positions as to elements 9D and 9E together, we understand the drive tower of the modified system, in the context of the challenge to claim 9 in this ground, to essentially have the configuration of conical drum 12 in Figure 1 of Roinestad. *See* Pet. 19–24 (addressing elements 9D and 9E); Ex. 1005, 5:25–29 (“Each of the drums is tapered in the direction of belt travel axially of the drum. Since the belt moves upwardly along the drum 12, that drum is tapered upwardly. Since the belt moves downwardly along the drum 13, that drum is tapered downwardly.”).

Dec. Inst. 23.

In the Reply, Petitioner indicates that it relies, at least in the alternative, on the drive towers on the right sides of *both* Figures 1 and 11 of Roinestad as disclosing a “tapered surface for a drive drum” as in, for example, element 9E. Pet. Reply 14–15 (citing O’Keefe Reply Decl. ¶ 22). With this, we maintain the understanding from the Decision on Institution as to the shape of the drive tower of the modified system proposed by

Petitioner, in the context of the challenge to claim 9 in this ground, as essentially having the configuration of conical drum 12 on the right side of Figure 1 of Roinestad. This is consistent with the understanding discussed above as to element 9D.

We turn now to whether Petitioner’s proposed combination, as explained above, satisfies element 9E. As noted above, Petitioner relies on Pupp as to the *structure* of the “drive member[s]” with “ridge[s]” for element 9E. *See* Pet. 23–24 (citing Ex. 1003, 4:14–15, 4:26–27, Figs. 5, 8; O’Keefe Pet. Decl. ¶¶ 79–80). As to the requirement that the “ridge in the lower segment is tapered along a portion of its length,” Petitioner, as discussed above, relies on Roinestad as to the *shape* of the drive tower—specifically, one having the configuration of conical drum 12 on the right side of Figure 1 of Roinestad. Pet. 24 (discussing “Roinestad’s tapered lower segment”; Pet. Reply 14–15 (discussing the right sides of both Figures 1 and 11 in Roinestad). For example, Petitioner states that “[p]lacing prior art drive members with an outwardly projecting ridge as described in Pupp . . . on a drive tower having *a tapered surface* as taught by Roinestad, clearly meets” element 9E. Pet. Reply 14–15 (emphasis added) (citing O’Keefe Reply Decl. ¶ 22). On whether the proposed modified device satisfies the “tapered” requirement, in the Decision on Institution, we stated, at that stage, that we were

persuaded that, if strips 10” in Pupp were around a conical drive tower in the configuration of conical drum 12 in Figure 1 of Roinestad, each of the identified “outwardly projecting ridges” (*see* Pet. 20 (annotated version of Pupp, Fig. 8)) in the “lower segment” of strips 10” would be “tapered along” *at least* “a portion of its length.”

Dec. Inst. 23. We also stated that we did not need to expressly construe “tapered” for purposes of institution, and that we “determine[d] that Petitioner ha[d] adequately shown that the proposed modified system” as discussed above “would at least fall within the scope of element 9E, as currently understood.” *Id.* at 24 (citing Ex. 1001, 3:30–33, 6:53–62).

In the Response, Patent Owner argues that the requirement that the ridge is “tapered along a portion of its length” in element 9E is *not* satisfied merely by a “ridge” angled such that it is not parallel to the axis of rotation of the drive tower. *See* PO Resp. 35–36. Specifically, Patent Owner argues that driving rods 304 in the lower portion of the right side of Figure 11 of Roinestad do not satisfy the requirement at issue because those rods are “[a]t most . . . *set at an angle* to the driving bars 303,” which align with the vertical axis. *Id.* at 35 (emphasis added).

Petitioner responds by asserting that the requirement that the ridge is “tapered along a portion of its length” in element 9E *is* satisfied if a “ridge,” along at least a portion of its length, is angled such that its outer surface is not parallel to the axis of rotation of the drive tower—e.g., one of the “ridges” on the purely conical drive tower of the proposed modified device. Pet. Reply 14–15. For example, Petitioner states that “[p]lacing prior art drive members with an outwardly projecting ridge as described in Pupp . . . on a *drive tower having a tapered surface* as taught by Roinestad, clearly meets” element 9E. *Id.* (emphasis added) (citing O’Keefe Reply Decl. ¶ 22). Stated differently, Petitioner asserts that a ridge is “tapered along a portion of its length” if the distance from the outer surface of a “ridge” to the axis of rotation of the drive tower varies along *at least a*

*portion* of the ridge’s length in a lower segment of the drive member. *Id.* at 14–15.

Having considered the full record developed at trial, for the reasons below, we are persuaded by Petitioner’s broader understanding of “tapered along a portion of its length” in element 9E as *at least including* a change in the distance from the outer surface of a “ridge” to the axis of rotation of the drive tower along *at least a portion* of the ridge’s length.

First, we consider the language of the claims. *TQ Delta, LLC v. DISH Network LLC*, 929 F.3d 1350, 1357 (Fed. Cir. 2019). The language of element 9E recites, without elaboration, that “the ridge in the lower segment is tapered along a portion of its length.” Claim 10, however, supports Petitioner’s broader understanding of this phrase. *See Wright Med. Tech., Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1445 (Fed. Cir. 1997) (“[W]e must not interpret an independent claim in a way that is inconsistent with a claim which depends from it . . .”). Specifically, claim 10 depends from claim 9, adding that “the distance of the ridge from the vertical axis in the lower segment is constant below the portion that is tapered.” Ex. 1001, 8:25–27. By using the term “tapered”—which refers back to the only prior use of “tapered,” i.e., in element 9E—claim 10 distinguishes between a “tapered” portion of the ridge under Petitioner’s understanding and one in which “the distance of the ridge from the vertical axis in the lower segment *is constant*” (i.e., not tapered). *Id.* (emphasis added).

Petitioner’s understanding of “tapered” is also supported by the use of that term in claims 1 and 2 (not at issue in this proceeding). Although those claims do not refer to a “ridge” that is tapered, they both use “tapered” to describe a “skirt portion” in which the distance from the outer surface of the

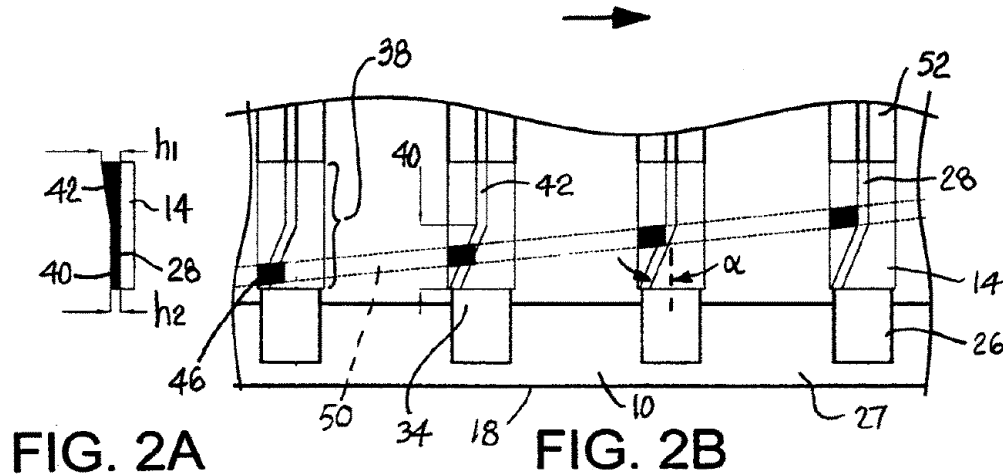
skirt to the axis of rotation of the drive tower varies. *See* Ex. 1001, 7:19–22 (claim 1: reciting “wherein the drive tower has an upper portion with a first diameter and a skirt portion *tapered* outwardly away from the vertical axis toward the bottom of the drive tower” (emphasis added)), 7:26–29 (claim 2: “A spiral conveyor as in claim 1 wherein the skirt portion includes a bottom portion with a second diameter greater than the first diameter and a *tapered* portion connecting the bottom portion to the upper portion.” (emphasis added)).

Turning to the Specification, the description of Figures 2A and 2B, for example, distinguish “tapered region 42” of a ridge from “constant-height region 40,” but the same discussion *directly equates*—using “[i]n other words”—that description of “tapered” with one involving varying distance from the outer surface of a “ridge” to the axis of rotation of the drive tower:

In a lower segment 38 of each drive member, the ridge 28 includes a *constant-height region 40 and a tapered region 42*. A constant-height region begins at the bottom of the rail and extends upward to the tapered region. The height of the ridge 28 increases from a height  $h_2$  in the constant-height region to a maximum height  $h_1$  at the upper end of the tapered region. *In other words*, the distance of the ridge 28 from the vertical axis 12 (FIG. 1) of the drive tower increases from a constant distance to a greater distance at the upper end of the tapered region.

Ex. 1001, 3:24–33 (emphasis added).

Figures 2A and 2B are reproduced below:



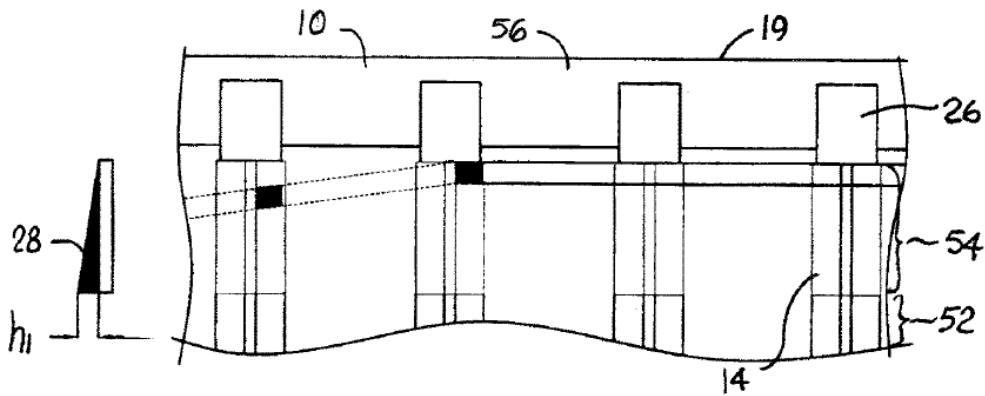
Figures 2A and 2B “are profile and head on views of a lower segment of the drive members [14] of the drive tower” shown in Figure 1. Ex. 1001, 2:13–14. Other passages similarly describe a “ridge” that is “tapered” as featuring *either* a change in “height” along its vertical length *or* a change in distance from the outer surface of the “ridge” to the axis of rotation of the drive tower, such as the description of Figures 4A and 4B reproduced below:

Just ahead of the belt’s exit from the top 19 of the tower 10, the height of the ridge *tapers* from the maximum height  $h_1$  to zero at the top, as shown in FIGS. 4A and 4B. The *tapering* occurs in an upper segment 54 of each drive member 14. The top of each rail is affixed to an upper rim 56. *The decreasing height of the ridge 28, or its distance from the drive tower’s vertical axis, in the upper segment allows the belt to disengage gradually and neatly from the drive members of the rotating tower.*

Ex. 1001, 4:2–10 (emphasis added).

Figures 4A and 4B are reproduced below:





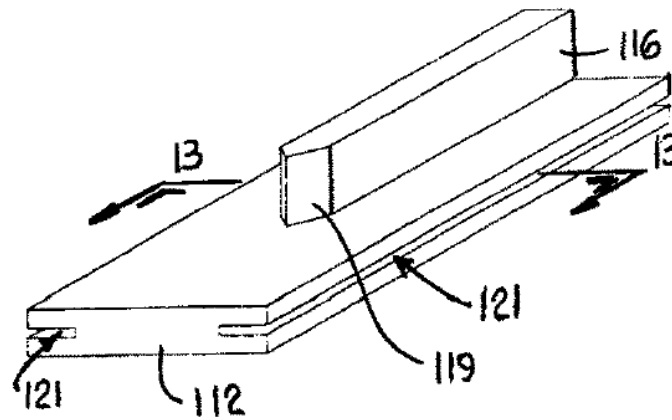
**FIG. 4A**

**FIG. 4B**

Figures 4A and 4B are “are profile and head-on views of an upper segment of the drive members of the drive tower” in Figure 1. Ex. 1001, 2:21–23.

The other uses of “tapered” in the Specification reflect usage of *one, but not both*, of these two possibilities. For example, the description of Figure 12 indicates that “the bottom end 119 of the ridge 116 is tapered.” Ex. 1001, 5:26–27.

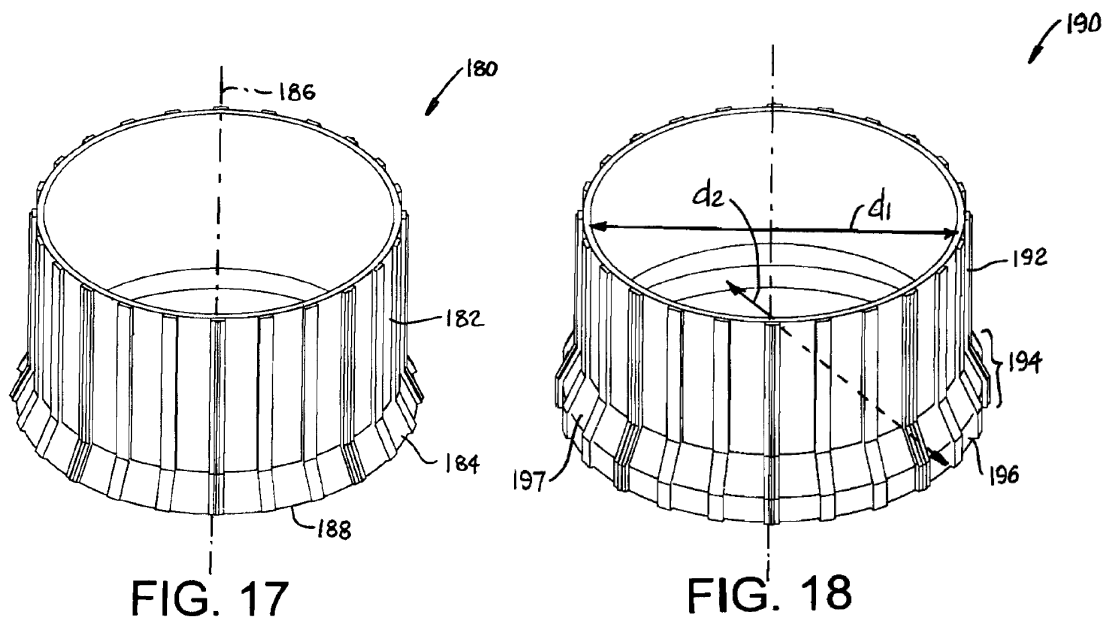
Figure 12 is reproduced below:



**FIG. 12**

Figure 12 shows “an oblique view of a portion of a drive member of a spiral conveyor.” Ex. 1001, 2:44–45. This usage of “tapered” aligns with the change in “height” along the length of the ridge, but does not align with the change in distance from the outer surface of the “ridge” to the axis of rotation of the drive tower.

In contrast, the descriptions of Figures 17 and 18 refer to “a skirt portion 184 th[at] *tapers* outwardly away from the tower’s vertical axis 186 toward the bottom 188 of the tower” in Figure 17 (below) and a “*tapered* portion 197” in Figure 18 (also below). Ex. 1001, 6:53–62 (emphasis added).



Figures 17 and 18 “are oblique views of two other versions of drive towers with outwardly extending bottom skirt portions usable with conveyor belts.” Ex. 1001, 2:58–60. These usages of “tapered” align with the change in distance from the outer surface of the “ridge” to the axis of rotation of the drive tower, but do not align with the change in “height” along the length of the ridge. Because the Specification uses “tapered” as including *either* of these two possibilities, the Specification supports Petitioner’s broader understanding of “tapered along a portion of its length.”

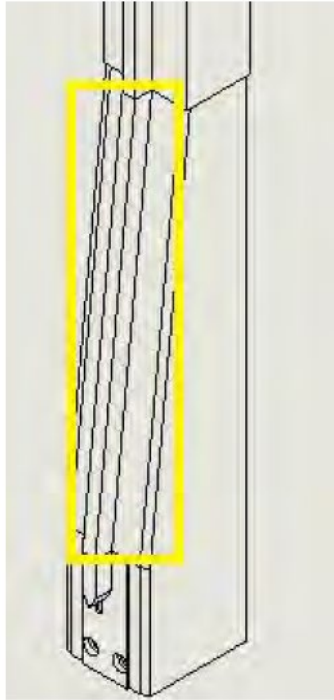
The prosecution history also generally supports this broader understanding. In the only Office Action addressing original claim 10 (now independent claim 9), the examiner essentially ignored the requirement that “the ridge in the lower segment is tapered along a portion of its length” but did identify prior art describing the requirement that the distance from the ridge to the “vertical axis varies from the bottom to the top of the drive tower.” *See* Ex. 1002 at 125–26.

Roinestad and Heber were cited in the '388 patent and during its prosecution history, thereby making them part of the intrinsic evidence for claim construction purposes. *See* Ex. 1002 at 132 (entries 2 and 7 for Roinestad and Roinestad2, respectively), 133 (entry 19 for Heber); Ex. 1001, code (56); *Powell v. Home Depot U.S.A., Inc.*, 663 F.3d 1221, 1231 (Fed. Cir. 2011) (quoting *Kumar v. Ovonic Battery Co.*, 351 F.3d 1364, 1368 (Fed. Cir. 2003)) (stating that “prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence” for claim construction purposes).

Roinestad uses the term “tapered” numerous times, for example, referring to “frusto-conical driving drums 12 and 13” in Figure 1 as “tapered upwardly” and “tapered downwardly,” respectively. Ex. 1005, 5:25–29. Given that the structure of the drums appears to be of uniform thickness throughout, this usage appears to align with the change in distance from the outer surface of the drum to the axis of rotation of the drive tower. Heber uses the term “tapered” in a similar manner, describing sidewall 25 in “conical guide ring 20” shown in Figure 4 as “tapered inward as it ascends so that the diameter of the upper edge 21 is smaller than the diameter of the lower edge 22.” Ex. 1004, 2:26–29. Roinestad2 does not use the term.

The record does not appear to include any extrinsic evidence as to the meaning of “tapered.” We note, however, that in explaining why Patent

Owner's own product allegedly practices element 9E, Patent Owner's declarant provided the annotated figure reproduced below:



Straight Decl. at 111 (Appendix C); *see also* Straight Decl. ¶ 179 (“Attached at Appendix C is a chart showing how each of the Patent claim limitations read on the DirectDrive™ spiral conveyor system. Each limitation of the claims is included in the DirectDrive™ system because the DirectDrive™ system was the basis for the specification and drawings of the ’388 Patent.”); PO Resp. 69 (“Each of the elements of the Patent claims is present in the DirectDrive™ system because it was the basis for the specification and drawings of the Patent. The nexus between the invention claimed in the Patent and the DirectDrive™ is explained in detail by Mr. Straight in his declaration.” (citing Straight Decl. ¶ 179)). The figure illustrates a ridge in a drive member (within a yellow box) that includes a change in distance from the outer surface of the “ridge” to the axis of rotation of the drive tower, but *does not* include a change in “height” along the length of the ridge.

For these reasons, we are persuaded by Petitioner’s broader construction of “tapered along a portion of its length” in element 9E as *at least including* a change in the distance from the outer surface of a “ridge” to the axis of rotation of the drive tower along *at least a portion* of the ridge’s length.

Applying this construction, Petitioner has adequately shown that the “ridge” in the “lower segment” of the drive members on the *purely conical* drive tower of the proposed modified device is “tapered along a portion of its length”—i.e., that, in the lower segment, the distance from the outer surface of the “ridge” to the axis of rotation of the drive tower changes along at least a portion of the ridge’s length. *See* Pet. 23–24; Pet. Reply 14–15. For the reasons above, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that the combination of Pupp and Roinestad discloses the subject matter of element 9E.

*(6) Element 9F*

In element 9F, claim 9 recites “a conveyor belt positively driven without slip on a helical path around the drive tower by the ridges of the drive members engaging an inside edge of the conveyor belt.” Ex. 1001, 8:22–24. Petitioner argues that Pupp discloses this element under both of two possible constructions of the phrase “without slip.” *See* Pet. 24–30. As explained in the claim construction discussion above, we construe “without slip” as describing a system in which there is essentially no slip between the conveyor belt and the drive tower, which is generally consistent with Petitioner’s first alternative construction of the phrase. We also explain above why we disagree with Petitioner’s second proposed construction of “without slip.” Accordingly, we analyze whether the teachings of Pupp and

Roinestad describe or suggest element 9F with this interpretation of “without slip.”

Petitioner argues that Pupp discloses element 9F because “Pupp discloses a positively driven conveyor belt 2, without slip, on a helical path around the drive tower 1” and discloses that “belt 2 is driven by ridges on drive members 10” that engage the inside edge of the belt 2.” Pet. 29 (internal citation omitted) (citing Ex. 1003, 1:30–33, 3:3–8, 4:14–36, Figs. 5, 8; O’Keefe Pet. Decl. ¶ 58).

Patent Owner presents several arguments on why Pupp allegedly does not satisfy element 9F under the adopted claim construction. *See* PO Resp. 11–23; PO Sur-reply 16–18. We address each in turn below. First, Patent Owner argues that “[n]othing of Pupp cited in the Petition and [Mr.] O’Keefe’s declaration (*i. e.*, [Ex. 1003,] 1:30–33, 3:3–8, 4:14–36, and FIG. 8) supports Petitioner’s argument that Pupp teaches positive drive.” PO Resp. 17 (citing Straight Decl. ¶¶ 115–119, 123). According to Patent Owner, column 1, lines 30–33 of Pupp “is a discussion of the ‘Prior Art,’” which “does not explain *how* Pupp, as opposed to the prior art would be positive drive or how to conduct such ‘positive engagement.’” *Id.* (citing Straight Decl. ¶ 116). Patent Owner then argues that column 3, lines 3–8 of Pupp indicates a disclosure of the “complete opposite of positive drive.” *Id.* at 17–18 (citing Straight Decl. ¶¶ 117, 125).

For the reasons below, the record more strongly supports that Pupp satisfies element 9F. Viewed in context of the rest of the discussion of the “Prior Art,” the relied-upon passage in column 1 of Pupp introduces two different kinds of friction in conveyor systems: (1) “circumferential friction”—*i. e.*, “in the circumferential direction around the drum” and (2)

friction “axially along the drum.” *See* Ex. 1003, 1:24–33. Overall, these passages, and the subsequent passage, cited by Petitioner (Pet. Reply 4), indicate that “[p]rior art solutions” have *already* addressed “circumferential friction”—i.e., by “a positive engagement between the drum and the inside of the conveyor belt”—but that the advancement of Pupp is to address friction “axially along the drum.” *See* Ex. 1003, 1:24–40; *see also* Pet. Reply 4–5 (“Pupp further describes employing the known prior art solution of driving engagement contacting between the belt and the drum to drive the belt without friction in the circumferential direction, with Pupp’s improvement to also reduce friction in the axial direction.” (citing Ex. 1003, 3:3–15; O’Keefe Reply Decl. ¶ 13)).

This understanding of the relied-upon passages in Pupp is supported by the first paragraph in column 3 (which includes as its first sentence the aspect cited by Petitioner), which indicates that the prior art system in Figure 1 addresses “circumferential friction” but *does not* address friction “axially along the drum”:

It will be appreciated that if the conveyor belt 2 in FIG. 1 makes contact with the outside of the drum 1, it will, while moving along the helical path, accompany, *without friction*, the drum 1 in the circumferential direction around the drum, merely if *the contact between the drum 1 and the conveyor belt 2 involves a driving engagement*. The simultaneous movement of the conveyor belt 2 axially up or down the outside of the drum 1, however, has up to now always taken place under friction owing to a mutual sliding movement between the conveyor belt 2 and the drum 1 in this direction. This friction may cause undesired stress in the conveyor belt 2 and is therefore eliminated almost completely according to the present invention, as will be described below.



Ex. 1003, 3:3–15, *cited at* Pet. Reply 4–5. Specifically, we find the first sentence of this passage—including the terms “without friction” and that “the contact between the drum 1 and the conveyor belt 2 involves a driving engagement”—to indicate that even the prior art addressed “circumferential friction” using “positive drive” in that a “positive drive” system does not rely on friction between the drum and belt to drive the belt. *See* Pet. Reply 4–5 (citing O’Keefe Reply Decl. ¶ 13).

And we find the next two sentences to indicate that the prior art *did not* address friction “axially along the drum,” but that the rest of the disclosure will describe how the invention of Pupp does address *that* type of friction. In other words, based on these passages in Pupp’s columns 1 and 3—which consistently describe the prior art as having already addressed “circumferential friction” via “positive engagement,” and with no disclosure of prior art using friction drive—we agree with Petitioner that one of ordinary skill in the art would view Pupp’s Figure 8 as implicitly describing “positive engagement” or, as phrased in element 9F, “positive[] drive[.]” Pet. 29–30 (discussing O’Keefe Pet. Decl. ¶¶ 58, 79–81, 83; Pet. Reply 4–5 (citing O’Keefe Reply Decl. ¶ 13)); *see also* *Burckel*, 592 F.2d at 1179; *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976) (“[T]he question under 35 U.S.C. [§] 103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made.”).<sup>15</sup>

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<sup>15</sup> Contrary to Patent Owner’s argument, in the context of an implicit disclosure position such as Petitioner’s here, the issue is how one of ordinary skill in the art would have understood the prior art, rather than merely what the prior art expressly discloses. *See* PO Resp. 23 (“The Petition at p. 29

The record does not support Patent Owner’s six arguments that Pupp does not adequately disclose “how” the “positive engagement” occurs. *See* PO Resp. 17, 18. As an initial matter, contrary to Patent Owner’s position, prior art patents such as Pupp are presumed enabled for prior art purposes, and those asserting lack of enablement must present “evidence of nonenablement that a trial court finds persuasive.” *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003). Here, Patent Owner cites to paragraph 116 of Mr. Straight’s Declaration, but that paragraph merely states that the passages in Pupp do not disclose “how the drive structures would engage in a positive drive system,” without explaining *why* Pupp’s disclosures fail to enable an ordinarily skilled artisan to make a positive drive. Straight Decl. ¶ 116, *cited at* PO Resp. 17.

We are also not persuaded by Patent Owner’s first argument that the phrase “without friction” in column 3, line 5, of Pupp indicates that “Pupp is the complete opposite of positive drive” in that “[i]f there is no friction, there is slip.” PO Resp. 18 (citing Straight Decl. ¶¶ 117, 125). For the same reasons discussed above, we view the highlighted aspects of columns 1 and 3 as indicating to one of ordinary skill in the art that both the prior art referenced by Pupp and the invention of Pupp include “positive engagement”—i.e., “positive drive” as recited in element 9F. In contrast, Patent Owner and Mr. Straight view “positive engagement” as referring to a friction drive system that has no friction and thus does not drive the tower at all. *See, e.g.*, Straight Decl. ¶ 117 (“Pupp calls for no friction. It cannot be

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ceases to cite the Pupp patent and instead relies on what its expert claims he sees. The question is not what an expert says, but what the prior art itself teaches.” (internal citation omitted)).

positive drive. In my opinion, Pupp does not disclose a positive drive.”); Ex. 1025 (Straight Deposition), 188:22–189:3, *discussed at* Pet. Reply 5. Patent Owner’s view of Pupp is not supported by the record.

Second, Patent Owner argues that “positive drive” requires structure on the outside of the drive tower to engage *other* structure (e.g., gaps) on the inner edge of the conveyor belt and asserts that Pupp does not disclose either of these structures. *See* PO Resp. 12–15, 19–23. The record does not support Patent Owner’s argument. We first address the structure on the outside of the drive tower. Patent Owner argues that “FIG. 5 of Pupp is a smooth drum that cannot positively drive the belt.” *Id.* at 13. Petitioner does not rely on the structure of Figure 5 of Pupp, however, but rather the unnumbered ridge shown in Figure 8 of Pupp as the “ridges of the drive members” recited in element 9F as providing “positive[] drive[.]” *See, e.g.*, Pet. 29–30 (citing O’Keefe Pet. Decl. ¶ 83; Ex. 1003, Fig. 8).

Patent Owner also argues that ridges such as those in Figure 8 of Pupp “are often used in friction drive systems, not just positive drive systems.” PO Resp. 14 (citing Straight Decl. ¶¶ 130–132), 19–23 (discussing various prior art that allegedly shows similar “ridges” in friction drives). We agree with Patent Owner that structures similar to those in Figure 8 of Pupp *may* be used in friction drives (*see id.* at 14, 19–23), but that does not demonstrate that Figure 8 *is itself* a friction drive. Indeed, for the same reasons discussed above, we are persuaded that one of ordinary skill in the art would have understood the embodiment shown in Figure 8 of Pupp as being a positive drive system.

We turn now to the structure (e.g., gaps) on the inner edge of the conveyor belt. Patent Owner argues that “Pupp does not disclose any

driving elements or gaps on the inside edge of the conveyor belt” and, instead, “only shows conveyor belts having a smooth inside surface which would rely on friction.” PO Resp. 14 (citing Straight Decl. ¶ 121; Ex. 1003, Figs. 2–4). Patent Owner contends that “[n]either Petitioner nor Mr. O’Keefe point to any evidence that the interior driven surfaces of the belt in Pupp have spaces or protrusions critical to positive engagement.” *Id.* at 15.

Patent Owner is correct that Pupp does not expressly disclose the structure (or gaps) on the inner edge of the conveyor belt. We determine, however, that the portions of columns 1, 3, and 4 of Pupp discussed above demonstrate that one of ordinary skill in the art would have understood that the embodiment in Figure 8 of Pupp includes positive drive. *See* O’Keefe Pet. Decl. ¶ 83 (“The belt 2 is driven by ridges on the drive members 10” wherein the ridges engage the inside edge of the belt 2.” (citing Ex. 1003, 1:30–33, 3:3–8, 4:14–36, Figs. 5, 8)), *cited at* Pet. 30. Thus, to the extent structure (e.g., gaps) on the inner edge of the conveyor belt are necessary for positive drive (as argued by Patent Owner), such structures are implicitly disclosed in Pupp. Mr. Straight states that the silence on this issue indicates that one of ordinary skill in the art would think that “the inside of the belt is smooth.” Straight Decl. ¶ 121. Mr. Straight, however, does not address the aspects of columns 1, 3, and 4 of Pupp addressed above.

Third, Patent Owner notes that Mr. O’Keefe could not identify a passage in Pupp that *expressly* refers to a “positive drive” or “without slip.” PO Resp. 11 (discussing Ex. 2014 (O’Keefe deposition), 13:8, 13:21–24). Although Patent Owner is correct that Pupp does not expressly state that its belt is “positively driven without slip,” as discussed above, we agree with

Petitioner's position that Pupp implicitly describes that aspect of element 9F to one of ordinary skill in the art.

Fourth, addressing the passage at column 4, lines 14–36 in Pupp, relied on by Petitioner (Pet. 29), Patent Owner argues that “[r]epeatedly engaging and disengaging the belt in angular area 14” in Pupp would indicate to one of ordinary skill in the art “that this is not a positive drive.” PO Resp. 12 (citing Straight Decl. ¶¶ 81, 119–120). Specifically, Patent Owner argues that column 4, lines 14–36 of Pupp, relied on by Petitioner (*see* Pet. 29), shows that Figure 8 is “not positive drive” because strip 10” “moves away from supporting the belt once every loop around the drum.” PO Resp. 19 (citing Ex. 2026 at 1038 (definition of “slip”)); *see id.* at 15–17 (similar argument).

The record does not support Patent Owner's argument. The most relevant passage appears at column 4, lines 30–36, which states:

As indicated by arrows in FIG. 8, the strip 10", when passing the angular area, will perform with its lower end a movement inwards, downwards and again outwards, whereby the lug 15' disengages the underside of the conveyor belt at the upper end of the lowermost turn and engages the underside of the lower end of the lowermost turn of the conveyor belt around the drum.

Ex. 1003, 4:30–36. As reproduced in a table in the Patent Owner Response, Mr. Straight allegedly summarizes this passage as “Pupp teaches the drum *disengages the underside of the conveyor belt* every time it passes through angular area 14 and then reengages the underside of the conveyor belt.” PO

Resp. 19 (citing Straight Decl. ¶ 118).<sup>16</sup> The plain language of the cited passage from Pupp conflicts with this summary, with the passage disclosing that *only those* strips 10" passing through “a small angular area 14” (Ex. 1003, 3:29–32) (shown in Figure 5, reproduced below) will be disengaging/engaging at any particular time:

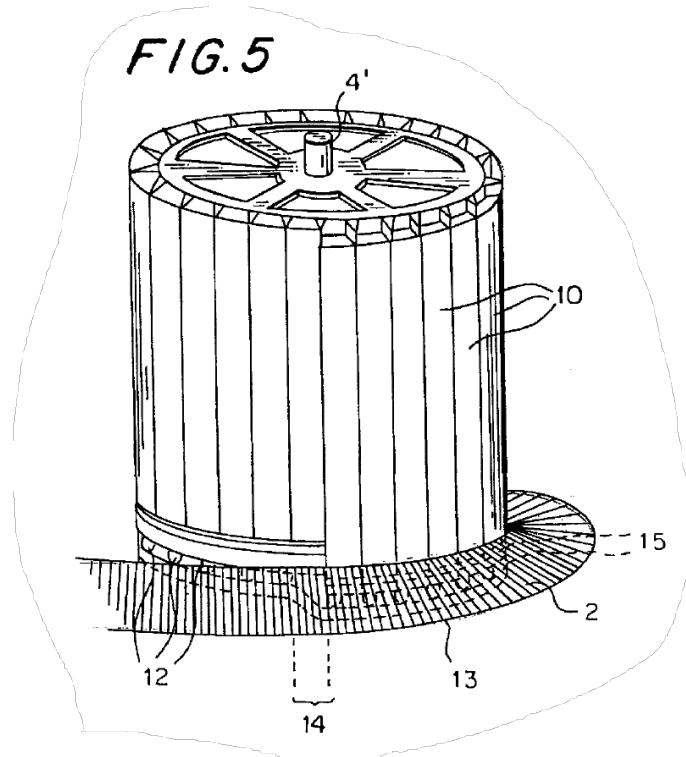


Figure 5 is “a schematic perspective view of a drum in a belt conveyor.” Ex. 1003, 2:15–16. In other words, even if *some* strips 10" in Pupp’s Figure 5 are shown as being disengaged from belt 14, we determine that Pupp describes a positive drive as required in element 9F because the

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<sup>16</sup> We note that in his actual Declaration, Mr. Straight summarizes this passage quite differently: “Pupp teaches the strip moves inwards at its lower end and stops driving the belt.” Straight Decl. ¶ 118.

Figure and Pupp’s accompanying text indicate that belt 14 is positively engaged and driven by many of the strips 10 shown.<sup>17</sup>

Fifth, in the Sur-reply, Patent Owner argues that, in the Reply, Petitioner presents “new theories [that] are built on Pupp’s reference to ‘prior art solutions’ of ‘positive engagement’ in the Background.” PO Sur-reply 17 (citing Pet. Reply 4). According to Patent Owner, these statements in Pupp are hearsay because “Pupp does not specifically identify the ‘prior art solutions,’ and therefore no one can review the disclosure.” *Id.*

The record does not support Patent Owner’s argument. As an initial matter, although Petitioner quotes the passage in Pupp referring to “[p]rior art solutions” using “positive engagement” in the Reply, this is hardly a new theory. *See* Pet. Reply 4 (quoting Ex. 1003, 1:31–34). Petitioner quoted exactly the same sentence in the Petition when addressing element 9F. *See* Pet. 29 (quoting Ex. 1003, 1:30–33). As to the merits, we address the hearsay issue more fully in the discussion of Patent Owner’s Motion to Exclude below. *See* § II.H.1.

Sixth, we turn to the term “without slip” in element 9F. Patent Owner presents arguments that Pupp does not disclose “a conveyor belt positively driven” as in element 9F *because* there allegedly would be slip between the “drive tower” and the “ridges of the drive members” (PO Resp. 17, 19), but Patent Owner does not separately argue that the “without slip” requirement in element 9F is not met if Pupp is assumed to disclose “a conveyor belt positively driven.” *See, e.g., id.* at 11 (“Grounds I to IV, therefore, all

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<sup>17</sup> Although we discuss Figure 5 here, Pupp makes clear that Figures 8 and 5 are related in that Figure 8 “illustrates a further embodiment of the strip 10” in Figures 5 and 6. *See* Ex. 1003, 4:14–15.

require Pupp to teach positive drive for any of these Grounds to invalidate the Patent . . . . There is no evidence that Pupp is positive drive.”). This aligns with the understanding presented in the ’388 patent that a system with positive drive will, by definition, have no slip. *See* Ex. 1001, 1:41–45 (“Because there is positive engagement between regularly spaced drive structure on the cage and regularly spaced edge structure on the inside edge of the belt, there is no slip as in overdrive systems.”). Accordingly, because we find that Pupp discloses “a conveyor belt positively driven” as recited in element 9F, we also find that Pupp satisfies the “without slip” requirement. *See* O’Keefe Pet. Decl. ¶ 83 (discussing disclosures in Pupp that allegedly “describe [element 9F] irrespective of the construction provided to ‘without slip’ discussed above”), *cited at* Pet. 30. For the reasons above, we find, based on the complete record, that Petitioner has shown by a preponderance of the evidence that Pupp discloses element 9F.

*(7) The Combination of Pupp and Roinestad*

Petitioner provides two reasons why one of ordinary skill in the art would have allegedly been motivated to combine Pupp and Roinestad as proposed. *See* Pet. 22–24. Petitioner also argues that there would have been a reasonable expectation of success. *See* Pet. 23. We first address the two alternative reasons provided to combine Pupp and Roinestad.

As the first asserted motivation, Petitioner states that “Pupp provides motivation to combine the tapered and non-tapered sections of Roinestad’s drive members” because, to one of ordinary skill in the art, “Pupp’s substantially cylindrical drive tower also encompasses a slightly conical or tapered configuration.” Pet. 22 (citing Ex. 1008, 9:10–14). According to Petitioner, “[b]ased on Pupp alone,” one of ordinary skill in the art “would



have immediately known and understood that modification of the drive tower configuration (slightly conical/tapered or cylindrical) along the height of the drive tower is merely a matter of design choice” that one of ordinary skill in the art “could readily evaluate and optimize using standard design methods (e.g., computerized computational models) that were well-known.” *Id.* (citing O’Keefe Pet. Decl. ¶ 81).

In the Decision on Institution, we stated that Petitioner had not adequately shown that this first asserted motivation is supported by rational underpinning. *See* Dec. Inst. 29 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), *cited with approval in KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)). In the Reply, Petitioner did not address this issue. For the same reasons discussed above in the context of element 9D (*see* § II.C.3.a.4), we determine that Petitioner has not demonstrated either that (1) Pupp discloses a “*substantially* cylindrical drive tower” in which the tower may be slightly conical or that (2) Pupp, when viewed in light of the identified passage in Daringer, would have been understood as disclosing a conical drive tower. Pet. 22 (emphasis added).

As the second asserted motivation, Petitioner states: “Pupp and Roinessad provide a motivation to combine the tapered and non-tapered sections of Roinessad’s drive members to provide ‘a system in which the belt may be smoothly and economically driven under low tension’ with Pupp’s positive drive, without slip[,] to eliminate the friction induced stress of Roinessad’s drive.” Pet. 22–23 (quoting Ex. 1005, 1:63–65) (citing Ex. 1005, 1:49–50; Ex. 1003, 1:24–41; O’Keefe Pet. Decl. ¶¶ 64–67, 81, 82). With this, Petitioner relies on Roinessad and Pupp, both in view of the O’Keefe Petition Declaration. We discuss each below.

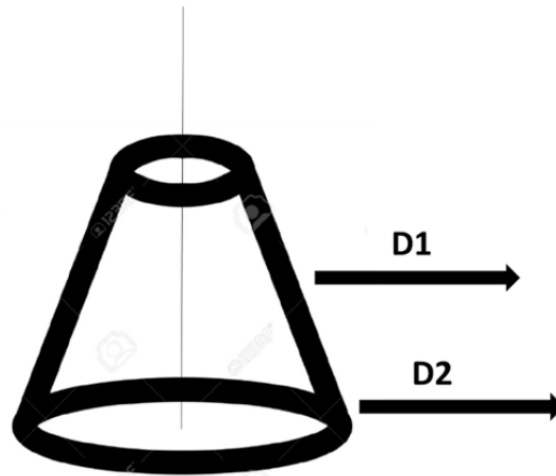
One of the relied-upon portions of Roinestad discloses: “A major problem in conveyor systems of the character described has involved the tension in the belts.” Ex. 1005, 1:49–50. The quoted portion of Roinestad provides that one “object of the invention is to provide such a system in which the belt may be smoothly and economically driven under low tension.” *Id.* at 1:63–65. In one of the cited declaration paragraphs, Mr. O’Keefe takes the position that the use of “tapered surfaces” in Roinestad *causes* the desired low belt tension. *See* O’Keefe Pet. Decl. ¶ 66 (“Roinestad recognizes that a ‘major problem in [helical path] conveyor systems . . . has involved the tension in the belts’ and *discloses conveyor belt systems having tapered surfaces as a solution that meets the object of Roinestad’s invention* of providing ‘such a system in which the belt may be smoothly and economically driven under low tension.’” (emphasis added) (citing Ex. 1005, 1:49–50, 1:63–65)). In support, however, Mr. O’Keefe merely cites to the same disclosures in Roinestad as identified by Petitioner. *Id.* Roinestad discloses drive towers not only in conical shapes (e.g., Ex. 1005, Fig. 1), but also in cylindrical shapes (e.g., Fig. 5) and a mixture of conical and cylindrical shapes (e.g., Fig. 11) as embodiments of its “invention[s]” (*see id.* at 4:52–5:9). In the Decision on Institution, we stated, that it was unclear what evidence, if any, supported the asserted *causal* linkage between conical drive towers and low belt tension.<sup>18</sup> *See* Dec. Inst. 30.

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<sup>18</sup> In another of the cited declaration paragraphs, Mr. O’Keefe indicates that the *combination* of “tapered and non-tapered sections of the outer edge of the drive members” shown in Figure 11—rather than just the tapered drive towers shown in Figure 1—“provides a system in which the belt can be

Patent Owner did not address whether conical drive towers were linked with low belt tension in the Response. In the Reply, Petitioner argues that “[a] drive drum (or a ridge of a drive member) which tapers upward and inward will decrease tension in a conveyor belt driven around the drum.” Pet. Reply 15.

Petitioner provides the following graphic:



Pet. Reply 16. The graphic shows a frustoconical shape with “D1” at a point roughly midway along and perpendicular to the axis of rotation and “D2” lower down the shape. *Id.* Discussing the graphic, Petitioner states: “If a rubber band fits snugly around the rotating conical shape at D2 (where the surface ‘angle[s] outwardly away from the vertical axis toward the bottom in a lower portion,’ the rubber band has a certain tangential speed that is greater than at D1.” *Id.* (citing O’Keefe Reply Decl. ¶ 20).<sup>19</sup> According to Petitioner, “[w]hen the rubber band moves up the taper from D2 to D1, the

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smoothly and economically driven under low tension.” O’Keefe Pet. Decl. ¶ 82 (citing Ex. 1005, 1:62–65).

<sup>19</sup> Although Petitioner cites paragraph 20, the relevant discussion appears in paragraph 24 of Mr. O’Keefe’s Reply Declaration.

diameter and tangential velocity lessens causing the tension in the rubber band to decrease. This same principle is employed in the spiral conveyors having tapered surfaces as disclosed in Roinestad.” *Id.* (citing Ex. 1005, 12:53–66; Ex. 1004, 1:63–65; O’Keefe Reply Decl. ¶ 24).

In the Sur-reply, Patent Owner contends that “there is no evidence or analyses that this claimed ‘well-known scientific principle’ is applicable to positive drive.” PO Sur-reply 8. We are persuaded by Patent Owner’s position and find that the evidence provided only demonstrates that using a conical drum reduces belt tension *in a friction drive system*. Specifically, Roinestad, cited by Petitioner (and Mr. O’Keefe), indisputably discloses only *friction drives*, not positive drives. *See* O’Keefe Pet. Decl. ¶ 66 (stating that “the tapered drives disclosed in Roinestad are frictionally driven”). As to Heber, even assuming that Heber properly incorporates Pupp (and its positive drive) by reference, Petitioner has not adequately explained, with supporting evidence, that the relied-upon statement in Heber—that “[t]he slope of the sidewall of the cylindrical guide ring is sufficient so that tension of the section of belt entering the spiral configuration is dissipated”—would have been understood by one of ordinary skill in the art to refer to positive drive. *See* O’Keefe Reply Decl. ¶ 24. And because the evidence only demonstrates that using a conical drum reduces belt tension *in a friction drive system*, Petitioner has not demonstrated the relevance of this principle in the context of the proposed combination, which involves “combin[ing] the tapered and non-tapered sections of Roinestad’s drive members . . . with Pupp’s positive drive, without slip to eliminate the friction induced stress of Roinestad’s drive.” Pet. 22–23. Thus, the relied-upon aspects of Roinestad do not support Petitioner’s second asserted motivation.

Turning to Petitioner's reliance on Pupp as to the second asserted motivation, the cited portion discloses how prior systems had:

a considerable friction between the conveyor belt and the drum in respect of the moving of the conveyor belt both in the circumferential direction around the drum and axially along the drum, said friction contributing to an increase of the stress affecting the conveyor belt along the helical path.

Prior art solutions have coped with the circumferential friction only, usually by a positive engagement between the drum and the inside of the conveyor belt along the helical path.

#### OBJECTS AND SUMMARY OF THE INVENTION

One object of the present invention is to provide a belt conveyor of the type mentioned by way of introduction, which yields a reduction of the stress affecting the conveyor belt along the helical path.

Ex. 1003, 1:24–41. Discussing this passage, Mr. O'Keefe states (in a paragraph cited by Petitioner) that "Pupp expressly recognizes that the friction resulting from frictionally driven helical belt systems contributes to 'an increase of the stress affecting the conveyor belt along the helical path' and that prior art solutions coped with such stress increasing friction 'usually by a positive engagement between the drum and the inside of the conveyor belt along the helical path.'" O'Keefe Pet. Decl. ¶ 66 (quoting Ex. 1003, 1:24–34), *cited at* Pet. 22–23. In the same paragraph, Mr. O'Keefe states that one of ordinary skill in the art

would have known and immediately understood to combine the taper of Roinestad's drive tower ("in which the belt may be smoothly and economically driven under low tension") with Pupp's positive drive, substantially cylindrical drive tower belt system to lower belt tension and reduce the amount of stress exerted on the belt as a matter of design choice.

O'Keefe Pet. Decl. ¶ 66.

Patent Owner presents three arguments against this asserted motivation to combine. First, Patent Owner argues that

Petitioner has not explained why its purported motivation—to provide a system in which the belt may be smoothly and economically driven under low tension (Pet., 22)—would have motivated [one of ordinary skill in the art] to specifically combine certain parts of Pupp and Roinestad, or how this smooth and economical drive would be achieved.

PO Resp. 32. According to Patent Owner, “one needs guidance on what parts to pick and why.” *Id.* (citing Straight Decl. ¶¶ 21, 139–141). Patent Owner also argues that “[n]owhere does the Petition articulate how [one of ordinary skill in the art] would combine the art to achieve the claimed invention.” *Id.* at 26 (citing Pet. 18–74); *see also id.* at 25 (“Petitioner fails to explain why Pupp’s strips 10” would be combined with the other references and what such combinations would look like.”), 28 (arguing that “there is no explanation as to any motivation **why and how** Pupp would be modified to arrive at the claimed invention”); PO Sur-reply 5 (“Petitioner used the cited references as boxes of parts, but it failed to describe **why** [one of ordinary skill in the art] would pick specific parts or **how** to make the proposed modifications.”).

The record supports the view that rational underpinnings support the conclusion that an ordinarily skilled artisan would have been motivated to make a system in which the belt may be smoothly and economically driven under low tension. As argued by Petitioner, and supported by the testimony of Mr. O’Keefe (as summarized above), Pupp *expressly* indicates that its positive engagement drive mechanism, which would be included in the proposed combination, provides a benefit of reduced “circumferential friction” as compared to frictional drive systems, such as in Roinestad. *See*

O’Keefe Pet. Decl. ¶ 66 (quoting Ex. 1003, 1:24–34), *cited at* Pet. 22–23; *see also* Ex. 1005, 1:11–18 (the abstract of Roinestad discussing how its system “frictionally drives the belt at a plurality of locations along the inner edge of the loops”); Pet. 22–23 (discussing “combin[ing] the tapered and non-tapered sections of Roinestad’s drive members . . . with Pupp’s positive drive, without slip to eliminate the friction induced stress of Roinestad’s drive”).

As to the alleged lacking “guidance on what parts to pick and why” (PO Resp. 32), we view Petitioner as having adequately explained the proposed combination, as summarized above. Further, given the relatively straightforward technology at issue here, we are persuaded that Petitioner’s explanation is adequate. *See Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (“A brief explanation [as to the proposed combination] may do all that is needed if, for example, the technology is simple and familiar and the prior art is clear in its language and easily understood.”); *see also KSR*, 550 U.S. at 421 (“A person of ordinary skill is also a person of ordinary creativity, not an automaton.”).

For the statement that “one needs guidance on what parts to pick and why,” Patent Owner merely cites without explanation four paragraphs in Mr. Straight’s Declaration explaining at some length why no motivation to combine Pupp and Roinestad allegedly exists. *See* PO Resp. 32 (citing Straight Decl. ¶¶ 21, 139–141). Arguments and information that are not presented and developed in a brief, but instead are incorporated by reference, are not entitled to consideration, as it is improper to incorporate by reference arguments from one document into another document. 37 C.F.R. § 42.6(a)(3); *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper

12 at 7–10 (PTAB Aug. 29, 2014) (informative) (discussing incorporation by reference). Therefore, we give little weight to Mr. Straight’s testimony on this point.

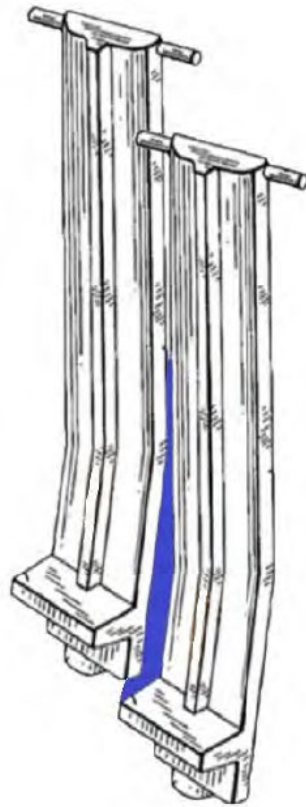
Second, Patent Owner argues that “[l]acking explanation, Petitioner must have used the claims of the Patent as ‘roadmap to piece together various elements’—this is improper hindsight.” PO Resp. 28 (quoting *Merck Sharp & Dohme B.V. v. Warner Chilcott Co., LLC*, 711 F. App’x 633, 637 (Fed. Cir. 2017)). Patent Owner then quotes a passage of Mr. O’Keefe’s deposition in which, according to Patent Owner, “Mr. O’Keefe readily admits he started the analysis by looking at the claims at issue, looked for the claim limitations, and formed an opinion before reviewing the prior art.” *Id.* at 28–30 (discussing Ex. 2014, 28:12–29:12).

We are not persuaded that Petitioner, or Mr. O’Keefe, engaged in improper hindsight. As an initial matter, this argument essentially rephrases the assertion that Petitioner failed to provide an adequate reason to combine Pupp and Roinestad. PO Resp. 28 (“*Lacking explanation*, Petitioner must have used the claims of the Patent as ‘roadmap to piece together various elements’—this is improper hindsight.” (emphasis added)). For the reasons discussed above, we view Petitioner’s second asserted motivation as supported by rational underpinnings in that Pupp’s positive engagement drive mechanism provides a benefit of reduced “circumferential friction” as compared to frictional drive systems. *See In re Cree, Inc.*, 818 F.3d 694, 702 n.3 (Fed. Cir. 2016) (viewing an “impermissible hindsight” argument as “essentially a repackaging of the argument that there was insufficient evidence of a motivation to combine the references”).



Moreover, although Mr. O’Keefe acknowledged, for example, starting with the claims at issue as part of the analysis (Ex. 2014, 29:4–12), we do not view Mr. O’Keefe’s testimony as showing impermissible hindsight. *See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) (“Any judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.”).

Third, Patent Owner argues that the allegedly proposed modified device would lead to technical issues. *See* PO Resp. 37–38. Specifically, Patent Owner argues that “[i]f Pupp’s strips were modified in view of Roimestad to include a tapered portion as suggested in the Petition, it would create a gap (in blue) at the bottom of the drive tower, illustrated below”:



PO Resp. 37; *see also* PO Sur-reply 20 (same). The graphic reproduced above shows two strips 10", as depicted in Figure 8 of Pupp, aligned along their long sides, but offset, and with a bend added in their lower portions. PO Resp. 37. Patent Owner has colored in blue the "gap" between the two strips 10". *Id.* According to Patent Owner, one of ordinary skill in the art "understands that a gap at that point is at the worst possible point in the spiral system" because "[i]t would cause a radial jarring of the belt which would shake product and work against the benefits of inventions disclosed in the Patent" and "[i]t would also have a deleterious effect on belt life." *Id.* at 37–38 (citing Straight Decl. ¶¶ 80, 144–147; *In re Fritch*, 972 F.2d 1260, 1265 n.12 (Fed. Cir. 1992); *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959)).

This argument does not address the proposed combination. As discussed above, we maintain the understanding—as previously stated in the Decision on Institution (Dec. Inst. 21, 23)—that, for claim 9 in the context of this asserted ground, Petitioner relies on a combination that includes strips 10" shown in Figure 8 of Pupp around a *purely conical* tower as shown in Figure 1 of Roinestad. As shown by the graphic above, both Patent Owner and Mr. Straight address a *different* proposed modified device. The modified device as understood would not include the bend shown in each of the two strips 10", as modified by Patent Owner. *Compare* Ex. 1003, Fig. 8 (showing a strip 10" with no bend), *with* PO Resp. 37. Moreover, in the context of the modified device as properly understood, Patent Owner has not adequately explained why the strips 10" would be offset vertically as shown. *See* PO Resp. 37. For these reasons, the record does not support the presence of the technical issues raised by Patent Owner.

We turn now to reasonable expectation of success. Petitioner states that one of ordinary skill in the art “would have had a reasonable expectation of success in combining the teachings of Pupp and Roinestad.” Pet. 23. Petitioner first notes that “Pupp expressly recognizes that “[f]urther modifications of the above-described embodiments [of Pupp] of the belt conveyor are obviously possible within the scope of invention.”” *Id.* (quoting Ex. 1003, 4:50–52). Petitioner also states:

Given that Pupp discloses to [one of ordinary skill in the art] (*See*, Ex. 1008 at 9:10–14) drive members with an outer edge that is tapered or non-tapered anywhere along the height of the drive tower and that Roinestad discloses dividing the height of the drive tower into tapered and non-tapered sections, [one of ordinary skill in the art] would reasonably expect that Pupp’s and Roinestad’s teachings could be combined as a simple matter of

routine design choice using standard design tools (e.g., computerized computational systems) to evaluate and optimize the system's design.

Pet. 23 (citing O'Keefe Pet. Decl. ¶ 67).

Patent Owner does not present arguments directly addressing the reasonable expectation of success. As discussed above in the context of element 9D (*see* § II.C.3.a.4), Petitioner has not demonstrated either (1) that Pupp expressly discloses conical drive towers or (2) that Pupp, when viewed in light of the identified passage in Daringer, would have been understood as disclosing conical drive towers. *See* Pet. 23. Regardless, Petitioner has adequately established, supported by testimony from Mr. O'Keefe, that one of ordinary skill in the art would have had a reasonable expectation of success.

For the reasons above, we determine, in light of the complete record, that Petitioner has shown by a preponderance of the evidence that one of ordinary skill in the art at the time of the invention would have had reason to combine Pupp and Roinestad, as proposed, and would have had a reasonable expectation of success.

*(8) Objective Evidence of Nonobviousness*

We turn next to Patent Owner's objective evidence of nonobviousness and Petitioner's rebuttal evidence. Objective evidence of nonobviousness, when present, must be considered as part of an obviousness inquiry.

*Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that one or more of the challenged

claims would not have been obvious to one of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984).

“In order to accord substantial weight to secondary considerations in an obviousness analysis, the evidence of secondary considerations must have a nexus to the claims, i.e., there must be a legally and factually sufficient connection between the evidence and the patented invention.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019), *cert. denied*, 141 S. Ct. 373 (2020). Applying *Fox Factory*, the Board uses a two-step analysis in evaluating nexus between the claimed invention and objective evidence of nonobviousness. *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (precedential). We first consider whether the patent owner has demonstrated “that its products are coextensive (or nearly coextensive) with the challenged claims,” resulting in a rebuttable presumption of nexus. *Id.* If not, that does not end the inquiry; “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Id.* (quoting *Fox Factory*, 944 F.3d at 1373–75).

Patent Owner produces evidence directed to alleged long-felt but unsolved need, industry praise and licensing, commercial success, copying, amount of time passed, and failure to provide a commercially successful product. PO Resp. 60–71. We address each of these in turn, below. First, however, we address nexus generally.

#### (a) Nexus

We first address whether Patent Owner is entitled to a rebuttable presumption of nexus. As stated in *Fox Factory*, “presuming nexus is

appropriate when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.” *Fox Factory*, 944 F.3d at 1373 (quotations omitted). Patent Owner provides evidence, primarily in a claim chart in the declaration of Mr. Straight, that its DirectDrive™ system practices the challenged claims. PO Resp. 69 (citing Straight Decl. ¶ 179 (discussing Appendix C)). Having reviewed this evidence, we determine that Patent Owner has adequately shown, for purposes of this Decision, that the DirectDrive™ system embodies the challenged claims. *See id.* (stating that “[e]ach of the elements of the Patent claims is present in the DirectDrive™ system because it was the basis for the specification and drawings of the Patent”). Petitioner does not challenge this aspect of Patent Owner’s position. *See* Pet. Reply 24–25 (only addressing the second option under *Fox Factory*); PO Sur-reply 23 (stating “[t]here is no dispute” on this issue).

Patent Owner states that “[t]he objective indicia attributable to the DirectDrive™ system are coextensive with the challenged claims of the Patent” but does not appear to fully develop the issue. PO Resp. 69. Having considered this issue, however, we view the record as supporting Patent Owner’s position (which is, again, unchallenged by Petitioner). For example, “[a] patent claim is not coextensive with a product that includes a ‘critical’ unclaimed feature that is claimed by a different patent and that materially impacts the product’s functionality . . . .” *Fox Factory*, 944 F.3d at 1375. Reviewing the claims in the ’645 patent at issue in IPR2020-00594 (which also relates to a patent allegedly practiced by the DirectDrive™ system), we do not view the claims challenged there as including any “critical” features not claimed in the ’388 patent. Because Patent Owner has

shown nexus by the first option under *Fox Factory*, and Petitioner has not attempted to rebut the presumption of nexus, we do not address whether Patent Owner has also proven nexus by showing that the evidence of objective indicia is the “direct result of the unique characteristics of the claimed invention.” *Fox Factory*, 944 F.3d at 1373–74. We determine, on the complete record, that Patent Owner has adequately shown a nexus from the DirectDrive™ system to the challenged claims.

(b) Long-felt need

Evidence of a long-felt but unsolved need tends to show nonobviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious; however, “[a]bsent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness.” *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004).

Patent Owner identifies three possible allegedly long-felt needs. First, Patent Owner contends that “[t]here was a pressing need for smoother, more reliable designs” for spiral conveyor systems. PO Resp. 62, 62–63 (“Processors in rural areas were also interested in the DirectDrive™ system because spiral experts are no longer needed to maintain smooth and reliable operation.” (citing Ex. 2030 (Chang declaration) ¶ 11)), 63 (“It allowed smooth and efficient operation, under low tension regardless the environmental variable.” (citing Ex. 2030 ¶ 12)). The cited passages of Mr. Chang’s declaration take the position that the DirectDrive™ system “provided several advantages not found in existing spiral conveyor systems” and “is the best spiral conveyor system out there currently” (Ex. 2030 ¶¶ 11, 12), but they do not provide objective evidence that the industry saw

smoother, more reliable operation as a persistent need that others failed to solve. *See In re Gershon*, 372 F.2d 535, 538 (CCPA 1967); *see also Vandenberg v. Dairy Equip. Co.*, 740 F.2d 1560, 1567 (Fed. Cir. 1984) (finding of lack of long-felt need not clearly erroneous when there was “no showing that the industry was very concerned with the problem involved”).

Second, Patent Owner contends that there was a “long felt need for a spiral conveyor not affected by sweet and savory baked good toppings” that addressed “product orientation issues and the related chatter or vibration of the belt.” PO Resp. 62. Again, the cited evidence discusses alleged benefits of the DirectDrive™ system compared to the prior art, but does not actually provide objective evidence that the industry saw product orientation issues, or chatter/vibration of the belt, as a persistent need that others failed to solve. *See id.* (citing Ex. 2033 (Freeland declaration) ¶¶ 10–13; Ex. 2034 (Orlando declaration) ¶¶ 7–8; Ex. 2035; Ex. 2036).

Third, Patent Owner’s contention that the DirectDrive™ system addresses “belt tension” issues suffers from the same infirmities, in that Patent Owner does not actually provide objective evidence that the industry saw those issues as a long-felt need. *See* PO Resp. 62 (citing Ex. 2031 ¶¶ 7–9). For these reasons, we afford little weight to Patent Owner’s evidence of this indicia.

(c) Awards, Industry Praise, and Licensing

Praise from industry participants, especially competitors, is probative as to obviousness because such participants “are not likely to praise an obvious advance over the known art. Thus, if there is evidence of industry praise of the claimed invention in the record, it weighs in favor of the nonobviousness of the claimed invention.” *Apple Inc. v. Samsung Elecs.*



*Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016). In addition, “[l]icenses taken under the patent in suit may constitute evidence of nonobviousness; however, only little weight can be attributed to such evidence if the patentee does not demonstrate ‘a nexus between the merits of the invention and the licenses of record.’” *GPAC Inc.*, 57 F.3d at 1580 (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983)). Patent Owner argues that awards, licenses, and industry praise highlight the claimed features. *See* PO Resp. 63–65. We address each in turn below.

First, Patent Owner highlights two awards for the DirectDrive™ system: “The Innovation Award from the American Society of Baking in 2016 and a silver medal at the 2015 International Food Tech Awards” shown at Appendix B of Mr. Elhassouni’s declaration. Ex. 2028 ¶ 2,<sup>20</sup> *cited at* PO Resp. 63–64. The first award was ostensibly given under the view that the DirectDrive™ system’s positive drive *alone* was a “technological breakthrough” providing certain benefits. *See* Ex. 2028 at 25–26. The record however, shows that positive drive was not developed by Patent Owner. Indeed, as discussed below, Patent Owner does not even contest that Roinestad2 discloses positive drive. *See* PO Resp. 55–59.

The evidence as to the second award provides that “[t]he patented system advances spiral conveyance by eliminating issues relates to produce migration, belt tensioning and sanitation, *according to Intralox*” (which is a wholly owned subsidiary of Patent Owner (*see* Paper 3 at 2)) and does not otherwise explain the basis for the award. *See* Ex. 2028 at 22 (emphasis added). We question whether this award is probative of objective praise by

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<sup>20</sup> The cited paragraph 2 is actually the second one, on page 4.

the industry rather than the result of marketing efforts by Patent Owner. Similarly, the “numerous publications and industry journals” featuring the DirectDrive™ system appear more the product of marketing efforts than actual industry praise from participants or competitors. *See* Ex. 2028 ¶ 3,<sup>21</sup> *cited at* PO Resp. 64; *see also* Ex. 2028, Appendix C (providing four articles).

Second, Patent Owner argues that “[e]quipment manufacturers that license the Patent and users of the patented technology recognize that the DirectDrive™ system provided a superior solution over other products on the market.” PO Resp. 64 (internal quotations omitted) (citing Ex. 2028 ¶ 7, which cites Ex. 2028, Appendix A); *see also id.* at 66–67 (discussing licensing in the context of commercial success). Mr. Jeffrey Chang, president of FPS Food Process Solutions, an original equipment manufacturer who provides customers with DirectDrive™ systems, stated that the DirectDrive™ system was a “game changer.” Ex. 2030 ¶ 10, *cited at* PO Resp. 64. Mr. Dan Crouch, a senior engineer at Coastline Equipment (another original equipment manufacturer who provides customers with DirectDrive™ systems), stated that it “lowered belt tension, reduced product movement on the spiral belt, and minimized system surging despite the very high belt load” and that the several design features of the DirectDrive™ system made it stand out from the competition, including its “dual diameter design,” “positive drive,” and “superior produce orientation.” Ex. 2031 ¶¶ 10, 11.

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<sup>21</sup> The cited paragraph 3 is actually the third one, on page 4.

We attribute some, but not considerable weight, to this second group of evidence as to this indicia. As an initial matter, we note that Patent Owner has not provided *any* evidence that any entity—including the entities discussed above—actually licenses the ’388 patent at issue in this proceeding. *See GPAC Inc.*, 57 F.3d at 1580 (stating that “only little weight can be attributed to such evidence if the patentee does not demonstrate ‘a nexus between the merits of the invention *and the licenses of record*’” (emphasis added) (quoting *Stratoflex*, 713 F.2d at 1539)). On this issue, Mr. Elhassouni states that “[s]ince the DirectDrive™ system was introduced to the market, the patented technology has been licensed to 104 OEMs globally, including approximately . . . 14 OEMs fully licensed to offer the DirectDrive™ system in the Americas” and that “[t]wenty unique spiral conveyor system projects were also licensed to use the DirectDrive™ system technology.” Ex. 2028 ¶ 6. We are left to assume, however, what, and how many, patents comprise the “patented technology,” and, most importantly, whether the ’388 patent is included.

Further, the evidence above provides laudatory comments of the DirectDrive™ system *generally*, but does little to link the evidence to the specific advances of the ’388 patent over the prior art. Mr. Chang states that “using a combination of positive drive and tapered drive members solves the problems of prior spiral conveyor systems,” but does not explain what those “problems” were, or explain how that allegedly novel combination of features in the ’388 patent solves those alleged problems. Ex. 2030 ¶ 10. Assuming that the ’388 patent *is* licensed, Mr. Crouch provides at least some discussion identifying alleged benefits specifically tied to the “dual diameter

design” purportedly falling within the scope of element 11F in claim 11 and the “positive drive” in element 11G in that claim. *See* Ex. 2031 ¶¶ 10–11.

Third, Patent Owner provides various “[c]ustomers and end users [that] recognize the importance and value of the improved positive drive design.” PO Resp. 65. For example, John Orlando, CEO of Orlando Baking, states that “it was a night and day difference . . . and helped reduce labor costs.” Ex. 2034 ¶ 7, *quoted at* PO Resp. 65. And Mr. Alan Freeland, General Manager at Schulze & Burch Biscuit Company, states that “we have had zero downtime during production, zero unscheduled sanitations, zero breaks in the belt, and zero hold orders due to potential contamination.” Ex. 2033 ¶ 11, *quoted at* PO Resp. 65. Mr. Chang and Mr. Elhassouni discuss other alleged general benefits of DirectDrive™ systems. PO Resp. 65 (citing Ex. 2030 ¶¶ 13–14; Ex. 2028 ¶¶ 4–5).

We do not attribute considerable weight to this evidence because, again, the evidence provides laudatory comments of the DirectDrive™ system generally, but does not link the evidence to the specific advances of the ’388 patent over the prior art. For these reasons, we afford some, but not considerable, weight to Patent Owner’s evidence of this indicia.

#### (d) Commercial Success

Patent Owner argues that the DirectDrive™ system is a commercial success due to the claimed features. *See* PO Resp. 65–67. Specifically, Patent Owner first argues that “conventional metrics, including sales growth” shows that the DirectDrive™ system has been a “huge commercial success.” PO Resp. 65 (citing Ex. 2029 ¶ 6). Patent Owner (via the declaration of its Global Finance Manager, Mr. Christiansen), provides a numerical value for the revenue generated by sales of DirectDrive™ systems

and “related optimization services” since 2012. *Id.* As an initial matter, revenue from “related optimization services” does not appear probative of commercial success as it is not part of the claimed invention itself.

Moreover, although we recognize that the amount of revenue of sales is considerable and entitled to some weight, the lack of overall market share data weakens the evidence as to supporting an indication of nonobviousness. *See, e.g., Chemours Co. FC v. Daikin Indus., Ltd.*, Nos. 2020-1289, -1290, 2021 WL 3085514, at \*6 (Fed. Cir. July 22, 2021) (stating that “market share data, though potential useful, is not required to show commercial success” (citing *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360–61 (Fed. Cir. 1999)); *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360–61 (Fed. Cir. 1999) (“Based on Tec Air’s sales evidence [of millions of products sold], the jury reasonably could have found that the invention enjoyed commercial success. Denso argues that this evidence is insufficient because Tec Air failed to provide market share data. Although sales figures coupled with market data provide stronger evidence of commercial success, sales figures alone are also evidence of commercial success.”)).

Next, Patent Owner argues that the record supports a finding that the industry has adopted its technology. *See* PO Resp. 66 (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 (Fed. Cir. 1986)). In support, Patent Owner cites to the declarations of Mr. Chang and Mr. Elzarka (a founder at Spiral Specialists, which designs, manufactures, and services spiral conveyors (Ex. 2032 ¶ 7)). *See* PO Resp. 66. We do not agree that the record shows “adoption by competitors,” as discussed in the cited decision or by the industry more generally. *See Custom Accessories,*

807 F.2d at 960. Mr. Chang states that “[i]n all of our recent sales proposals, wherever plastic conveyor belts suit the application, [DirectDrive™ system] is made as the default offer” and that “[t]his focus on [the DirectDrive™ system] is already evident in our sales records: in the past 24 months, of the new freezers that were sold with plastic belting, 100% were [DirectDrive™ systems].” Ex. 2030 ¶ 13, *cited at* PO Resp. 66.

We do not view this as strongly supporting adoption of the technology in the ’388 patent by either competitors or the industry generally. First, Mr. Chang notably limits his statements to only plastic conveyor belt applications, even though the claims do not recite the material comprising the conveyor belt. *See* Ex. 1001, 8:10–56. Second, Mr. Chang does not focus on alleged adoption of the allegedly novel features—positive drive and tapered drive surfaces *together*—but instead focuses on how *positive drive systems* (again, in plastic belt applications) allegedly are replacing *friction drive systems* (for similar applications). *See* Ex. 2030 ¶ 13 (“At FPS we are phasing out plastic friction driven spiral conveyor systems. In all of our recent sales proposals, wherever plastic conveyor belts suit the application, [the DirectDrive™ system] is made as the default offer.”). In other words, this evidence does not address the alleged advances over the prior art. Lastly, we have no evidence in Mr. Chang’s declaration or the record overall as to the percentage of installations of DirectDrive™ systems as compared to the overall market of spiral conveyor systems (positive drive or overall). In other words, we have little evidence as to the alleged extent of adoption by the industry of the claimed technology.

Mr. Elzarka’s statement that “[b]ecause [the DirectDrive™ system] was a major improvement over other spiral conveyor designs in the industry,

[the DirectDrive™ system] is becoming the industry standard” does not support Patent Owner’s position because Mr. Elzarka provides no actual evidence to support the view that the DirectDrive™ system is truly “becoming the industry standard.” Ex. 2032 ¶ 8, *cited at* PO Resp. 66.

For these reasons, we are persuaded, based on the complete record, that the overall value of sales of the DirectDrive™ system provides some evidence of nonobviousness of the claims, but that the lack of overall market share data lessens the impact of that revenue value on the overall analysis. We are not persuaded by Patent Owner’s arguments as to adoption by the industry of the patented technology. In conclusion, we find that Patent Owner is entitled to some, but not considerable, weight with respect to the objective evidence of commercial success.

(e) Copying

Patent Owner argues Petitioner copied the DirectDrive™ system (allegedly practicing one or more claims of the ’388 patent) in that (1) the record shows evidence of access by Petitioner to the DirectDrive™ system and (2) the record shows substantial similarity between one of Petitioner’s patents and Patent Owner’s DirectDrive™ system. *See* PO Resp. 67–68 (citing *Liqwd, Inc. v. L’Oreal USA, Inc.*, 941 F.3d 1133, 1136 (Fed. Cir. 2019)). Comparing a figure in one of Petitioner’s patents and Figure 18 of the ’388 patent, Mr. Straight concludes that the inventor on Petitioner’s patent copied the DirectDrive™ system. *See* Straight Decl. ¶¶ 178–179. Petitioner responds that Patent Owner raised the same arguments in the denied motion for additional discovery and that Patent Owner has provided no new evidence of copying. Pet. Reply 29.

As noted in the order denying Patent Owner’s motion for additional discovery on copying, Petitioner acknowledged having access to the DirectDrive™ system. *See* Paper 17 at 4. We turn now to “substantial similarity.” In denying Patent Owner’s motion for additional discovery on this issue, we noted that Patent Owner had not shown, at that stage of the proceeding, that the DirectDrive™ system is a “patented product.” Paper 17 at 6. At this stage of the proceeding, however, as discussed above in the section addressing nexus, Patent Owner has overcome that deficiency. We find that the features highlighted by Patent Owner show substantial similarity between the DirectDrive™ system (which practices the ’388 patent) and Figure 8 of Petitioner’s U.S. Patent No. 9,884,723. *See* PO Resp. 68. Petitioner does not dispute these alleged substantial similarities. Accordingly, we are persuaded that the record shows some evidence of copying.

(f) Amount of Time Passed from Prior Art  
to Challenged Claims

Patent Owner argues that the length of time between the issuance of the Roinestad, Roinestad2, and Pupp references and the filing of the application that led to the ’388 patent indicates nonobviousness. *See* PO Resp. 70 (“The application was filed 43 years after Roinestad issued, 23 years after Roinestad2 issued, and 11 years after Pupp issued.”). Patent Owner cites *Leo Pharmaceutical Products, Ltd. v. Rea*, but that decision dealt with the passage of time in the context of analyzing long-felt but unresolved need (which Patent Owner has not established, as discussed above); it does not support the proposition that the *mere passage of time* from the dates of the prior art to the challenged patent indicate



nonobviousness. *See Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1359 (Fed. Cir. 2013) (“The record also shows evidence of *long* felt but unsolved need, *i.e.*, the need for a single formulation to treat psoriasis. The length of the intervening time between the publication dates of the prior art and the claimed invention can also qualify as an objective indicator of nonobviousness.”); *see also Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1337–38 (Fed. Cir. 2016), *overruled by Aqua Prod., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017) (distinguishing *Leo Pharmaceutical* for similar reasons). Similarly, in the informative decision in *Ex parte Whirlpool* cited by Patent Owner (PO Resp. 70), the Board viewed the passage of time from the prior art to the filing of the challenged claims as relevant in the context of analyzing long-felt but unresolved need. *See Ex Parte Whirlpool Corp.*, Appeal No. 2013-008232, 2013 WL 5866602, at \*9 (PTAB Oct. 30, 2013).

Moreover, although the *Power Integrations* decision cited by Patent Owner (PO Resp. 70) does not clearly state the specific indicia at issue when discussing the passage of time from the prior art to the challenged claims, we understand the discussion to address long-felt but unsolved need. *See Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1368 (Fed. Cir. 2013) (discussing how the presence of a component in the prior art, but removed in the claims, “adds expense and imposes design constraints,” indicating that removal “provided otherwise unexpected benefits,” and stating that during the eleven years from issuance of the prior art to the claims, no one identified the component for removal). This understanding aligns with other Federal Circuit precedent indicating that the mere passage of time from prior art to the challenged claims is not particularly relevant outside of the context of established indicia. *See Iron*

*Grip Barbell Co.*, 392 F.3d at 1325 (“Absent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness.”). Because Patent Owner has not established long-felt but unresolved need (as discussed above) or failure of others (as discussed below), we are not persuaded by the argument addressing the mere passage of time.

(g) Failure to Provide a Commercially Successful Product

In the Sur-reply, Patent Owner argues that the record shows a failure to develop a “[c]ommercially [s]uccessful” positive drive spiral conveyor system. PO Sur-reply 25 (emphasis omitted). In support, Patent Owner argues that (1) “Mr. Straight discussed Petitioner’s failure to achieve any commercial success with the positive drive disclosed in Roinestad2” (citing Ex. 1025, 176:14–20, 182:23–185:9), (2) “[t]wo new declarations submitted by Petitioner also acknowledge Petitioner’s failure with the Roinestad2 positive drive” (citing Ex. 1032 ¶¶ 7–8; Ex. 1033 ¶¶ 7–8), and (3) “Mr. Pupp describes how his design did not have a load reduction zone and also failed commercially” (citing Ex. 1034 ¶¶ 12–13). PO Sur-reply 25–26.

We are not persuaded by this evidence as Patent Owner has not identified any legal support for the proposition that the failure of others to provide a *commercially successful* product indicates nonobviousness. Instead, the decision Patent Owner cites addresses “a long-felt need that others, including [the defendant], had tried and failed to meet.”

*Heidelberger Druckmaschinen AG v. Hantscho Com. Prod., Inc.*, 21 F.3d 1068, 1072 (Fed. Cir. 1994), *cited at* PO Sur-reply 26. Accordingly, we are not persuaded that this evidence indicates nonobviousness.

*(9) Conclusion*

For the reasons discussed above (§ II.C.3.a.1–7), the evidence presented by Petitioner strongly indicates that claim 9 would have been obvious over the combination of Pupp and Roinestad. For the reasons also discussed above (§ II.C.3.a.8), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012)), we find Petitioner’s strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioner has demonstrated by a preponderance of the evidence that claim 9 would have been obvious over Pupp and Roinestad.

*b. Dependent Claim 10*

Claim 10 depends from claim 9 and adds the requirement that “the distance of the ridge from the vertical axis in the lower segment is constant below the portion that is tapered.” Ex. 1001, 8:25–27. For claim 10, Petitioner contends that “[t]he combination of Pupp and Roinestad disclose the additional limitation recited in claim 10.” Pet. 30. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage. Pet. 30–31. Petitioner also articulates reasons to combine the relied-upon aspects of Pupp and Roinestad, and a basis for a reasonable expectation of success. Pet. 31.

Referring to the discussion of element 9D, Petitioner states that:

Pupp and Roinestad disclose to [one of ordinary skill in the art] (Ex. 1008 at 9:10–14) that the distance of the outer ridge of the drive members to the vertical axis is either tapered (Ex. 1005 at 12:37–48, Figs. 11–13) or non-tapered (Ex. 1003 at 4:14–15, [4:]26–27, Fig. 8).

Pet. 30. According to Petitioner, it “would have been obvious as a simple design choice for [one of ordinary skill in the art] to combine a non-tapered and a tapered section of Pupp and Roinestad to provide a drive tower with drive members having an outer ridge whose distance from the vertical axis is constant below a portion that is tapered such as . . . in Roinestad Figure 11, left side.” Pet. 30–31 (citing O’Keefe Pet. Decl. ¶¶ 64–67, 85, 86).

Petitioner relies on the same motivations to combine and reasonable expectation of success discussed above as to claim 9. Pet. 31.

In the Decision on Institution, we stated that it was “unclear how to reconcile” the understanding of the drive tower of the modified system in the context of the challenge to claim 9 in this ground—generally configured like conical drum 12 in *Figure 1* of Roinestad—with Petitioner’s apparent reliance on the left side of *Figure 11* in Roinestad as to claim 10, which depends from claim 9:

Based on the Petition, we understand the drive tower of the modified system in the context of this challenge to claim 10 to be configured akin to driving drum 301 on the left side of Figure 11 in Roinestad. *See* Pet. 31 (discussing the left side of Figure 11 of Roinestad).<sup>22</sup> Claim 10, however, depends from claim 9, and thus includes all the limitations of claim 9. Ex. 1001, 8:25–27; pre-AIA 35 U.S.C. § 112 ¶ 4 (“A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.”). And as discussed above . . . , we understand the drive tower of the modified system in the context of the challenge to claim 9 in this ground to be configured akin to conical drum 12 in Figure 1 of

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<sup>22</sup> In one of the cited declaration paragraphs, however, Mr. O’Keefe discusses Figure 12 of Roinestad, rather than the left side of Figure 11. *See* O’Keefe Pet. Decl. ¶ 86.

Roinestad. At this stage of the proceeding, it is unclear how to reconcile these issues.

Dec. Inst. 34–35.

In the Response, Patent Owner only addresses the stated reason to combine Pupp and Roinestad to arrive at claim 10. *See* PO Resp. 59 (discussing why “[t]he constant lower portion below the tapered portion is not merely an obvious design choice”). Despite the express statement as to the confusion on this issue in the Decision on Institution, in the Reply, Petitioner did not address the issue, instead asserting that, “[i]f not indefinite, the dependent claims are not inventive, but known design options taught by the prior art that would be obvious.” Pet. Reply 21–22.

At the oral hearing, the panel questioned Petitioner as to the specific shape of the drive tower in the proposed modified device in the context of claim 10 for this asserted ground. Tr. 28:13–24. Petitioner stated it relied on two *different* drive tower shapes in Roinestad: (1) the mixed conical/cylindrical shape on the left side of Figure 11 and (2) the mixed conical/cylindrical shape on the right side of Figure 11. *Id.*

As discussed above, we understand Petitioner to rely on the shape of the purely conical towers shown in Figure 1 of Roinestad for claim 9 in the context of this ground. Petitioner’s discussion of claim 10 in the context of this asserted ground, however, does not even mention Figure 1 of Roinestad. *See* Pet. 30–31. In contrast, the discussion of claim 10 focuses Figure 11 of Roinestad, but Figure 11 was never discussed at all as to claim 9 in the context of this asserted ground. *See* Pet. 18–31. For these reasons, Petitioner has not explained, with sufficient particularity, the proposed modified device in the context of claim 10 to demonstrate how such a modified device satisfies both the requirements of claim 9 *and also* those of

claim 10 (which depends from claim 9). *See* pre-AIA 35 U.S.C. § 112 ¶ 4 (“A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.”), *cited at* Dec. Inst. 34; *see also* *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” (quoting 35 U.S.C. § 312(a)(3) (2012))). For these reasons, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claim 10 would have been obvious based on Pupp and Roinestad.

*c. Independent Claim 11*

Petitioner contends that the proposed combination of Pupp and Roinestad satisfies each of the limitations of claim 11. Pet. 32–38. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to combine Pupp and Roinestad and argues that there would have been a reasonable expectation of success. Pet. 35–38. We address in turn below the subject matter of each limitation in claim 11, then Petitioner’s identified reasons to combine Pupp and Roinestad, and then objective evidence of nonobviousness.

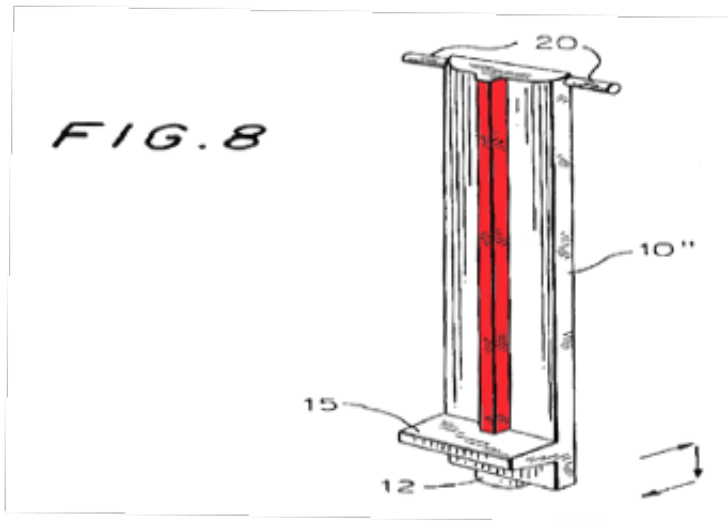
*(1) Elements 11A, 11B, 11C, and 11G*

For elements 11A, 11B, 11C, and 11G, Petitioner references its positions with respect to elements 9A, 9B, 9C, and 9F. *See* Pet. 32 (citing

O’Keefe Pet. Decl. ¶¶ 87, 94). Patent Owner argues that element 11G is lacking for the same reasons that element 9F was allegedly lacking from Pupp. *See* PO Resp. 38. Given the similarities between these claim elements, we determine that the record evidence, summarized above, supports Petitioner’s position as to these elements. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses elements 11A, 11B, 11C, and 11G.

*(2) Element 11D*

In element 11D, claim 11 recites “wherein each of the drive members includes a ridge projecting radially outward to an outer edge.” Ex. 1001, 8:33–34. Referring to the discussion of element 9D in the context of this asserted ground, Petitioner states that “Pupp as shown in Figure 8 below discloses an outwardly projecting ridge (in red) on each of the strips 10” – *i.e.*, the drive members.” Pet. 33 (citing Ex. 1003, 4:14–36, Fig. 8; O’Keefe Pet. Decl. ¶¶ 88–89). Petitioner then provides the same annotated version of Figure 8 provided as to element 9D, shown below:



Pet. 33. Figure 8 shows an alternative embodiment of the strips shown in Figures 5 and 6. Ex. 1003, 2:23–24. In the annotated version of Figure 8,

Petitioner added red shading to a structural feature shown on strip 10''.

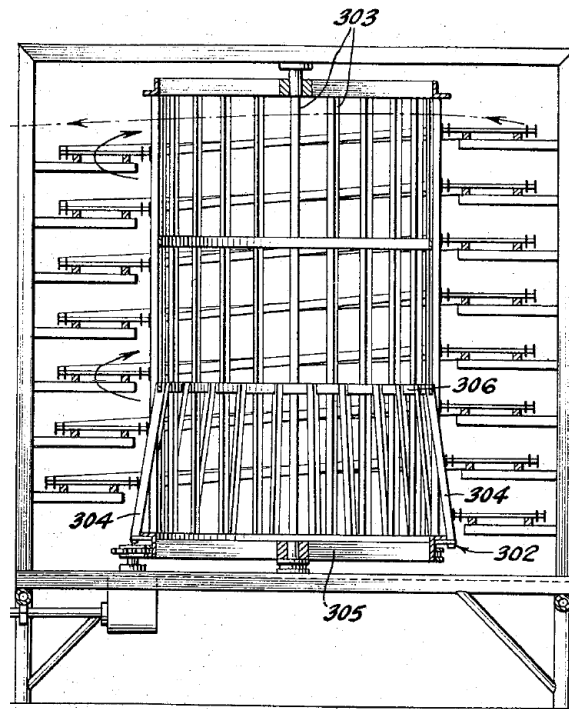
Pet. 33. Given the similarities between element 11D and aspects of 9D, we determine that the record evidence, summarized above, supports Petitioner's position as to these elements. Patent Owner does not present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses element 11D.

*(3) Element 11E*

In element 11E, claim 11 recites "wherein each of the drive members includes a lower segment at the bottom of the drive tower and an upper segment extending from the lower segment toward the top of the drive tower." Ex. 1001, 8:35–38. Referring to the discussion of elements 9C and 9E, Petitioner states that, in Figure 8, "Pupp discloses strips 10'' (drive members) that extend from the bottom to the top of the drive tower)" and, as shown in Figure 5 of Pupp, "each drive member 10'' has a lower segment at the bottom of the drive tower and an upper segment toward the top of the drive tower." Pet. 33.

Petitioner also states that Roinestad teaches "a conveyor system having a drive tower where the drive members have a lower segment at the bottom of the drive tower and an upper segment extending from the lower segment toward the top of the drive tower." Pet. 34 (citing Ex. 1005, Figs. 5, 11, 12; O'Keefe Pet. Decl. ¶ 91). Petitioner adds that, in the embodiment on the right side of Figure 11 of Roinestad (reproduced below), "drive tower 302 . . . shows the upper and lower segments":





Ex. 1005, Fig. 11 (right side), *reproduced at* Pet. 35. Figure 11 is a “vertical sectional view of [a] modification of the driving drums.” Ex. 1005, 5:4–5. Based on this explanation, including the discussions of strips 10” as the “drive members” and of element 11F, which focuses on the embodiment shown on the right side of Figure 11 of Roinestad (Pet. 35–38), in the context of claim 11 as to this asserted ground, we understand Petitioner to essentially rely on placing strips 10” in Pupp on the surface of driving drum 302 shown on the right side of Figure 11 of Roinestad. *See* Pet. 33–38.

With this, we further understand Petitioner to identify, as the recited “lower segment at the bottom of the drive tower,” the portion of strips 10” that would be generally in the location of tapered driving rods 304 shown in the right side of Figure 11 of Roinestad. Pet. 34–35; Ex. 1005, 12:43–44. And we understand Petitioner to identify, as the recited “upper segment extending from the lower segment toward the top of the drive tower,” the portion of strips 10” that would be generally in the location of the upper two

thirds of driving rods 303 shown in the right side of Figure 11 of Roinestad. Pet. 34–35. This understanding of the “lower segment” and “upper segment” is supported by the cited testimony in Mr. O’Keefe’s Petition Declaration, which states, referring to the right side of Figure 11 of Roinestad, that “the lower segment 304 is shown on the right and the upper segment is above lower segment 304.” O’Keefe Pet. Decl. ¶ 91, *cited at* Pet. 34–35. Patent Owner does not present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Pupp discloses this element.

*(4) Element 11F*

In element 11F, claim 11 recites “wherein the distance of the outer edge of the ridge from the vertical axis of rotation is a first distance in the upper segment and the distance of the outer edge of the ridge from the vertical axis of rotation is a greater second distance in a lower portion of the lower segment.” Ex. 1001, 8:39–44. Petitioner states that “[t]he teachings of Pupp and Roinestad disclose” element 11F to one of ordinary skill in the art. Pet. 37 (citing O’Keefe Pet. Decl. ¶¶ 92, 93). Specifically, Petitioner states that, in the drive tower shown in the right side of Figure 11 of Roinestad, “the distance of the drive members from the vertical axis of rotation is a first distance in the upper segment and a greater second distance in a lower portion of the lower segment.” Pet. 36 (citing Ex. 1005, Fig. 11; O’Keefe Pet. Decl. ¶ 93). Specifically, we understand Petitioner to rely on (1) as the “first distance,” the distance from the axis of rotation to the outer surface of the portion of strips 10” that would be generally in the location of the upper two thirds of driving rods 303 shown in the right side of Figure 11 of Roinestad, and (2) as the “greater second distance in a lower portion of

the lower segment,” the distance from the axis of rotation to the outer surface of the portion of strips 10” at the lowest portion of tapered driving rods 304 shown in the right side of Figure 11 of Roinestad.

In the Response, Patent Owner argues that Pupp alone does not satisfy element 11F and that the alleged “ridge” in Figure 8 of Pupp, if anything, moves *towards* rather than *away* from the axis of rotation “in a lower portion of the lower segment,” as required by element 11F. *See* PO Resp. 39–40.

This argument does not address the proposed modified device as described above. First, Patent Owner does not address the shape of the proposed modified device, as shown in the right side of Figure 11 of Roinestad. Instead, Patent Owner addresses a cylindrical shape such as that shown in Figure 5 of Pupp. *See* PO Resp. 40. Moreover, because Petitioner does not mention the “inwards, downwards, and again outwards” motion of strips 10” in the context of the proposed modified device (Ex. 1003, 4:30–36; Pet. 32–38 (discussing claim 11 in the context of this asserted ground)), we do not understand that feature—relied on in Patent Owner’s argument (PO Resp. 39–40)—to be present in the modified device. For the reasons above, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that the combination of Pupp and Roinestad discloses the subject matter of element 11F.<sup>23</sup>

*(5) The Combination of Pupp and Roinestad*

Petitioner essentially relies on the same two reasons to combine Pupp and Roinestad, as well as the same reasonable expectation of success, as

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<sup>23</sup> We address below Patent Owner’s arguments that one of ordinary skill in the art would not have combined Pupp and Roinestad as proposed. *See infra* § II.C.3.c.5.

proposed in the context of claim 9 for this asserted ground. *See* Pet. 37–38. In the Response, Patent Owner does not provide arguments addressing the reasons to combine in the context of claim 11 for this asserted ground separate from those presented above as to claim 9. *See* § II.C.3.a.7. Accordingly, for the reasons above in the context of claim 9, we determine, in light of the complete record and in the context of claim 11 as to this asserted ground, that Petitioner has shown by a preponderance of the evidence that one of ordinary skill in the art at the time of the invention would have had reason to combine Pupp and Roinestad, as proposed, and would have had a reasonable expectation of success.

*(6) Objective Evidence of Nonobviousness*

The analysis of Patent Owner’s objective evidence of nonobviousness is the same for claim 11 in the context of this asserted ground as for claim 9. Thus, for the same reasons discussed above (§ II.C.3.a.8), we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

*(7) Conclusion*

For the reasons discussed above (§ II.C.3.c.1–5), the evidence presented by Petitioner strongly indicates that claim 11 would have been obvious over the combination of Pupp and Roinestad. For the same reasons discussed above (§ II.C.3.c.6), Patent Owner’s objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine*, 676 F.3d at 1079), we find Petitioner’s strong evidence of obviousness outweighs Patent Owner’s objective evidence of nonobviousness. Thus, we conclude Petitioner has demonstrated by a

preponderance of the evidence that claim 11 would have been obvious over Pupp and Roinestad.

*d. Dependent Claims 12 and 13*

Claim 12 depends from claim 11 and adds that “the distance of the outer edge of the ridge from the vertical axis of rotation in an upper portion of the lower segment increases from the first distance at the upper segment to the greater second distance at the lower portion of the lower segment.” Ex. 1001, 8:48–52. Claim 13 depends from claim 12 and adds that “the distance of the outer edge of the ridge from the vertical axis of rotation in the upper portion of the lower segment increases linearly from the first distance to the greater second distance.” *Id.* at 8:53–56.

Petitioner contends that “[t]he combination of Pupp and Roinestad disclose the additional limitations recited in claims 12 and 13.” Pet. 38. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage. Pet. 38–40. Petitioner also relies on the same reasons to combine the relied-upon aspects of Pupp and Roinestad, and a basis for a reasonable expectation of success as discussed as to claim 9 in the context of this asserted ground. Pet. 39–40.

As to the specific subject matter of these two dependent claims, Petitioner again refers to the right side of Figure 11 of Roinestad and states that, in that embodiment, “the distance of the outer edge of the drive member 304 from the vertical axis of rotation in an upper portion of the lower segment increases linearly from the first distance at the upper segment to the greater second distance at the lower portion of the lower segment.” Pet. 38–39 (citing O’Keefe Pet. Decl. ¶¶ 96–97, 100).

Patent Owner argues that claim 12 “defines a transition in the distance of the driving ridge from the vertical axis” and that the “transition portion (i.e. the upper portion of the lower segment) provides a gradual decrease in the inside radius of the positively driven belt as it advances up the helical path.” PO Resp. 59–60. As to claim 13, Patent Owner argues that “the transition portion (i.e. the upper portion of the lower segment) provides a gradual decrease, as opposed to step jumps, in the inside radius of the positively driven belt as it advances up the helical path.” *Id.* at 60.

We are persuaded by Petitioner’s argument that the proposed modified device, in the configuration of the right side of Figure 11 of Roinestad, satisfies claims 12 and 13. As discussed in the context of element 11F above, we understand the “greater second distance in a lower portion of the lower segment” as the distance from the axis of rotation to the outer surface of the portion of strips 10” at the lowest portion of tapered driving rods 304 in the right side of Figure 11 of Roinestad. And we understand the “upper portion of the lower segment,” as the uppermost portion of tapered driving rods 304 in the right side of Figure 11 of Roinestad.

Patent argues as if claims 12 and 13 require a configuration more similar to that shown in Figure 18 of the ’388 patent, with “tapered portion 197” acting as a “transition portion.” *See* PO Resp. 59–60; Ex. 1001, 6:53–62. Although we agree that such a configuration would likely fall within the scope of claims 12 and 13, we view the record as supporting that the modified device proposed by Petitioner also falls within the scope of those claims. For the reasons above, we determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence

that claims 12 and 13 would have been obvious based on Pupp and Roinestad.

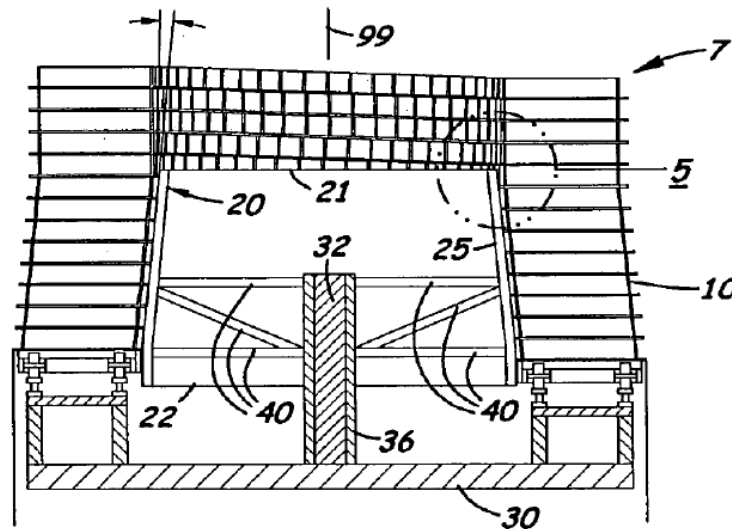
*D. Asserted Anticipation of Claims 9–13 by Heber*

Petitioner asserts that claims 9–13 of the '388 patent are anticipated under 35 U.S.C. § 102(a) and (b) by Heber. Pet. 3, 40–53; Pet. Reply 4–13, 15–16, 21–30; *see supra* note 8. Patent Owner provides arguments addressing this asserted ground. *See* PO Resp. 41–51, 59–71; PO Sur-reply 1–32. We summarize aspects of Heber and then address the arguments.

*1. Heber*

Heber discloses an improved “guide ring” for use in “self-stacking, spiral conveyor belt systems.” *See* Ex. 1004, 1:11–12, 2:20–25.

Figure 4 is reproduced below:



**Fig. 4**

Figure 4 is “a side elevational view of the spiral created by the conical guide ring disclosed” in Heber. Ex. 1004, 2:10–11. Heber discloses replacing a *cylindrical* guide ring (element 8 in prior art Figure 1) with the *conical* guide ring 20 shown in Figure 4. *See id.* at 2:20–29. Heber

describes conical guide ring 20 as having “an outer sidewall 25 that is tapered inward as it ascends so that the diameter of the upper edge 21 is smaller than the diameter of the lower edge 22.” *Id.* at 2:26–29. In the discussion of the prior art, Heber states it incorporates by reference “[v]arious types of belts and drive assemblies” disclosed in twelve U.S. Patents, including Pupp. *See id.* at 1:23–27.

## 2. Analysis

For claims 9–13 challenged in this asserted ground, Petitioner contends that Heber anticipates each claim, based on Heber’s alleged incorporation by reference of Pupp. Pet. 40–53. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* In the Decision on Institution, we did not substantively address this ground, but instead, merely included claims 9–13 in the context of this ground in the instituted *inter partes* review. Dec. Inst. 36 (citing *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); TPG 64).

First, Patent Owner argues that Heber does not properly incorporate by reference the relied-upon aspects of Pupp. *See* PO Resp. 41–45 (discussing *Advanced Display Sys. v. Kent State Univ.*, 212 F.3d 1272 (Fed. Cir. (2000))). Petitioner responds to this argument. *See* Pet. Reply 12–13. For the analysis below, we assume, only for purposes of this Decision, that Heber properly incorporates the positive drive disclosed in Pupp.

Second, Patent Owner argues that Heber does not disclose the limitations of claims 9–13 “arranged as in the claim” and that one of ordinary skill in the art would not have “at once envisaged” such an arrangement. PO Resp. 45–47 (quoting *Net MoneyIN, Inc. v. Verisign, Inc.*,



545 F.3d 1359, 1369 (Fed. Cir. 2008) & *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015)). For the reasons below, we are persuaded by this argument.

For a prior art reference to anticipate a claim, it must disclose all of the limitations of the claim, “arranged or combined in the same way as in the claim.” *Net MoneyIN*, 545 F.3d at 1370. “[T]he [prior art] reference must clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.” *Id.* at 1371 (citation omitted). But “a reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (alteration in original) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)).

In general, in the context of this asserted ground, Petitioner relies on Heber for certain features, such as the requirement that “the ridge in the lower segment is tapered along a portion of its length” in element 9E, and relies on Pupp for other features, such as the “conveyor belt positively driven” in element 9F. *See* Pet. 45–46; *see also* Pet. 48–51 (relying on both Heber and Pupp as to independent claim 11). We agree with Patent Owner that Petitioner does not adequately explain how Heber (even assuming the proper incorporation by reference of Pupp), discloses all the limitations of either independent claim 9 or independent claim 11 “arranged or combined in the same way as in the claim” in the context of the proposed modified

device. *See Net MoneyIn*, 545 F.3d at 1370. Nor has Petitioner attempted to show that one of ordinary skill in the art reading Heber “would at once envisage the claimed arrangement or combination.” *Kennametal*, 780 F.3d at 1381 (internal quotations omitted). Indeed, in the Reply, Petitioner addressed the incorporation by reference argument, but did not address this second argument by Patent Owner. *See* Pet. Reply 12–13.

For the reasons above, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 9–13 are anticipated by Heber (even assuming the proper incorporation by reference of Pupp).

*E. Asserted Obviousness of Claims 9–13 Based on Heber*

Petitioner asserts that claims 9–13 of the ’388 patent are unpatentable under 35 U.S.C. § 103(a) based on Heber. Pet. 3, 53–54; Pet. Reply 12–13, 15–16, 21–30. Patent Owner provides arguments specifically addressing this asserted ground. *See* PO Resp. 51–55; PO Sur-reply 1–32.

*1. Asserted References*

In this asserted ground, Petitioner relies on Heber (summarized above (*see* § II.D.1)) and Pupp (allegedly incorporated by reference into Heber) (summarized above (*see* § II.C.1)).

*2. Analysis*

Petitioner states that “Heber teaches all the elements of claims 9–13 for the same reasons described” in the asserted ground of anticipation based on Heber, but that,

[t]o the extent that Heber is found to not expressly teach any of the elements of claims 9–13, those limitations would have been obvious given the cited teachings of Heber above in [the asserted ground of anticipation based on Heber] and the cited teachings

of Pupp in [the asserted ground of obviousness based on Pupp and Roinestad] that Heber expressly incorporates by reference. Pet. 54 (citing O’Keefe Pet. Decl. ¶¶ 101–119). In the Decision on Institution, we did not substantively address this ground, but instead, merely included claims 9–13 in the context of this ground in the instituted *inter partes* review. Dec. Inst. 36 (citing *SAS*, 138 S. Ct. at 1354, 1359–60; TPG 64).

Patent Owner argues that Petitioner has failed to adequately explain why one of ordinary skill in the art would have been motivated to combine Heber and Pupp as proposed. *See* PO Resp. 51 (discussing *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012)). We agree. “To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner 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). Here, the discussion of obviousness spans only eight lines of text in the Petition and does not state a reason to combine Heber and Pupp. *See* Pet. 53–54. Moreover, even if we consider the entirety of the discussions of the prior two grounds—allegedly “incorporated” into this ground (*see* Pet. 54)—neither of the two prior grounds provides a reason to combine the two references relied on here: Heber and Pupp. For these reasons, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 9–13 would have been obvious based on Heber and Pupp.

*F. Asserted Obviousness of Claims 9–13 Based on Heber and Roinestad*

Petitioner asserts that claims 9–13 of the '388 patent are unpatentable under 35 U.S.C. § 103(a) based on Heber and Roinestad. Pet. 3, 54–55; Pet. Reply 12–16, 21–30. Patent Owner provides arguments addressing this asserted ground. See PO Resp. 51–55; PO Sur-reply 1–32.

*1. Asserted References*

In this asserted ground, Petitioner relies on Heber (summarized above (*see* § II.D.1)), Pupp (allegedly incorporated by reference into Heber) (summarized above (*see* § II.C.1)), and Roinestad (summarized above (*see* § II.C.2)).

*2. Analysis*

Petitioner states that “Heber teaches all the elements of claims 9–13 for the same reasons described” in the asserted ground of anticipation based on Heber, but that,

[t]o the extent that Heber is found to not expressly teach any of the elements of claims 9–13, those limitations would have been obvious given the teachings of Heber cited above in [the asserted ground of anticipation based on Heber], including the teachings of Pupp cited in [the asserted ground of obviousness based on Pupp and Roinestad] that Heber expressly incorporates by reference, in combination with the cited teachings of Roinestad cited above in [the asserted ground of obviousness based on Pupp and Roinestad].

Pet. 54 (citing O’Keefe Pet. Decl. ¶¶ 121–147). In the Decision on Institution, we did not substantively address this ground, but instead, merely included claims 9–13 in the context of this ground in the instituted *inter partes* review. Dec. Inst. 37 (citing *SAS*, 138 S. Ct. at 1354, 1359–60; TPG 64).

Patent Owner argues that this asserted ground “is essentially a recycling of [the ground based on Pupp and Roinestad] and may be read as: Obvious over Heber (using Pupp) in view of Roinestad.” PO Resp. 51. We agree. Moreover, although it is clear that Petitioner relies on Pupp for the “positively driven” requirements in the independent claims, it is not clear how Petitioner intends to rely on either Heber or Roinestad. *See* Pet. 54–55. Here, we determine that Petitioner has not adequately explained its positions in the context of this asserted ground to allow us to analyze those positions. *See Intelligent Bio-Sys.*, 821 F.3d at 1369 (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’”). For these reasons, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claims 9–13 would have been obvious based on Heber and Roinestad.

*G. Asserted Obviousness of Claims 9–13 Based on Roinestad2 and Roinestad*

Petitioner asserts that claims 9–13 of the ’388 patent are unpatentable under 35 U.S.C. § 103(a) based on Roinestad2 and Roinestad. Pet. 3, 55–76; Pet. Reply 3–4, 13–30. Patent Owner provides arguments addressing this asserted ground. *See* PO Resp. 24–30, 55–71; PO Sur-reply 1–32. We begin our analysis with an overview of the asserted prior art and then address the parties’ specific contentions in turn.

*1. Roinestad2*

In this asserted ground, Petitioner relies on Roinestad2, in addition to Roinestad (summarized above (*see* § II.C.2)). Roinestad2 discloses a positive drive helical conveyor system. Ex. 1007, code (54).

Figure 3 of Roinestad2 is reproduced below:

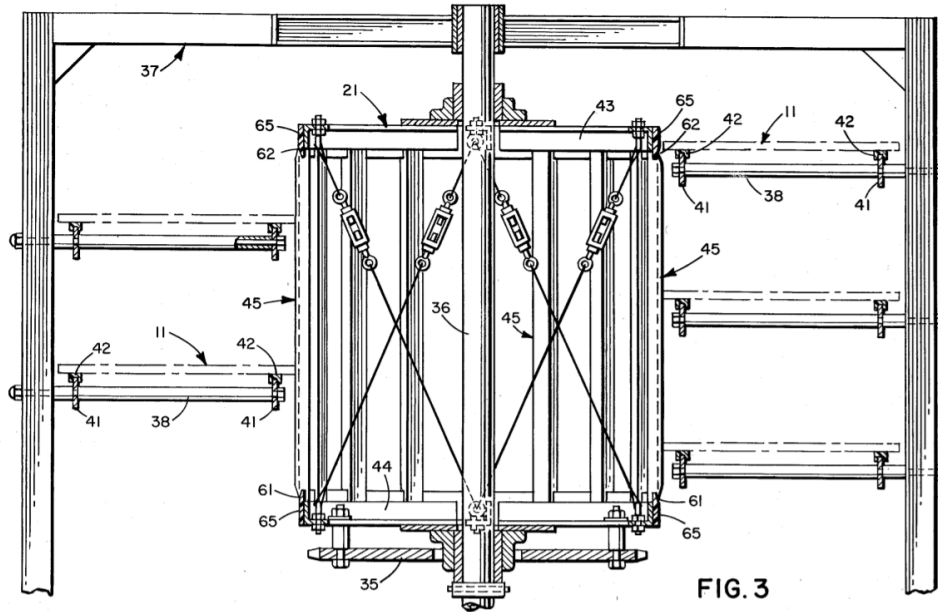
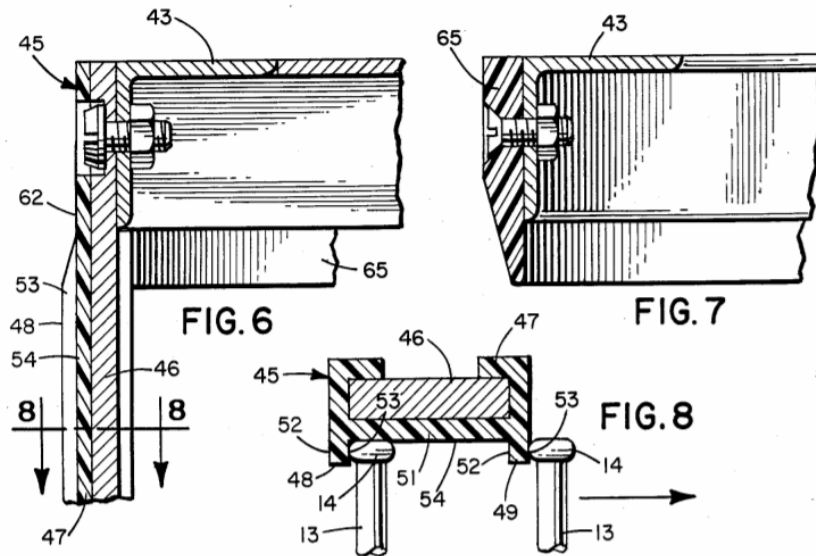


Figure 3 “is a vertical section, illustrating the primary driving cage and the belt supporting structure.” Ex. 1007, 3:19–20. As shown, “belt 11 travels in an endless path including a helical portion in which the belt is curved laterally edgewise around a driving cage 21 through a plurality of vertically spaced generally horizontal loops.” *Id.* at 4:13–17. Roinestad2 discloses that “cage 21 is fixed to the shaft 36 and includes top and bottom members 43 and 44 to which are connected a plurality of vertical driving bars 45 which are spaced circumferentially around the cage 21.” *Id.* at 4:43–46.

Figures 6–8 of Roinestad2 are reproduced below:



Figures 6–8 show various cross-sections of the driving structures that drive the belt. *See* Ex. 1007, 3:28–37. These figures show driving bars 45 “formed as radially outwardly directed channels having legs 48 and 49 and base 51.” *Id.* at 4:48–50. Roinestad2 discloses that “driving surfaces 53 overlap and abut the enlarged heads 14 of the rods 13 [of the belt] in positive driving engagement.” *Id.* at 4:54–56.

## 2. Analysis

### a. Independent Claim 9

Petitioner contends that the proposed combination of Roinestad2 and Roinestad satisfies each of the limitations of claim 9. Pet. 55–65. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to combine Roinestad2 and Roinestad, and argues that there would have been a reasonable expectation of success. Pet. 58–64. We

address below Petitioner’s stated positions as to the shape of the modified device in the context of this claim. This issue is dispositive as to claim 9 in the context of this asserted ground.

In element 9D, claim 9 recites “wherein each of the drive members includes an outwardly projecting ridge whose distance from the vertical axis varies from the bottom to the top of the drive tower.” Ex. 1001, 8:15–17. Petitioner first highlights Figures 6–8 of Roinestad2 (reproduced above), and states that, in those figures, Roinestad2 “discloses drive members (driving bars 45) having outwardly projecting ridges (channel legs 48) with driving surfaces 52 and 53.” Pet. 58 (citing Ex. 1007, 4:48–52, Figs. 6, 8). Petitioner asserts that, in a combination of “Roinestad’s tapered drive tower geometry with Roinestad’s positive drive,” “the distance of the outwardly projecting ridge on the drive members from the vertical axis would vary from the bottom to the top of the drive tower and disclose all the limitations” of this element. Pet. 59–60 (citing O’Keefe Pet. Decl. ¶¶ 154–155).

According to Petitioner, because

a substantially cylindrical drive tower configuration, to [one of ordinary skill in the art], also encompasses a slightly conical or tapered drive tower (Ex. 1008 [Daringer] at 9:10–14), Roinestad2’s drive members 45 on a slightly conical or tapered drive tower discloses to [one of ordinary skill in the art] drive members that include an outwardly projecting ridge whose distance from the vertical axis varies from the bottom to the top of the drive tower. [O’Keefe Pet. Decl.] ¶ 154. Roinestad2 therefore discloses to [one of ordinary skill in the art] all of the limitations of claim element 9[d].

Pet. 58–59. Petitioner also states that Roinestad “expressly discloses conical or tapered drive towers, e.g., Figure 1 drive towers 12 and 13,” which, according to Petitioner, one of ordinary skill in the art “would have



understood to be included within Roinestad2’s description of a substantially cylindrical drive tower.” Pet. 59.

Although the heading of the section of the Petition addressing element 9D indicates that Petitioner relies on the combination of Roinestad2 and Roinestad to satisfy this element (Pet. 58), based on the block quote above, Petitioner appears to take the *alternative* position that Roinestad2 *alone*—as understood based on Daringer (Exhibit 1008)—satisfies this element. *See, e.g.*, Pet. 19–20 (citing O’Keefe Pet. Decl. ¶ 79 (discussing the same passage from Daringer before concluding that “Pupp therefore, teaches all the limitations of [9D]”). For reasons similar to those stated in the Decision on Institution in the context of the ground of Pupp and Roinestad, it is unclear what aspects of Roinestad2 Petitioner asserts to disclose “a *substantially* cylindrical drive tower” as opposed to a *purely* cylindrical drive tower, as in Figures 1–3 of Roinestad2. *See* Dec. Inst. 19 (addressing a similar issue in the context of the ground of Pupp and Roinestad). Indeed, in the context of element 9B, Petitioner cites to passages in Roinestad2 disclosing a “cylindrical cage.” Pet. 56 (quoting Ex. 1007, 2:34–35; citing O’Keefe Pet. Decl. ¶¶ 154–155).

In the Response, Patent Owner summarized and “agree[d]” with our preliminary analysis in the context of the ground of Pupp and Roinestad. PO Resp. 30–32. Because the full record does *not* support Petitioner’s position that Roinestad2 teaches “a *substantially* cylindrical drive tower” as opposed to a purely conical drive tower, we need not address whether, having considered the cited portion of Daringer, one of ordinary skill in the art would have understood that alleged teaching in Roinestad2 to *also* teach a *conical* drive tower. *See Burckel*, 592 F.2d at 1179.

We turn now to Petitioner’s alternative reliance on the combination of Roinestad2 and Roinestad for this claim element. As noted above, Petitioner relies on Roinestad2 as disclosing “drive members (driving bars 45) having outwardly projecting ridges (channel legs 48).” Pet. 58. As to the requirement that the “distance from the vertical axis varies from the bottom to the top of the drive tower,” in this alternative position, Petitioner relies on Roinestad as to the *shape* of the drive tower. As with the ground based on Pupp and Roinestad discussed above, we understand Petitioner to rely on the shape of the purely conical towers shown in Figure 1 of Roinestad. This understanding of Petitioner’s position is supported by the express reference to “Roinestad’s tapered drive tower configuration” in the only statement in the Petition addressing how the combination of Roinestad2 and Roinestad allegedly satisfies this element. Pet. 59–60. Earlier in the same discussion, Petitioner described Figure 1 of Roinestad as disclosing “conical or tapered drive towers.” Pet. 59. This understanding is also strongly supported by paragraph 155 of Mr. O’Keefe’s Petition Declaration, which includes only Figure 1 of Roinestad rather than any other figures. *See* O’Keefe Pet. Decl. ¶ 155. For these reasons, we understand Petitioner to rely on the shape of the purely conical towers shown in Figure 1 of Roinestad for element 9D in the context of this asserted ground.

Turning to element 9E, however, for the reasons discussed below, Petitioner relies on a *different* shape, specifically that of the right side of Figure 11 of Roinestad. In element 9E, claim 9 recites “wherein each drive member includes a lower segment at the bottom of the drive tower and wherein the ridge in the lower segment is tapered along a portion of its length.” Ex. 1001, 8:18–21. Referring to the discussion of element 9D,

Petitioner first states that “Roinestad2 discloses a substantially cylindrical drive tower having drive members with outwardly projecting ridges, which to [one of ordinary skill in the art] also teaches a drive tower that may be slightly conical or tapered anywhere along the height of the drive tower.” Pet. 62 (Ex. 1007, 4:48–52, Figs. 6, 8; Ex. 1005, 5:24–26, 12:37–48, Figs. 11–13; O’Keefe Pet. Decl. ¶ 156). Petitioner then states that Roinestad “teaches that these tapered and non-tapered sections can be combined along the height of the drive tower (e.g., drums 301 and 302 have tapered sections constructed for example drive rods 304 and non-tapered sections constructed for example by drive rods 303).” *Id.*

As to the apparent reliance on Roinestad2 *alone* for element 9E, for the same reasons discussed above in the context of element 9D, the full record does *not* support Petitioner’s position that Roinestad2 would have been understood by one of ordinary skill in the art as disclosing “a substantially cylindrical drive tower” rather than a purely conical tower. Pet. 62.

We turn now to Petitioner’s alternative reliance on the combination of Roinestad2 and Roinestad for this claim element. In the discussion of this alternative position, Petitioner only discusses and cites *Figure 11* of Roinestad, not *Figure 1* of Roinestad (as relied on for element 9D). *See* Pet. 62–64. This understanding is supported by Mr. O’Keefe’s Petition Declaration, which includes Figure 11 in the context of element 9E but does not mention Figure 1. *See* O’Keefe Pet. Decl. ¶ 157.

At the oral hearing, the panel questioned Petitioner as to the specific shape of the drive tower in the proposed modified device in the context of claim 9 for this asserted ground. Tr. 32:5–12. As with the ground based on

Pupp and Roinestad, Petitioner stated it relied on three *different* drive tower shapes in Roinestad: (1) the purely conical shapes in Figure 1; (2) the mixed conical/cylindrical shape on the left side of Figure 11; and (3) the mixed conical/cylindrical shape on the right side of Figure 11. *Id.* Because Petitioner has not adequately explained how one shape of the modified device of Roinestad2 and Roinestad satisfies all of the claim elements of claim 9, we find, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claim 9 would have been obvious based on Roinestad2 and Roinestad.

*b. Dependent Claim 10*

Claim 10 depends directly from claim 9. *See* Ex. 1001, 8:25–27. For the reasons discussed above as to claim 9 in the context of this ground, we determine, based on the complete record, that Petitioner has not demonstrated by a preponderance of the evidence that claim 10 would have been obvious based on Roinestad2 and Roinestad.

*c. Independent Claim 11*

Petitioner contends that the proposed combination of Roinestad2 and Roinestad satisfies each of the limitations of claim 11. *Pet.* 67–74. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also identifies reasons why one of ordinary skill in the art at the time of the invention would have been motivated to combine Roinestad2 and Roinestad and argues that there would have been a reasonable expectation of success. *Pet.* 73–74. We address in turn below the subject matter of each limitation in claim 11, then Petitioner’s

identified reasons to combine Roinestad2 and Roinestad, and then objective evidence of nonobviousness.

*(1) Element 11A*

In element 11A, claim 11 recites “[a] spiral conveyor comprising.” Ex. 1001, 8:28. Petitioner states, “[t]o the extent the preamble is limiting,” Roinestad2 discloses this element. Pet. 55–56<sup>24</sup> (citing Ex. 1007, 1:5–7, Figs. 1–11; O’Keefe Pet. Decl. ¶ 150); *see also* Pet. 68 (citing O’Keefe Pet. Decl. ¶¶ 158, 162, 169). In the cited passage, Roinestad2 discloses that “this invention relates to endless conveyor belt systems and more particularly to such systems in which conveyor belts are driven in helical paths.” Ex. 1007, 1:5–7; *see also id.*, Fig. 1. Patent Owner does not present arguments for this element. To the extent element 11A is limiting, we find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Roinestad2 discloses this element.

*(2) Element 11B*

In element 11B, claim 11 recites “a drive tower extending from a bottom to a top and rotating about a vertical axis of rotation.” Ex. 1001, 8:29–30. Referring to Figure 1 of Roinestad2, Petitioner contends that “Roinestad2 discloses a drive tower – i.e., ‘cylindrical cage’ – that extends from a bottom to a top and rotates about a vertical axis.” Pet. 56 (citing O’Keefe Pet. Decl. ¶¶ 151–152; discussing Ex. 1007, 1:10–15, 2:34–35, 4:27–28, Figs. 1, 2); *see also* Pet. 68 (citing O’Keefe Pet. Decl. ¶¶ 158, 162, 169). Patent Owner does not present arguments for this element. We find,

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<sup>24</sup> For elements 11A–11C and 11G, Petitioner relies on the discussion as to elements 9A–9C and 9F in the context of this ground. *See* Pet. 67–68. Our discussion of elements 11A–11C and 11G reflects that reliance.

based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Roinestad2 discloses this element.

*(3) Element 11C*

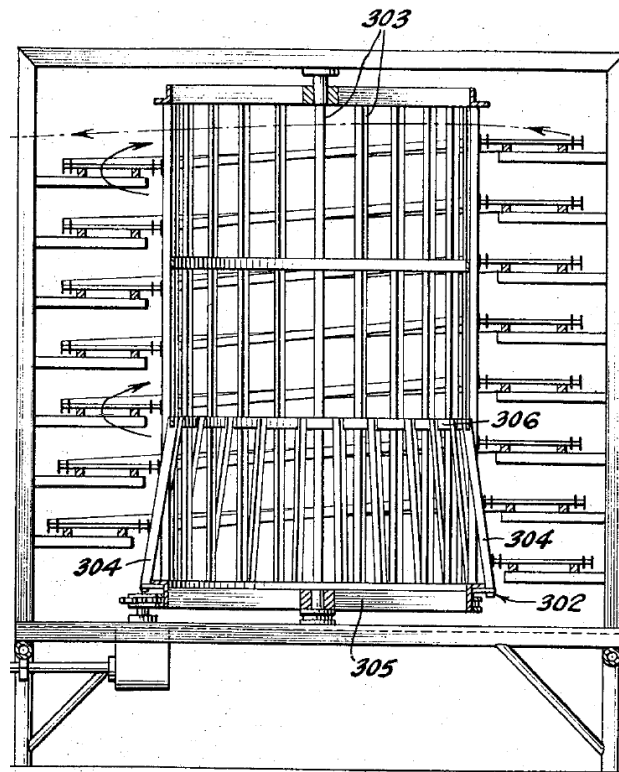
In element 11C, claim 11 recites “a plurality of parallel drive members extending in length from the bottom to the top of the drive tower.” Ex. 1001, 8:31–32. Petitioner argues that driving cage 21 in Figure 3 of Roinestad2 has “top and bottom members which are connected to ‘a plurality of vertical driving bars 45,’ i.e., ‘drive members,’ extending in length from the bottom to the top of the drive tower.” Pet. 57 (discussing Ex. 1007, 4:43–46); *see also* Pet. 68 (citing O’Keefe Pet. Decl. ¶¶ 158, 162, 169). Patent Owner does not present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Roinestad2 discloses this element.

*(4) Element 11D*

In element 11D, claim 11 recites “wherein each of the drive members includes a ridge projecting radially outward to an outer edge.” Ex. 1001, 8:33–34. Referring to the discussion of element 9D in the context of this asserted ground, Petitioner states that “Roinestad2 as shown in Figure 8 below discloses an outwardly projecting ridge, i.e., channel legs 48 and 49 with driving surfaces 52 and 53, i.e., on each of the driving members (driving bars 45).” Pet. 68–69 (citing Ex. 1007, 4:48–52, Figs. 6–8; O’Keefe Pet. Decl. ¶ 164). Patent Owner does not present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Roinestad2 discloses this element.

*(5) Element 11E*

In element 11E, claim 11 recites “wherein each of the drive members includes a lower segment at the bottom of the drive tower and an upper segment extending from the lower segment toward the top of the drive tower.” Ex. 1001, 8:35–38. Referring to the discussion of elements 9C, 9E, 11C, and 11D, Petitioner states that “Roinestad<sup>2</sup> discloses driving bars 45 (drive members) that extend from the bottom (bottom member 44) to the top (top member 43) of the drive tower (cylindrical cage 21).” Pet. 69 (citing Ex. 1007, 4:43–46; O’Keefe Pet. Decl. ¶ 165). According to Petitioner, “each drive member (driving bar 45) has a lower segment at the bottom of the drive tower and an upper segment extending from the lower segment toward the top of the drive tower.” *Id.* (citing Ex. 1007, Fig. 3; O’Keefe Pet. Decl. ¶ 165). Petitioner adds that, in the embodiment on the right side of Figure 11 of Roinestad (reproduced below), “drive tower 302 . . . shows the upper and lower segments” (Pet. 70):



Ex. 1005, Fig. 11 (right side), *reproduced at Pet. 71*. Figure 11 is a “vertical sectional view of [a] modification of the driving drums.” Ex. 1005, 5:4–5. Based on this explanation, including the discussions of driving bars 45 as the “drive members” and of element 11F, which focuses on the embodiment on the right side of Figure 11 of Roinestad (Pet. 71–74), in the context of claim 11 as to this asserted ground, we understand Petitioner to essentially rely on driving bars 45 of Roinestad2 modified to the shape of driving drum 302 shown in the right side of Figure 11 of Roinestad. *See Pet. 69–74.*

With this, we further understand Petitioner to identify, as the recited “lower segment at the bottom of the drive tower,” the portion of driving bars 45 that would be generally in the location of tapered driving rods 304 shown in the right side of Figure 11 of Roinestad. Pet. 69–71; Ex. 1005, 12:43–44. And we understand Petitioner to identify, as the recited “upper segment extending from the lower segment toward the top of the drive



tower,” the portion of driving bars 45 that would be generally in the location of the upper two thirds of driving rods 303 shown in the right side of Figure 11 of Roinestad. Pet. 69–71. This understanding of the identified “lower segment” and “upper segment” is supported by the relied-upon testimony in Mr. O’Keefe’s Petition Declaration, which states, referring to the right side of Figure 11 of Roinestad, that “the lower segment 304 is tapered and the upper segment is above lower segment 304.” O’Keefe Pet. Decl. ¶ 166, *cited at* Pet. 70. Patent Owner does not present arguments for this element. We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that the combination of Roinestad2 and Roinestad discloses this element.

*(6) Element 11F*

In element 11F, claim 11 recites “wherein the distance of the outer edge of the ridge from the vertical axis of rotation is a first distance in the upper segment and the distance of the outer edge of the ridge from the vertical axis of rotation is a greater second distance in a lower portion of the lower segment.” Ex. 1001, 8:39–44. Petitioner states that “[t]he teachings of Roinestad2 and Roinestad disclose” element 11F to one of ordinary skill in the art. Pet. 73 (citing O’Keefe Pet. Decl. ¶¶ 167–168). Specifically, Petitioner states that, in the drive tower shown in the right side of Figure 11 of Roinestad, “the distance of the drive members from the vertical axis of rotation is a first distance in the upper segment and the distance of the drive members from the vertical axis of rotation is a greater second distance in a lower portion of the lower segment.” Pet. 72 (citing Ex. 1005, Fig. 11; O’Keefe Pet. Decl. ¶ 168). Specifically, we understand Petitioner to rely on (1) as the “first distance,” the distance from the axis of rotation to the outer

surface of the portion of driving bars 45 that would be generally in the location of the upper two thirds of driving rods 303 shown in the right side of Figure 11 of Roinestad, and (2) as the “greater second distance in a lower portion of the lower segment,” the distance from the axis of rotation to the outer surface of the portion of driving bars 45 at the lowest portion of tapered driving rods 304 shown in the right side of Figure 11 of Roinestad.

Patent Owner does not present arguments for this element.<sup>25</sup> We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that the combination of Roinestad2 and Roinestad discloses this element.

*(7) Element 11G*

In element 11G, claim 11 recites “a conveyor belt positively driven on a helical path around the drive tower by the ridges of the drive members engaging an inside edge of the conveyor belt.” Ex. 1001, 8:45–47. Petitioner argues that “Roinestad2 discloses a positively driven conveyor belt that traverses a helical path around the drive tower without slip by the drive members engaging an inside edge of the conveyor belt.” Pet. 64 (citing Ex. 1007, 2:15–16, 2:37–40; O’Keefe Pet. Decl. ¶ 158). Petitioner adds that “Roinestad2 further specifically discloses that it was known to ‘employ a positive drive in which the radially inner edge of the belt is directly driven by the continued abutting engagement between the driving elements and the belt as opposed to a sliding frictional engagement.’” *Id.*

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<sup>25</sup> We address below Patent Owner’s arguments that one of ordinary skill in the art would not have combined Roinestad2 and Roinestad as proposed. *See infra* § II.G.2.c.8.

(quoting Ex. 1007, 1:33–38). Patent Owner does not present arguments for this element.<sup>26</sup> We find, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that Roinestad2 discloses this element.

*(8) The Combination of Roinestad2 and Roinestad*

Petitioner relies on the discussion of the motivation to combine Roinestad2 and Roinestad provided in the discussion of element 9D in the context of this asserted ground. *See* Pet. 69–74. Petitioner also relies on the discussion of a reasonable expectation of success as to element 9D. *See id.* Moreover, in the discussion of element 11F, Petitioner states that one of ordinary skill in the art would have combined “the above tapered and non-tapered drive members disclosed in Roinestad2 and Roinestad to provide a system in which the belt may be smoothly and economically driven under low tension (Ex. 1005 at 1:62–65) and which reduces stress caused by friction (Ex. 1007 at 1:26–28, 1:33–38).” Pet. 74 (citing O’Keefe Pet. Decl. ¶ 168). With this statement, Petitioner relies on Roinestad and Roinestad2, both in view of the O’Keefe Petition Declaration. We discuss each below.

For the same reasons discussed above in the context of claim 9 as to the ground of Pupp and Roinestad (*see* § II.C.3.a.7), we are not persuaded by Petitioner’s argument that Roinestad alone supports this motivation to combine Roinestad2 and Roinestad.

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<sup>26</sup> In the Sur-reply, Patent Owner argues that Roinestad2 operates with “occasional slippage” and thus does not operate “without slip,” as recited in claim 9. *See* Sur-reply 14–16. As an initial matter, we view this argument as untimely as it is first made in the Sur-reply. *See* TPG 74. Moreover, as acknowledged by Patent Owner, claim 11 does not include the “without slip” requirement. *See* PO Sur-reply 14 (discussing only claims 9 and 10).

Turning now to Roinestad2, the cited portion of that reference discloses how, in prior art friction-based systems, “the belt is subjected to excessively high tension which can result in excessive wear and fatigue failure of the belt in addition to causing damage to the conveyor structure” and also discloses that

[a]ttempts have been made in certain prior art conveyor systems to employ a positive drive in which the radially inner edge of the belt is directly driven by the continued abutting engagement between the driving elements and the belt as opposed to a sliding frictional engagement.

Ex. 1007, 1:26–28, 1:33–38. Discussing this passage, Mr. O’Keefe states (in a paragraph cited by Petitioner) that one of ordinary skill in the art would have combined the shape of Roinestad’s drive tower with Roinestad2’s positive drive, as relied upon in the context of claim 11, “to lower belt tension and reduce the amount of stress exerted on the belt.” O’Keefe Pet. Decl. ¶ 168.

Patent Owner presents several arguments as to the asserted motivation to combine Roinestad2 and Roinestad. First, Patent Owner argues that:

Petitioner does not attempt to explain what would have motivated [one of ordinary skill in the art] to specifically combine Roinestad2 with Roinestad, what parts to pick, or how this smooth and economical drive would be achieved. [Straight Decl.] ¶¶ 113, 163, 166-168. These are just general motivations such as “build a better mouse trap”, not specifics on how to do it.

PO Resp. 55.

The record shows that this asserted motivation is supported by rational underpinnings in that Roinestad2’s positive drive would provide lower belt tension and reduce the amount of stress on the belt. As argued by Petitioner, and supported by the testimony of Mr. O’Keefe (as summarized above),

Roinestad2 *expressly* indicates that its positive drive, which would be included in the proposed combination, provides a benefit of reduced belt tension as compared to frictional drive systems, such as in Roinestad. *See* O’Keefe Pet. Decl. ¶ 168, *cited at* Pet. 74; Ex. 1007, 1:26–28, 1:33–38.

Second, Patent Owner argues that “Roinestad2 vociferously attacks the use of Roinestad’s tapered drive tower configuration and teaches away from using Roinestad’s tapered drive tower to reduce belt tension.” PO Resp. 56 (citing Ex. 1007, 6:43–45; Straight Decl. ¶¶ 166–167), 56–59 (entire argument). The record does not support that Roinestad2 teaches away from the proposed combination with Roinestad.

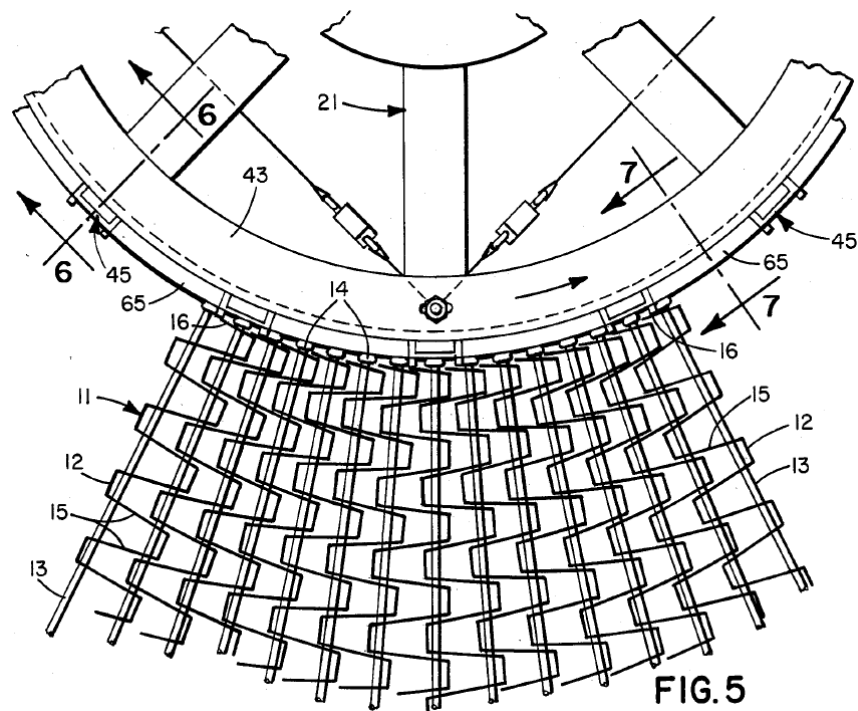
“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018) (quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009)). Here, as argued by Petitioner, the passage at column 6, lines 40–53 of Roinestad2 highlighted by Patent Owner discloses higher belt tension in Roinestad, but does not link that to the *conical shape* of the drive tower in Figure 1 of Roinestad. *See* Ex. 1007, 6:40–53; Pet. Reply 17–18 (arguing that, in this passage, “Roinestad2’s critique is directed only to the Roinestad patent as a whole, i.e., Roinestad’s use of friction drive as opposed to positive drive, not any particular drum surface” (citing Ex. 1025, 86:9–17)); *see also* O’Keefe Reply Decl. ¶ 27 (stating that “Roinestad2’s critique of Roinestad is directed to Roinestad as a whole including its use of friction drive as opposed to positive drive”), *cited at* Pet. Reply 18. Instead, as

discussed above and as relied on by Petitioner, Roinestad2 directly links the decreased tension benefit over Roinestad to use of *positive drive*. See Ex. 1007, 1:26–28, 1:33–38, *cited at* Pet. 74. Moreover, Patent Owner’s argument does not address the modified device in the context of claim 11 as to this ground—i.e., the right side of Figure 11 of Roinestad, rather than the conical shape of Figure 1.

As part of this argument, Patent Owner asserts that, at column 1, lines 52–62, “Roinestad2 specifically discloses that changing the diameter of the drive tower (*e.g.* a tapered or conical design) along the helical path will cause significant problems.” PO Resp. 56. The highlighted passage provides, in part, that “any significant variation in the pitch of the driven surfaces while traversing the helical loops is disadvantageous” and that “[s]uch pitch changes occur with any significant variation in the length of the belt in the helical path.” Ex. 1007, 1:52–56.

Petitioner responds that Patent Owner’s argument “improperly twists Roinestad2’s meaning of ‘significant variation in the pitch of the driven surfaces,’ to mean a tapered drum surface” even though “Roinestad2 clearly states that this disadvantageous pitch is caused by ‘significant variation in length of the belt in the helical path’ ([Ex. 1007,] 1:55–57), not by a tapered surface.” Pet. Reply 18.

The record here does not support Patent Owner’s argument that this disclosure teaches away from the proposed combination of Roinestad2 and Roinestad. As an initial matter, we agree with Patent Owner that “pitch” in this passage refers to the distance between the protrusions on the inner edge of the belt, such as rod heads 14 shown in Figure 5 of Roinestad2, reproduced below:



Ex. 1007, Fig. 5. Figure 5 depicts “a fragmentary plan view of a portion of the conveyor belt being driven in one of the helical loops by the driving cage.” Ex. 1007, 3:25–27. This is supported by Roinestad, which, as argued by Patent Owner, defines the term in that way. *See* PO Sur-reply 11 (citing Ex. 1005, 13:15–20). Petitioner does not offer a competing understanding of “pitch.”

Even with this understanding of “pitch,” however, the record does not support Patent Owner’s understanding of the passage at issue in Roinestad2. First, as argued by Petitioner, the passage refers to “significant variation in the length of the belt in the helical path” but does not link that feature to a conical drive tower surface. *See* Pet. Reply 18–19; *see also* Ex. 1025 (Straight Deposition), 75:25–76:4 (“Q: Okay. And there is no example in [Roinestad2] where he says that the pitch is caused by the taper of the drum surface, is there? A: That’s correct.”), *cited at* Pet. Reply 18; Ex. 1025, 236:20–22 (Mr. Straight stating “I don’t think Roinestad[2] mentions the

taper there” and that the “emphasis is on not letting the pitch change”), *cited at* Pet. Reply 19. For these reasons, we are not persuaded by Mr. Straight’s view that one of ordinary skill in the art “would understand Roinestad2 is warning to stay away from variations in the drum surface.” Straight Decl. ¶ 167.

Instead, we understand the passage at issue, with its reference to “significant variation in the length of the belt in the helical path,” as cautioning against configurations in which the pitch of the “driven surfaces” on the belt side *would change* but the corresponding distance between the driving surfaces (such as driving bars 45 shown in Figure 5 above) *would not change*. This is supported by the sentences in the passage noting that “[i]f there is an increase in pitch, driving contact can be lost” and that “[t]he belt can thus migrate backwardly along the loops and become slack in its approach to the first loop.” Ex. 1007, 1:56–59. Indeed, the corresponding distance between the driving surfaces (such as driving bars 45 shown in Figure 5 above) would not change along the height of the tower in Roinestad2 in that, as noted by Patent Owner, its drum is cylindrical. *See* PO Resp. 57; *see also* Ex. 1007, 2:34–37 (“Preferably, the primary drive comprises a cylindrical cage rotatable about a vertical axis and having a plurality of vertical driving bars spaced circumferentially around the cage.”).

But, in the modified device, which is shaped similar to the right side of Figure 11 of Roinestad, the distance between the driving surfaces (such as driving bars 45 in Roinestad2) *would change*—specifically, would increase—as one moved downwards in the conical region towards the bottom end (which has a larger circumference). This is supported by the testimony of Mr. O’Keefe, highlighted by Patent Owner. *See* PO Sur-



reply 11 (“Yet O’Keefe at his deposition made it clear that as the belt traveled up the tapered section, the drive bars and protrusions would get closer together.” (citing Ex. 2039, 21:3–23:5)); *see also* Ex. 2039, 30:5–17 (similar). This position is also expressly taken by Patent Owner. *See* PO Sur-reply 11–14. Patent Owner has not adequately explained how the discussion at issue in Roinestad2 would be understood as a teaching away given that, in a conical region of a drive tower such as that in the modified device, the “pitch” of the driven surfaces would increase *along with* the corresponding distance between the driving surfaces.

Patent Owner also states that “[n]one of the embodiments described in Roinestad2 include a tapered drive tower or provide any solution to overcome the additional complexities involved in adding a tapered ridge to a positive drive mechanism.” PO Resp. 58 (citing Straight Decl. ¶¶ 109, 112, 166). Although we agree that Roinestad2 does not teach drive towers in shapes other than cylinders, we are not persuaded by this argument because Roinestad2 does not actually criticize, discredit, or otherwise discourage drive towers in shapes other than cylinders. *See DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006) (“We will not read into a reference a teaching away . . . where no such language exists.”); *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of the[] [disclosed] alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed . . . .”); *see also* Pet. Reply 19 (stating that “mere preference is not a direct teaching away”).

As to reasonable expectation of success, Petitioner states that one of ordinary skill in the art

would have been familiar with and used standard design tools (e.g., computerized computational systems) to evaluate and optimize the design of the conveyor belt system to provide a conveyor system that can be smoothly and economically driven under low tension (Ex. 1005, 1:62–65) and that reduces the amount of friction induced stress on the belt (Ex. 1007, 1:26–28, 1:33–38).

Pet. 61–62 (citing O’Keefe Pet. Decl. ¶ 155). Petitioner has adequately established, supported by testimony from Mr. O’Keefe, that one of ordinary skill in the art would have had a reasonable expectation of success. Patent Owner does not present arguments addressing this issue.

For the reasons above, we determine, in light of the complete record, that Petitioner has shown by a preponderance of the evidence that one of ordinary skill in the art at the time of the invention would have had reason to combine Roinestad2 and Roinestad, as proposed, and would have had a reasonable expectation of success.

*(9) Objective Evidence of Nonobviousness*

The analysis of Patent Owner’s objective evidence of nonobviousness is the same for this asserted ground as for the prior asserted ground. Thus, for the same reasons discussed above (§ II.C.3.a.8), we determine, on the complete record, that Patent Owner is entitled to some, but not considerable, weight in favor of nonobviousness.

*(10) Conclusion*

For the reasons discussed above (§ II.G.2.c.1–8), the evidence presented by Petitioner strongly indicates that claim 11 would have been obvious over the combination of Roinestad2 and Roinestad. For the same

reasons discussed above (§ II.G.2.c.9), Patent Owner's objective evidence weighs only slightly in favor of nonobviousness. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine*, 676 F.3d at 1079), we find Petitioner's strong evidence of obviousness outweighs Patent Owner's objective evidence of nonobviousness. Thus, we conclude Petitioner has demonstrated by a preponderance of the evidence that claim 11 would have been obvious over Roinestad2 and Roinestad.

*d. Dependent Claims 12 and 13*

Claim 12 depends from claim 11 and adds the requirement that "the distance of the outer edge of the ridge from the vertical axis of rotation in an upper portion of the lower segment increases from the first distance at the upper segment to the greater second distance at the lower portion of the lower segment." Ex. 1001, 8:48–52. Claim 13 depends from claim 12 and adds the requirement that "the distance of the outer edge of the ridge from the vertical axis of rotation in the upper portion of the lower segment increases linearly from the first distance to the greater second distance." *Id.* at 8:53–56.

Petitioner contends that "[t]he combination of Roinestad2 and Roinestad disclose[s] the additional limitations recited in claims 12 and 13." Pet. 75. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage. Pet. 74–76. Petitioner relies on the same reasons to combine the relied-upon aspects of Roinestad2 and Roinestad, and a basis for a reasonable expectation of success as discussed as to claim 11 in the context of this asserted ground. Pet. 76.

As to the specific subject matter of these two dependent claims, Petitioner again refers to the right side of Figure 11 of Roinestad and states that, in that embodiment, “the distance of the outer edge of the drive member 304 from the vertical axis of rotation in an upper portion of the lower segment increases linearly from the first distance at the upper segment to the greater second distance at the lower portion of the lower segment.” Pet. 75 (citing O’Keefe Pet. Decl. ¶¶ 172, 175).

Patent Owner relies on the same argument as to claims 12 and 13 discussed above in the context of the ground of Pupp and Roinestad. See PO Resp. 59–60. For the same reasons discussed above (*see* § II.C.3.d), we are persuaded by Petitioner’s argument that a modified device in the configuration of the right side of Figure 11 of Roinestad satisfies both claims 12 and 13. Accordingly, we determine, based on the complete record, that Petitioner has demonstrated by a preponderance of the evidence that claims 12 and 13 would have been obvious based on Roinestad2 and Roinestad.

#### *H. Patent Owner’s Motion to Exclude Evidence*

##### *1. Exhibit 1003*

Patent Owner argues that the statement at column 1, lines 31–34 of Pupp is “hearsay” in that Pupp “neither identifies the ‘prior art’ nor explains how this ‘prior art’ positive engagement functioned or could operate without slip.” Paper 47 at 3. According to Patent Owner, “[b]ecause no data or information is supported by affidavit, it is inadmissible under 37 C.F.R. § 42.61(c).” *Id.* On this basis, Patent Owner argues that Pupp “should be excluded in its entirety” and all but the ground based on Roinestad2 and Roinestad “should be struck.” *Id.*

We are not persuaded to exclude Pupp in its entirety. As argued by Petitioner, Pupp’s statement as to “[p]rior art solutions” is not hearsay as the statement is not relied on to prove that positive drives actually existed prior to Pupp; instead it is being relied on to show that one of ordinary skill in the art would have understood the disclosures in Pupp to describe a positive drive. Paper 48 at 2–3 (citing, *e.g.*, *BioMarin Pharm. Inc., v. Genzyme Therapeutic Prods. Ltd. P’ship*, IPR2013-00537, Paper 79 at 25 (PTAB Feb. 23, 2015) (not excluding a document “offered as evidence of what it describes to an ordinary artisan, not for proving the truth of the matters addressed in the document”)); *see also* Pet. 29 & Pet. Reply 4 (citing Ex. 1003, 1:31–34). In other words, contrary to Patent Owner’s argument, Petitioner does not rely on this statement in Pupp for the “‘truth’ that *other* prior art is positive drive.” Paper 50 at 2. Thus, Petitioner’s reliance on the passage at issue in Pupp falls within the scope of 37 C.F.R. § 42.61(c), which provides that “[a] specification or drawing of a United States patent application or patent is admissible as evidence only to prove what the specification or drawing describes.” Further, for the reasons stated by Petitioner (Paper 48 at 3–4), we agree that Patent Owner’s argument as to waiver and the alleged need for supplemental evidence (Paper 47 at 2–3) are not persuasive. For these reasons, we do not exclude Exhibit 1003.

## 2. *Exhibit 1006*

Patent Owner provides numerous arguments as to why various paragraphs of Exhibit 1006, Mr. O’Keefe’s Petition Declaration, should be excluded. Paper 47 at 3–7. We address each in turn below.

First, Patent Owner identifies several paragraphs in Exhibit 1006 in which Mr. O’Keefe allegedly “asserts that Pupp employs or discloses a

conveyor belt positively driven *without slip*.” Paper 47 at 4. According to Patent Owner, “Petitioner was unable to establish a foundation for any opinion by O’Keefe relating to Pupp disclosing positive drive and most specifically, *without slip*” in that “O’Keefe’s conclusions are based only on his perception of a raised feature that is not even discussed in the patent.” *Id.* (citing Ex. 1003, Fig. 8; Ex. 2014, 19:9–20).

We are not persuaded to exclude the identified paragraphs as to this first issue. As noted by Petitioner, “arguments about whether an ‘expert’s opinions have been shown to be reliable or supported by underlying facts go to the weight of the evidence, not its admissibility.” Paper 48 at 4–5 (quoting *Palo Alto Networks, Inc. v. Finjan, Inc.*, IPR2016-00151, Paper 51 at 24 (PTAB Mar. 15, 2017) (denying request to exclude petitioner’s expert declarations)); *see also* TPG 79 (“A motion to exclude is not a vehicle for addressing the weight to be given evidence.”). As further noted by Petitioner, the relevant rule also addresses weight, not admissibility. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”), *cited at* Paper 48 at 5. Indeed, “[v]igorous cross-examination [and] presentation of contrary evidence . . . are the traditional and appropriate means of attacking shaky but admissible evidence” (*Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993)), not a motion to exclude the evidence.

Second, Patent Owner identifies several paragraphs in Exhibit 1006 that allegedly “refer to O’Keefe’s unfounded assertion that Ex. 1008 (Daringer) teaches that the disclosure of a cylindrical or a substantially cylindrical drive tower implicitly includes the disclosure of a conical drive

tower.” Paper 47 at 4. Patent Owner argues “Petitioner never established a foundation for any opinion by O’Keefe relating to Ex. 1008.” *Id.*

We are not persuaded to exclude the paragraphs identified as to this second issue. As an initial matter, as discussed above, we were not persuaded as to the merits of Petitioner’s reliance (via Mr. O’Keefe) on the relevant aspects of Daringer. Moreover, for reasons similar to those discussed in the context of the first issue as to Exhibit 1006, Patent Owner’s argument addresses the weight to give Mr. O’Keefe’s testimony on this issue, rather than its admissibility.

Third, Patent Owner states that paragraphs 66, 67, 70, and 72 refer to “‘standard design tools’ (e.g., computerized computational systems and computerized computational models)” and argues that “Petitioner established no foundation for any opinion by O’Keefe relating to such tools or that he even knows how to use them.” Paper 47 at 5.

For reasons similar to those discussed in the context of the first issue as to Exhibit 1006, Patent Owner’s argument addresses the weight to give Mr. O’Keefe’s testimony on this issue, rather than its admissibility. Moreover, as discussed above, Patent Owner did not actually challenge the merits of Petitioner’s position as to reasonable expectation of success in either the ground based on Pupp and Roinestad or the ground based on Roinestad2 and Roinestad. And Patent Owner does not appear to have questioned Mr. O’Keefe about the “standard design tools” at his deposition. *See Ex. 2014.*

We address the fourth, fifth, and sixth arguments together. Fourth, Patent Owner identifies several paragraphs in Exhibit 1006 and Appendix B in which Mr. O’Keefe allegedly “claims that a reference or combination of

references ‘expressly teach[es],’ ‘expressly disclose[s],’ ‘expressly recognize[s],’ ‘expressly provide[s],’ ‘expressly incorporate[s],’ or ‘expressly state[d]’ information.” Paper 47 at 5. According to Patent Owner, “Petitioner established no foundation for any opinion by O’Keefe relating to any asserted ‘express teaching’ because none exists.” *Id.*

Fifth, Patent Owner identifies several paragraphs in Exhibit 1006 and Appendix B in which Mr. O’Keefe allegedly “assert[s] that strip 10”, shown in FIG. 8 of [Pupp], can be divided into segments that are either a constant or a varied distance from the vertical axis.” Paper 47 at 5. According to Patent Owner, “Petitioner established no analysis or foundation for any opinion by O’Keefe relating to dividing strips 10” into such segments.” *Id.* at 5–6.

Sixth, Patent Owner identifies paragraphs 64, 65, 67–69, and 72 in Exhibit 1006 and asserts that Mr. O’Keefe “assert[s] that [one of ordinary skill in the art] would have had a ‘reasonable expectation of success.’” Paper 47 at 6. According to Patent Owner, “Petitioner established no foundation for any opinion by O’Keefe regarding [one of ordinary skill in the art’s] expectation of success.” *Id.*

For reasons similar to those discussed in the context of the first issue as to Exhibit 1006, Patent Owner’s fourth, fifth and sixth arguments each address the weight to give Mr. O’Keefe’s testimony on these issues rather than the admissibility.

Seventh, Patent Owner argues that, in paragraph 66, Mr. O’Keefe “claims a causal link between conical drive towers and low belt tension.” Paper 47 at 6. According to Patent Owner, “Petitioner established no



foundation for any opinion by O’Keefe regarding an alleged causal link.”  
*Id.*

We are not persuaded to exclude the identified paragraph. As an initial matter, as discussed above, we were not persuaded as to the merits of Petitioner’s reliance (via Mr. O’Keefe) on the alleged causal link. *See* § II.G.2.c.8. Moreover, for reasons similar to those discussed in the context of the first issue as to Exhibit 1006, Patent Owner’s argument again addresses the weight to give Mr. O’Keefe’s testimony on this issue, rather than its admissibility.

Eighth, Patent Owner argues that Exhibit 1006 should be excluded in its entirety because Mr. O’Keefe is allegedly “not qualified to be an expert” in this proceeding because, according to Patent Owner, he never designed a positive-drive helical conveyor system. Paper 47 at 6. Patent Owner argues that “[m]uch of O’Keefe’s testimony is inadmissible because it needs to relate to what a skilled artisan would have known about positive drive spiral conveyors around the 2011 timeframe of the invention” but that Mr. O’Keefe lacks the relevant experience and knowledge. *Id.* at 7.

As an initial matter, contrary to Patent Owner’s argument, as provided in the Trial Practice Guide, “[a] person may not need to be a person of ordinary skill in the art in order to testify as an expert under Rule 702, but rather must be ‘qualified in the pertinent art.’” TPG 34 (citing *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363–64 (Fed. Cir. 2008)). Failure to possess certain characteristics of the level of ordinary skill in the art “may not preclude an expert from providing testimony that is helpful to the Board, so long as the expert’s experience provides sufficient qualification in the pertinent art.” *Id.*

Further, Patent Owner argues that Mr. O’Keefe never designed a positive-drive helical conveyor system (Paper 47 at 6), however, the level of skill in the art identified above is broader, requiring only experience in design of “mechanical production equipment.” *See* Paper 48 at 6 (Petitioner arguing that, as of the Decision on Institution, the qualifications of one of ordinary skill in the art “do[es] not include particularized experience in ‘spiral conveyor systems’”). And it is unclear why the work performed by Mr. O’Keefe modifying the inlet on a conveyor to include an “air ride system” (Ex. 2014, 7:2–8:3) would not qualify as experience in design of mechanical production equipment. For these reasons, we view Mr. O’Keefe as qualified in the pertinent art, and we do not exclude any paragraphs of Exhibit 1006 based on Patent Owner’s arguments.

### *3. Exhibit 1011*

Patent Owner argues that Exhibit 1011, a supplemental declaration provided by Mr. O’Keefe, should be excluded. Paper 47 at 8. We deny Patent Owner’s motion as to this exhibit as moot, as we do not rely on it in this Decision. *See* TPG 79–80 (“In the Board’s experience, consideration of the objected-to evidence is often unnecessary to resolve the patentability of the challenged claims, and the motion to exclude is moot.”).

### *4. Exhibits 1027–1030*

Patent Owner argues that Exhibits 1027 through 1030 (U.S. Patent Nos. 8,302,764 to Johnson, 4,944,162 to Lang, 4,852,720 to Roinestad, and GB 1,377,498 to Bellenger), should be excluded. Paper 47 at 8–9. We deny Patent Owner’s motion as to these exhibits as moot, as we do not rely on them in this Decision. *See* TPG 79–80.

*5. Exhibit 1031*

Patent Owner argues that Exhibit 1031, the declaration of Mr. O’Keefe provided with the Reply, should be excluded. Paper 47 at 9–12. We deny Patent Owner’s motion as to this exhibit as moot, as we do not rely on it in this Decision. *See* TPG 79–80.

*6. Exhibits 1032 through 1034*

Patent Owner argues that Exhibit 1032 (a declaration by Martin Tabaka), Exhibit 1033 (a declaration by Robert Houlihan), and Exhibit 1034 (a declaration by Ingmar Pupp) should be excluded. Paper 47 at 12–15. We deny Patent Owner’s motion as to these exhibits as moot, as we do not affirmatively rely on them in this Decision. *See* TPG 79–80. Instead, we only mention these declarations in the context of one of Patent Owner’s arguments, which we did not find persuasive. *See supra* § II.C.3.a.8.

### III.CONCLUSION

Upon consideration of the briefing and the evidence of record, we determine that Petitioner (1) has proven by a preponderance of the evidence that claims 9 and 11–13 would have been obvious based on Pupp and Roinestad, (2) has *not* proven by a preponderance of the evidence that claim 10 would have been obvious based on Pupp and Roinestad, (3) has *not* proven by a preponderance of the evidence that claims 9–13 are anticipated by Heber, (4) has *not* proven by a preponderance of the evidence that claims 9–13 would have been obvious based on Heber, (5) has *not* proven by a preponderance of the evidence that claims 9–13 would have been obvious based on Heber and Roinestad, (5) has proven by a preponderance of the evidence that claims 11–13 would have been obvious based on Roinestad2

and Roinestad, and (6) has *not* proven by a preponderance of the evidence that claims 9 and 10 would have been obvious based on Roinestad2 and Roinestad.<sup>27</sup>

#### IV. ORDER

For the reasons above, it is:

ORDERED that Petitioner has proven by a preponderance of the evidence that claims 9 and 11–13 are unpatentable;

FURTHER ORDERED that Petitioner has not proven by a preponderance of the evidence that claim 10 is unpatentable;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any such appeal, a certificate shall issue canceling claims 9 and 11–13;

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

FURTHER ORDERED that the parties shall file, within 10 days of entry of this Decision, a joint motion to seal this Decision, and shall provide, along with the joint motion, an exhibit with a proposed redacted public version of this Decision; and

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<sup>27</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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

In summary:

<b>Claims</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/ Basis</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not Shown Unpatentable</b>
9-13	103(a)	Pupp, Roinestad	9, 11-13	10
9-13	102(a)/(b)	Heber		9-13
9-13	103(a)	Heber		9-13
9-13	103(a)	Heber, Roinestad		9-13
9-13	103(a)	Roinestad2, Roinestad	11-13	9, 10
<b>Overall Outcome</b>			9, 11-13	10

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