

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARCELORMITTAL,
Petitioner,

v.

ARRAY TECHNOLOGES, INC.,
Patent Owner.

Case IPR2018-00801
Patent 8,459,249 B2

Before BENJAMIN D. M. WOOD, BEVERLY M. BUNTING, and
JASON W. MELVIN, *Administrative Patent Judges*.

BUNTING, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

ArcelorMittal (“Petitioner”)¹ filed a Petition (Paper 2, “Petition” or “Pet.”) requesting an *inter partes* review of claims 1, 2, 5–10, 13, and 14 (“the challenged claims”) of U.S. Patent No. 8,459,249 B2 (Ex. 1001, “the ’249 patent”). Array Technologies, Inc., (“Patent Owner”) filed a Preliminary Response to the Petition (Paper 7, “Prelim. Resp.”). Upon consideration of the information presented in the Petition, we determined that there was a reasonable likelihood that Petitioner would prevail with at least one challenged claim, and instituted this trial, pursuant to 35 U.S.C. § 314(a), as to all challenged claims of the ’249 patent. Paper 8 (“Decision on Institution” or “Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 17, “PO Resp.”), Petitioner filed a Reply (Paper 23, “Reply”),² and Patent Owner filed a Sur-Reply (Paper 25). Petitioner filed evidentiary objections to certain of Patent Owner’s Exhibits (Paper 18) but did not file a motion to exclude, which is required to preserve any evidentiary objection. See 37 C.F.R. § 42.64(c). A transcript of the oral hearing held on July 1, 2019 has been entered into the record as Paper 30 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we conclude that Petitioner has not

¹ Petitioner names ArcelorMittal France and ArcelorMittal Project Martillac as the real parties-in-interest. Pet. 1.

² Patent Owner filed a Motion for Observations (Paper 34), and Petitioner filed a Response (Paper 38).

demonstrated, by a preponderance of the evidence, that the challenged claims are unpatentable.

B. Related Matters

The parties state that the '249 patent was asserted on August 25, 2017 in: *Array Technologies, Inc. v. Exosun, Inc.*, No. CV-17-02883-PHX-SPL.³ Pet. 1; Paper 5, 2.

C. The '249 Patent

The '249 patent, titled “Single Axis Solar Tracking System,” issued on June 11, 2013, and claims priority from an application filed on December 18, 2008, and a provisional application filed June 15, 2007. Ex. 1001, [54], [45], [22], [60]. The patent relates to solar energy production, and more specifically to a “method and apparatus for constructing mechanically linked, single axis solar tracking systems of various tracking geometries to follow the diurnal motion of the sun.” *Id.* at 1:14–17. The background of the '249 patent explains that solar tracking systems need to be built strong enough to resist wind forces in any tracking position. *Id.* at 1:64–66. The '249 patent describes several types of known solar tracking systems, including a horizontal tracker that “minimizes the structural material requirements by keeping the modules at a relatively low profile to the foundation and at a minimum overhung moment load relative to the rotating axis without requiring special connections to rotate the system about its center of gravity.” *Id.* at 2:22–26. Another type of solar tracker is a tilted, single axis tracker that tilts in elevation and rotates about the tilted axis. *Id.*

³ Petitioner, or its related companies, purchased certain assets of French company Exosun SAS, the purported parent of Exosun, Inc. Pet. 1.

at 3:51–52. Still another type of solar tracking system is a dual-axis tracker that keeps the solar module perpendicular to the sun in both axes. *Id.* at 4:3–6.

The '249 patent describes a mechanically linked, horizontal, single axis tracking assembly 10 used to point one or more solar panels 12 towards the sun via drive mechanism 14 and drive shaft 28 as shown in Figure 1A, reproduced below.

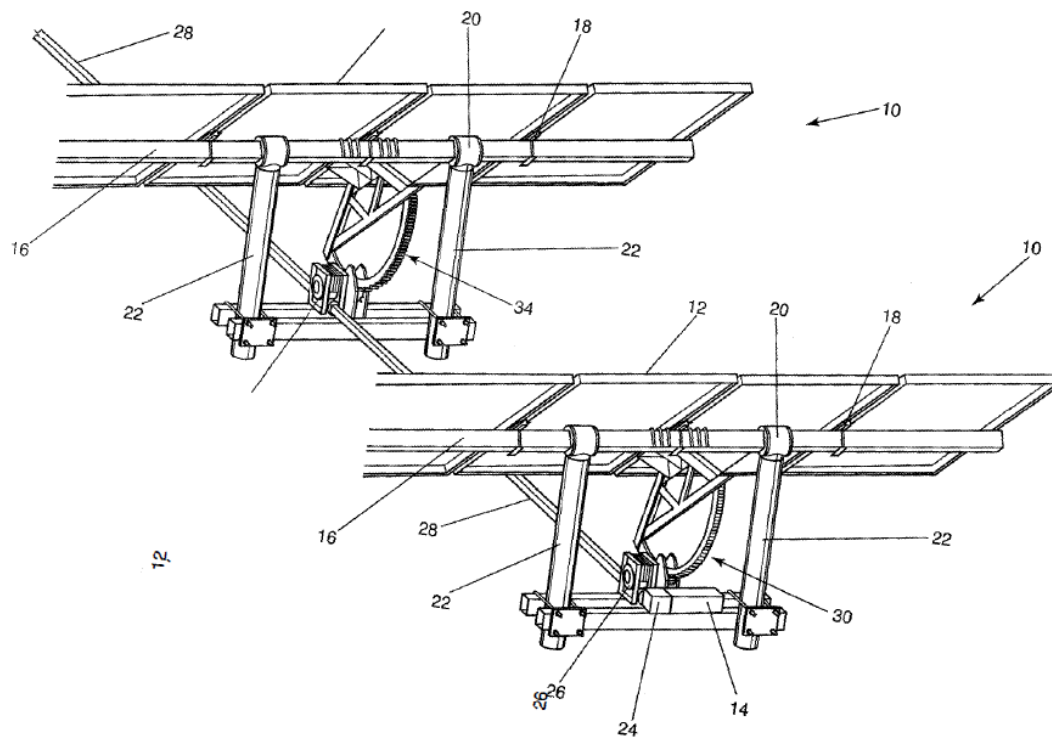


FIG. 1A

Ex. 1001, 7:36–41. Figure 1A illustrates the mechanically linked horizontal trackers.

In the embodiment shown in Fig. 1A, drive mechanism 14 rotates drive shaft 28, which drives “worm-gear assembly or drive box 26.” *Id.* at 7:45–46. That is, drive mechanism 14 drives worm-gear box 26 to directly or indirectly rotate torsion tube 16, which in turn rotates modules 12. *Id.* at

7:55–60. Multiple tracking assemblies can be connected to drive shaft 28, allowing one motor to drive a plurality of tracking assemblies. *Id.* at 7:63–8:4. Torque tube 16 is attached to vertically oriented support columns 22. *Id.* at 8:44–55.

Worm-gear assembly 26 is illustrated in Figure 3A, reproduced below.

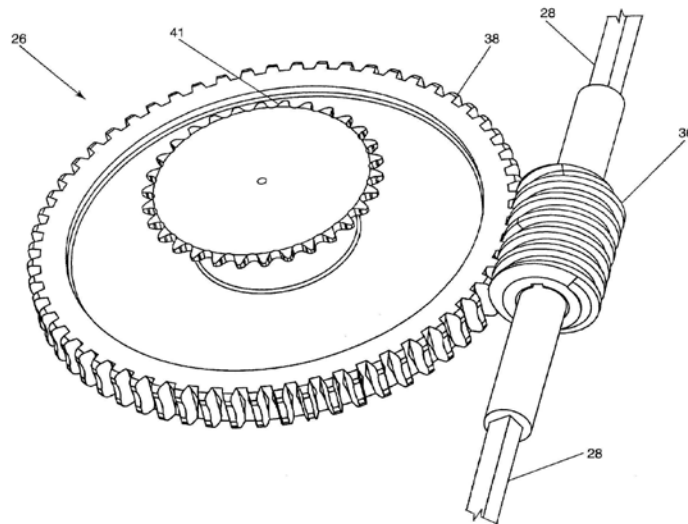


FIG. 3A

Figure 3A is an exemplary worm-gear assembly. Each tracker location includes worm-gear assembly 26 that “[t]ypically [] contains worm 36 and worm-gear 38. Worm 36 is affixed to drive shaft 28 by means well known in the art.” *Id.* at 8:12–14. For example, in Figure 3A, worm gear assembly 26 drives D-ring chain drive assembly 34, while in Figure 3B, worm gear assembly 26’ drives spur gear rack assembly 30. *Id.* at 8:14–20.

D. Challenged Claims

Of the challenged claims, apparatus claim 1 and method claim 9 are independent. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A linked tracker system for driving a plurality of individual solar tracker assemblies displaced in a large field for following the motion of the sun relative to the earth, the linked tracker system comprising:

a single driving apparatus for rotating a plurality of linked drive shafts configured to drive mechanically linked multiple rows of the individual solar tracking assemblies, at least one drive shaft from the plurality of drive shafts affixed to each solar tracking assembly and the at least one drive shaft being minimally constructed to withstand the forces of being driven by the single driving apparatus;

a worm-gear box assembly directly mounted to one or more support columns anchored to the ground and connected to the each solar tracker assembly for providing motion by the driving apparatus to the each solar tracker assembly to avoid transmitting of external forces exerted on the each solar tracker assembly to the plurality of linked drive shafts between the worm-drive gear boxes and to transmit the external forces to the one or more anchored support columns, said worm-gear box assembly affixed and driven by the at least one drive shaft; wherein the at least one drive shaft comprise articulating joints for compensating for non-linearity between trackers in a horizontal and a vertical direction.

Ex. 1001, 12:35–59.

E. Evidence Relied Upon

Petitioner relies on the following prior art references:⁴

Reference	Patent/Printed Publication	Date	Exhibit
Mackamul	U.S. Patent Pub. No. 2006/0044511 A1	March 2, 2006	1005
Johnson '521	U.S. Patent No.	Oct. 27, 1981	1006

⁴ Petitioner identifies the admitted prior art (“the ’249 patent APA) as the references listed “at column 2, lines 51 to 62 as Background Art, and is admitted in the ’249 patent as prior art.” Pet. 26 (citing Ex. 1001, 1:18, 2:51-62).

Reference	Patent/Printed Publication	Date	Exhibit
	4,297,521		
Dorian	U.S. Patent No. 4,223,214	Sep. 16, 1980	1007
Appelqvist	U.S. Patent No. 7,140,475	Nov. 28, 2006	1008
Sampayo	U.S. Patent No. 5,542,409	Aug. 6, 1996	1009
Johnson '355	U.S. Patent No. 4,968,355	Nov. 6, 1990	1010
Shingleton	U.S. Patent No. 6,058,930	May 9, 2000	1011

F. Grounds of Unpatentability

Petitioner challenges the '249 patent based on the following grounds of unpatentability (Pet. 25–26):

References	Basis ⁵	Claim(s) Challenged
Mackamul, Johnson '521, Johnson '355, Sampayo, the '249 patent APA, Shingleton	§ 103(a)	1, 2, 8–10, 14
Mackamul, Johnson '521, Dorian, Johnson '355, Sampayo, the '249 patent APA, Shingleton ⁶	§ 103(a)	5, 6, 13

⁵ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (Sept. 16, 2011), took effect on March 16, 2013. Because the application from which the '249 patent issued was filed before that date, our citations to Title 35 are to its pre-AIA version.

⁶ We maintain our determination from the Decision on Institution that “[w]e view the usage of terms such as ‘and,’ ‘or’ and ‘optionally’ in the table describing the asserted references as an invitation for us to select the best combination of references, which we decline. Instead, we consider the list

References	Basis ⁵	Claim(s) Challenged
Mackamul, Johnson '521, Appelqvist, Johnson '355, Sampayo, the '249 patent APA, Shingleton	§ 103(a)	7, 14

Pet. 25–26. Petitioner supports its challenge with the Declaration of T. Kim Parnell, PhD. (Ex. 1016) and Patent Owner relies on the declaration of Edward C. Kern, Jr., Ph.D. (Ex. 2001). The parties rely on other exhibits as discussed below.

II. ANALYSIS

A. Legal Principles

1. Burden of Proving Unpatentability

In an *inter partes* review, petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail in this proceeding, Petitioner must support its challenges by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Accordingly, all of our findings and conclusions are based on a preponderance of the evidence.

2. Obviousness

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a

of references for a particular ground as inclusive of all references cited by Petitioner.” Dec. 10–11.

person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). The U.S. Court of Appeals for the Federal Circuit has made clear that a petitioner in an *inter partes* review proceeding cannot “satisfy its burden of proving obviousness” by “employ[ing] mere conclusory statements” and “must instead articulate specific reasoning, based on evidence of record” to support an obviousness determination. *In re Magnum Oil Tools Int’l*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016).

We analyze the following grounds of unpatentability in accordance with the above-stated principles. Because Patent Owner does not provide evidence regarding secondary considerations, our determination is based on the first three factors. *See generally* PO Resp. 39–63; Pet. 73–74; *see also* *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1373 (Fed. Cir. 2018) (“While [the] burden of persuasion remains with the challenger, a patentee bears the burden of production with respect to evidence of secondary considerations of nonobviousness.”).

B. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, 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.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted).

Petitioner relies on the testimony of Dr. Parnell in contending that a person of skill in the art (“POSITA”) would have “a bachelor’s degree in mechanical engineering with direct experience with solar tracker systems for driving solar tracker assemblies.” Pet. 41 (citing Ex. 1016 ¶ 112). Patent Owner does not expressly disagree with this formulation. *See generally* PO Resp. Indeed, Patent Owner’s expert, Dr. Kern, testifies that he “do[es] not disagree with Dr. Parnell’s characterization of a person of ordinary skill in the art for the purpose of this proceeding.” Ex. 2001, ¶ 32.

Thus, based on the complete record, we accept Petitioner’s formulation, finding that the POSITA would have “a bachelor’s degree in mechanical engineering with direct experience with solar tracker systems for driving solar tracker assemblies.”

C. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear.⁷ 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, and absent any special definitions, we generally give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*,

⁷ The USPTO revised its rules to harmonize the Board’s claim construction standard with that used in federal district court. 83 Fed. Reg. 51,340 (Nov. 13, 2018). This rule change applies to petitions filed after November 13, 2018, however, and does not apply to this proceeding. *Id.*

504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Petitioner proposes claim constructions or asserts no construction is required for (1) the preamble (Pet. 27–28); (2) “single driving apparatus” (*id.* at 29); (3) minimally constructed (*id.* at 29–32); (4) “worm gear box assembly,” “worm gear box,” and “worm-drive gear boxes” (*id.* at 32–35); (5) “directly mounted to one or more support columns” (claim 1) and “mounted to one or more support columns” (claim 9)” (*id.* at 35–36),); (6) “to avoid transmitting of external forces” (claim 1) and “resisting a transmission of external forces” (claim 9) (*id.* at 36–39; (7) “to transmit the external forces to the one or more anchored support columns” (*id.* at 39); (8) “articulating joints for compensating for non-linearity between trackers in a horizontal and a vertical direction” (*id.* at 40); and (9) “low back forces” or “back forces” (*id.* at 40–41).

In turn, Patent Owner proposes constructions or asserts no construction is required for (1) the preamble (PO Resp. 24–27); (2) “minimally constructed” (*id.* at 27–30); (3) “worm gear box assembly,” “worm gear box,” and “worm-drive gear boxes” (*id.* at 30–35); (4) “to avoid transmitting of external forces” and “resisting a transmission of external forces” (*id.* at 36–37); (5) “to transmit the external forces to the one or more anchored support columns” (*id.* at 37–38); and (6) “harmonic dampener affixed between a torsions tube of a photovoltaic (PV) module assembly and the one or more support columns” (*id.* at 39).

We determined in our Decision on Institution that no express construction of any term or limitation was necessary. Dec. 10. Now, having considered the entire record, we conclude that our determination regarding the obviousness of the challenged claims does not turn on the interpretation of any of the claim terms, and that no express construction of any claim term is necessary for purposes of this Final Written Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017), *cert. denied*, 138 S Ct. 1695 (April 30, 2018) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (indicating that “we need only [expressly] construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”).

D. Obviousness Based on Mackamul, Johnson ’521, Johnson ’355, Sampayo, the ’249 Patent APA, and Shingleton

Petitioner challenges the patentability of claims 1, 2, 8–10, and 14 of the ’249 patent under 35 U.S.C. § 103 as obvious based on Mackamul, Johnson ’521, Johnson ’355, Sampayo, the ’249 patent APA, and Shingleton. Pet. 41–66. In support thereof, Petitioner identifies the disclosures in the cited references alleged to describe the subject matter in each of the challenged claims, as well as reasons why a POSITA would have modified Mackamul based on Johnson ’521, Johnson ’355, Sampayo, the ’249 patent APA, and Shingleton. *Id.* Petitioner supports its arguments and evidence with the testimony of its declarant, Dr. Parnell. Ex. 1006.

Patent Owner disputes that Mackamul teaches certain limitations and further argues that the proposed combination is unavailing for the reasons discussed *infra*. PO Resp. 39–54, 60–62. Patent Owner supports its

arguments and evidence with the testimony of its declarant, Dr. Kern. Ex. 2001.

For the reasons that follow, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 2, 8–10, and 14 are obvious based on Mackamul, Johnson '521, Johnson '355, Sampayo, the '249 patent APA, and Shingleton. We begin our analysis with an overview of the cited references, and then address the party's contentions in turn.

1. Mackamul Ex. (1005)

U.S. Patent Application Publication 2006/0044511 A1 to Mackamul was published on March 2, 2006. Ex. 1005 (10), (12), (43). Mackamul is directed to a tracker drive system for rotatably driving solar panels to track the sun's path during the day. *Id.* at Abstract.

Tracker drive system 112 is supported by foundations 114, and includes drive member 108 to rotatably drive rows 104 of solar panels 106. Ex. 1005 ¶¶ 41, 44, Figs. 1, 2. Support beam 116 extends between successive foundations 114, and provides support for movable drive member 108 and drive mechanism 118. *Id.* ¶¶ 44–46, Figs. 2, 4. Mackamul discloses that drive mechanism 118 may be a linear actuator that drives drive member 108 along “a predetermined linear path in direction YY,” e.g., an east-west direction. *Id.* ¶ 51. Figure 4 is reproduced below.

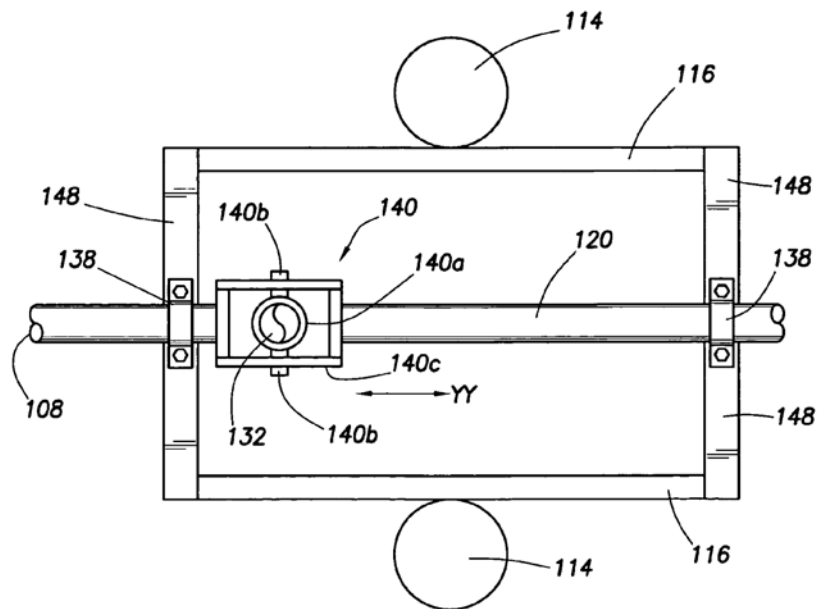


FIG. 4

Figure 4 is a schematic top view of part of Mackamul's tracker drive system. Moveable drive member 108—or more specifically, driving section 120, an intermediate section of drive member 108—is connected to lever arm 132 via dynamic coupler 140. *Id.* ¶¶ 46, 58, 61, Fig. 3. In the embodiment illustrated in Figure 4, dynamic coupler 140 is represented by gimbal sleeve bearing 140, intercoupled with driving section 120. *Id.* at 61. Lever arm 132 is attached to torque element 124 (e.g., a bar or beam as depicted in Figures 3 and 5), which supports a row of solar panels 106. *Id.* ¶¶ 52-53. Linear movement of drive member 108/driving section 120 causes angular movement of lever arm 132, which in turn rotates torque element 124 and the solar panels supported by the torque element. *Id.* ¶ 69. Because the end of lever arm 132 passes through dynamic coupler 140, the point of driving contact between driving section 120 and lever arm 132 moves linearly as drive member 108 moves linearly, allowing a translational degree of

freedom and a rotational degree of freedom between drive member 108/driving section 120 relative to lever arm 132. *Id.* As also depicted in Figure 4, cross-beams 148 extend between support beams 116, and linear sleeve bearings 138 are mounted on cross beams 148 to facilitate movement of driving section 120. *Id.* ¶ 58. Mackamul contemplates that “other drive mechanisms or actuators may be employed.” *Id.* ¶ 83.

2. *Johnson '521 (Ex. 1006)*

U.S. Patent No. 4,297,521 to Johnson issued on October 27, 1981, and is directed to a solar energy collector apparatus. Ex. 1006 [11], [19], [45], [54]. Johnson '521 describes an embodiment in Figure 6, in which motor 130 rotates shaft 132, to engage gears 136a–136c by worm gears 134a–134c, in order to rotate solar collectors 102a–102c. *Id.* at 9:47:52.

Johnson also discloses the embodiment shown in Figure 3, reproduced below.

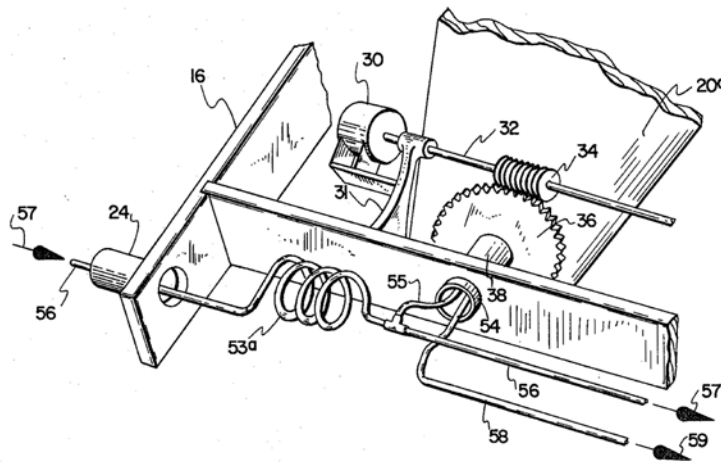


Fig. 3

Figure 3 is a partial perspective view of the solar collector. *Id.* at 4:4–6. In Johnson '521, “[m]otor 30 is mounted on a stanchion 31 and may be selectively ganged with other banked solar panels 10 (Fig. 1) through the

appropriate shafts, universal joints, bearings, gears and couplings (not shown).” *Id.* at 5:46–49.

3. *Johnson ’355 (Ex. 1010)*

U.S. Patent No. 4,968,355 to Johnson issued on November 6, 1990, and is directed to a solar tracking mechanism. Ex. 1010 [11], [19], [45], [57]. In the embodiments of drive mechanisms shown in Figures 6–10, Johnson ’355 states that “the worm drive could be expected to exhibit the best tracking resolution due to the high step-down gearing ratio between the worm and worm wheel, and due to the absence of intermediate mechanical couplings.” *Id.* at 7:10–13.

4. *Sampayo (Ex. 1009)*

U.S. Patent No. 5,542,409 to Sampayo issued on August 6, 1996, and is directed to a solar concentrator system. Ex. 1010 [11], [19], [45], [57]. The driving mechanism is shown in Figure 3, reproduced below.

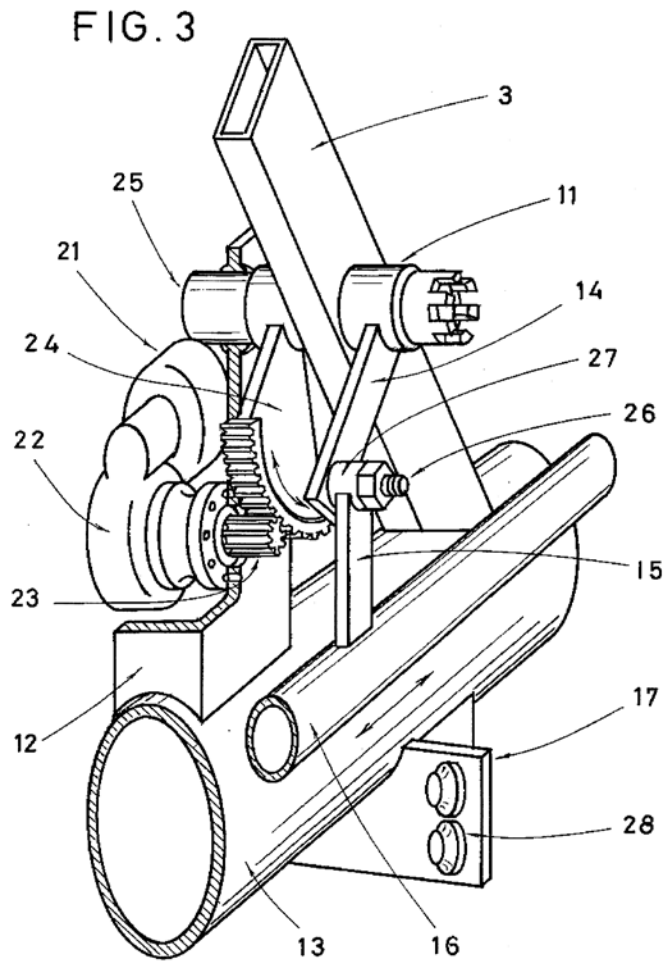


Figure 3 is a perspective view of the drive mechanism coupled to the moving frame. *Id.* at 2:56–59. The driving mechanism includes motor drive 21, worm gear 22, external gear 23, and bushing 11. *Id.* at 3:51–55.

5. *Shingleton (Ex. 1011)*

U.S. Patent No. 6,058,930 to Shingleton issued on May 9, 2000, and is directed to a solar collector and tracker that includes a linkage mechanism to allow use on uneven terrain. Ex. 1011 [11], [19], [45], [57], 3:35–37.

6. *Discussion*

a. *Claim 1*

Our rules require that the petition identify where each element of the claim is found in the cited prior art, and the relevance of the evidence to the

challenged claim. 37 C.F.R. § 42.104 (b). With the complete trial record before us, we note that we have reviewed arguments and evidence advanced by Petitioner to support its unpatentability contentions. In its proposed combination, Petitioner relies on certain components of Mackamul’s system, particularly Mackamul’s dynamic coupler, to teach certain limitations in claim 1. Yet, as discussed in detail below, it is unclear from the Petition whether Mackamul’s dynamic coupler is removed, or retained and replaced with Johnson ’521’s worm drive assembly, as Petitioner argues in its Reply. Pet. Reply. 15–18. This lack of clarity infects Petitioner’s mapping of Mackamul and Johnson ’521 to each of the limitations of claim 1. Based on the complete record, we are not persuaded that Petitioner’s proposed combination based on Mackamul and Johnson ’521, teaches or suggests all of the limitations of claim 1.

(1) Petitioner’s reliance on Mackamul’s Dynamic Coupler

We first address Petitioner’s reliance on Mackamul’s dynamic coupler to meet the limitations of claim 1. For example, Petitioner contends that Mackamul discloses drive mechanism 118 that “mov[es] a plurality of linked drive member 108 sections to rotate rows 104 of solar panels 106.” Pet. 42 (citing Ex. 1005, ¶¶ 45–46). By attaching drive member 108 to driving sections 120 for rotating each row of solar panels 106 via drive mechanism 118, Petitioner explains that “[t]he driving section 120 may also serve as an intermediate section linking two sections of the drive member 108 (for example, when the drive member 108 is designed to drive more than two rows of solar panels).” *Id.* at 43 (citing Ex. 1005 ¶ 46; Ex. 1016 ¶ 139) (emphasis omitted). Additionally, Petitioner contends that the disclosure in Mackamul regarding connecting drive member 108 “to each

row of solar panels 106 via the driving sections 120, dynamic coupler 140, lever arm 132 and torque element 124” teaches “at least one drive shaft from the plurality of drive shafts affixed to each solar tracking assembly.” *Id.* (citing Ex. 1005 ¶¶ 68, 69; Ex. 1016 ¶ 141). Thus, Petitioner relies on structure in Mackamul’s dynamic coupler to assert that Mackamul teaches the claimed drive shaft.

Relying on the testimony of Dr. Parnell, Petitioner argues that Mackamul also teaches “at least one drive shaft being minimally constructed to withstand the forces of being driven by the single driving apparatus.” Pet. 43. Specifically, Petitioner argues that the sections of drive member 108 don’t experience all the transmitted external forces from the solar panels, “but rather the external forces exerted on the solar panels that remain after having been avoided via transferring forces to the support columns.” *Id.* at 43 (citing Ex. 1016 ¶ 142). Petitioner maintains that Mackamul teaches expressly reduced resistive forces on the drive mechanism. *Id.* at 44 (citing Ex. 1005 ¶ 73; Ex. 1016 ¶ 143). Mackamul discloses that “force on the dynamic coupler at the extremes is reduced . . . as compared to the force exerted when the lever arm 132 is at the vertical or minimum effective lever arm length position.” Ex. 1005 ¶ 73. Thus, Petitioner relies on Mackamul’s dynamic coupler to support its assertion that Mackamul teaches that the forces on the driveshaft are reduced from those applied to the solar panels.

Petitioner maintains that the “directly mounted to one or more support columns anchored to the ground” element is satisfied by Mackamul’s bearings 138, cross beams 148, and support beams 116, which form a support assembly that is “directly mounted” to foundation 114. Pet. 50 (citing Ex. 1005 ¶ 58, Figure 4).

Petitioner contends that Mackamul teaches a “support assembly” that is “connected to the each solar tracker assembly for providing motion by the driving apparatus to the each solar tracker assembly.” Pet. 51 (citing Ex. 1016 ¶¶ 169–170). Petitioner explains that (1) driving section 120 rotates lever arm 132 using dynamic coupler 140 to rotate torque element 124; (2) torque element 124 supports the rows 104 of solar panels; (3) torque element 124 may be supported by beam 116; (4) rotation of torque element 124 causes row 104 of solar panels 106 to rotate; and (5) each driving section 120 is connected to a row 104 to provide motion from drive mechanism 118 to each solar panel. Pet. 50–51 (citing Ex. 1005 ¶¶ 53, 54, 59).

Petitioner also contends that Mackamul teaches both “to avoid transmitting of external forces exerted on the each solar tracker assembly to the plurality of linked drive shafts” and “transmitting the ‘external forces to the one or more anchored support columns’ via its support assembly.” Pet. 51 (citing Ex. 1016 ¶ 172). Petitioner explains that (1) the support assembly is connected to foundation 114; (2) foundation 114 holds linear driving section 120; (3) linear driving section 120 is supported by bearings 138 mounted on cross beams 148 and connecting support beams 116 via dynamic coupler 140; and (4) dynamic coupler 140 drives lever 132. *Id.* at 51. In Petitioner’s view, certain external forces on solar panels 106 are transmitted to torque element 124 via lever arm 132 and dynamic coupler 140, and then to cross-beams and foundation 114. *Id.* (citing Ex. 1005 ¶73; Ex. 1016 ¶ 171). Relying on its understanding of Mackamul’s operation, Petitioner concludes that the resistive forces on the drive mechanism are reduced. *Id.* (citing Ex. 1005 ¶73; Ex. 1016 ¶ 171).

(2) *Petitioner's reliance on Johnson '521*

Petitioner acknowledges that Mackamul does not disclose that drive mechanism 118 is “for rotating a plurality of linked drive shafts,” e.g., drive member 108, and therefore asserts that one of ordinary skill in the art would have replaced Mackamul’s linear drive mechanism 118 with Johnson ’521’s “single drive motor for rotating a worm drive shaft.” Pet. 46 (citing Ex. 1016 ¶¶ 149–152). The specific teachings of Johnson ’521 on which Petitioner relies describe rotation of drive shaft 132 by single motor 130 to “pivot the solar collectors via worm gears 134a to 134c” (*Id.* at 45 (citing Ex. 9:47–52)), and in the Figure 3 embodiment, “[m]otor 30 is mounted on a stanchion 31 and may be selectively ganged with other banked solar panels 10 (FIG. 1) through the appropriate shafts, universal joints, bearings, gears and couplings” (*id.* at 45–46 (citing Ex. 1006, 5:40–49)).

Petitioner provides several reasons why a POSITA would replace Mackamul’s linear drive mechanism with Johnson ’521’s single motor worm drive. For example, Petitioner argues that the proposed modification “would have been a simple substitution of one known element for another to obtain predictable results of rotating solar collectors.” Pet. 46 (citing Ex. 1016 ¶ 156). Petitioner supports this argument by explaining that Mackamul contemplates the use of other types of drive mechanisms (*Id.* at 47 (citing Ex. 1005 ¶¶ 10, 50)), and reasons that “[o]ne of skill in the art would have understood that the other drive mechanisms or actuators contemplated by Mackamul would have included a worm drive as in Johnson ’521” (*id.* (citing Ex. 1016 ¶ 159)).

Patent Owner responds that Petitioner fails to explain how Mackamul would be modified by Johnson ’521 to achieve the claimed invention. PO

Resp. 46–51. Central to Patent Owner’s argument is its contention that Petitioner relies on Mackamul’s dynamic coupler to meet certain limitations, but the dynamic coupler would be removed in the proposed combination. PO Resp. 4. Patent Owner asserts that “nowhere does the Petition explain how the worm gear of Johnson ’521 would allegedly interact with the lever arm 132 and torque element 124 that are mounted to the back of the solar panels in Mackamul,” which “represents a significant gap in the analysis, because this is achieved by the dynamic coupler in Mackamul,” which would be removed as a result of the proposed combination. *Id.* at 47 (citing Ex. 2001 ¶¶ 95–102). Patent Owner supports this position with the cross-examination testimony of Dr. Parnell that “‘the entire drive system’ including the dynamic coupler of Mackamul would have to be removed in order to make the combination.” *Id.* at 4 (citing (Ex. 1019, 110:12–111:8). Patent Owner argues that Petitioner’s proposed combination suggests two options:

either the dynamic coupler remains (as argued in the Petition) and a worm gear cannot be added because a rotating drive shaft cannot be used, or the dynamic coupler is removed (not argued in the Petition but necessary to make the combination) and the Petition does not explain how every element of any claim of the ’249 Patent would be obvious over the proposed combination.

Id.

We agree, and first address the option of retaining the dynamic coupler, but modifying it to use Johnson ’521’s worm and worm drive rather than Mackamul’s linear actuator 118. Here, Petitioner argues that Patent Owner mischaracterizes the proposed combination because it did not suggest removing Mackamul’s dynamic coupler. Pet. Reply 15–18. Along this vein, Petitioner maintains that substituting the worm drive for the linear actuator

of Mackamul “does not remove the dynamic coupler” but rather “uses a different kind of dynamic coupler: a worm and worm gear.” *Id.* at 15–16. Nonetheless, Petitioner’s arguments directed to “a different kind of dynamic coupler” still means replacing *Mackamul*’s dynamic coupler, which we address below.

Retaining Mackamul’s dynamic coupler requires driving it with a linear motion, as with Mackamul’s linear actuator 118. *See* Ex. 1005 ¶¶ 50–51 (describing linear actuator 118). There is a fundamental mismatch, however, between the linear motion required for Mackamul’s dynamic coupler and the rotational motion claimed and also created by a worm gear. Critically, Petitioner does not address this mismatch, which undermines a combination that retains the dynamic coupler.

Patent Owner challenges Petitioner’s statement that “Mackamul’s disclosure that ‘other drive mechanisms or actuators may be employed’ ‘provides a specific teaching, suggestion, and motivation that would have led a POSITA to modify the linear drive with a worm drive as in Johnson ’521.’” *Id.* at 49–50 (citing Pet. 47). Patent Owner disputes that this general statement contemplates rotary motion because Mackamul discloses a push/pull drive mechanism and dynamic coupler. *Id.* at 50 (citing Ex. 1005 ¶ 83). Instead, Patent Owner understands this statement as suggesting that other types of “linear mechanisms” may be used. *Id.* (citing Ex. 2001 ¶ 105). In other words, Patent Owner asserts that this passage is not “teaching a person of skill to abandon the entire invention – linear motion, the lever arm, the torque element, the rod, the dynamic coupler and the drive member – and replace the whole thing with an entirely new system.” *Id.* (citing Ex. 2001 ¶¶ 100–105).

Petitioner counters that

Mackamul expressly discloses that the drive mechanism is not limited to linear actuators:

- (1) “[t]he drive member is drivable by a drive mechanism that in one embodiment **may include** a linear actuator” (Ex. 1005, [0010]) (emphasis added);
- (2) “[**w**]hen a linear actuator is employed as the drive mechanism...” (Ex. 1005, [0050]) (emphasis added); and
- (3) “**other** drive mechanisms or actuators may be employed. Ex. 1005, [0083] (emphasis added).

Pet. Reply 21. Petitioner also argues that a “specific teaching” is not required because “[t]he analysis need not seek out **precise teachings** directed to the **specific subject matter** of the challenged claim.” Pet. Reply 22 (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 405 (2007)).

Petitioner supports its argument with the cross-examination testimony of Dr. Kern, acknowledging that the use of rotational drives in solar tracker arrays was known and suggesting that claim 1 is not limited to linear actuators. *Id.* (citing Ex. 2003, 118:14–125:19).

In its sur-reply, Patent Owner argues that the reference to “other drive mechanisms” does not refer to rotary drive mechanisms. PO Sur-Reply 20 (citing Ex. 2001 ¶¶ 104–105). Instead, Patent Owner understands this passage as suggesting other types of linear mechanisms, such as “a pneumatic rod type actuator, a rack and pinion actuator, a screw jack, a ball screw, or a hydraulic cylinder.” *Id.* (citing Ex. 2001 ¶ 105).

As an initial matter, we observe that Patent Owner addresses only the “other drive mechanisms” language of paragraph 83 of Mackamul, and not the statements in paragraphs 10 and 50 of Mackamul, on which Petitioner also relies. Pet. 47; Pet. Reply 21. That said, regardless of how this language is interpreted, it does not resolve the underlying mismatch between

Mackamul's (linear) dynamic coupler and a (rotational) worm drive in Petitioner's proposed combination, discussed above.

Thus, Petitioner has not provided sufficient articulated reasoning with rational underpinning explaining why one with ordinary skill in the art would have modified the teachings of the applied references to address the noted differences. *See KSR*, 550 U.S. at 418 (citing *Kahn*, 441 F.3d at 988) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”)). As the Federal Circuit has made clear, when a reason to combine or modify references is in dispute, we must make a finding of a motivation to combine and must have an adequate evidentiary basis for that finding. *See In re Nuvasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016). “[C]onclusory statements’ alone are insufficient and, instead, the finding must be supported by a ‘reasoned explanation.’” *Id.* at 1383 (quoting *In re Lee*, 277 F.3d 1338, 1342, 1345 (Fed. Cir. 2002)); *accord id.* at 1384 (not permitting the Board to effectively adopt the petitioner’s argument, which “amount[ed] to nothing more than conclusory statements that a PHOSITA would have been motivated to combine the prior art references to obtain additional information.”). Moreover, the Board “cannot rely solely on common knowledge or common sense to support [our] findings.” *Id.*

Here, Petitioner proposes replacing Mackamul's linear actuator for moving a link member that then rotates a solar panel with Johnson '521's single motor worm drive for rotating a solar panel. We recognize that both actuators may effect rotation of a solar panel. Petitioner's proposed modification, however, does not persuade us that one of skill in the art

would consider replacing Mackamul's linear actuator with a rotating actuator to be "a simple substitution." Pet. 46 (citing Ex. 1016 ¶ 156). In particular, we disagree that retaining Mackamul's dynamic coupler, which Petitioner relies on for the drive shaft limitation, and replacing the drive mechanism 118 with Johnson '521's worm and worm gear, is a simple substitution. We credit the cross-examination testimony of Dr. Parnell that

Q: You would agree that if you take Item 118 out of Figure 2 [of Mackamul] and put a rotating drive there and don't make any other changes to Mackamul, it simply won't work.

A: As I explained in the declaration, you have to look at the overall drive system to make the substitution.

Q: You agree that just changing the motor wouldn't work. You'd have to change the entire drive system of Mackamul.

A: You need to make the change or the substitution for the entire drive system.

Q: And when you do that, you would not have the drive force reduction that is provided by the dynamic coupler of Mackamul; right? ... As a production in drive force based on the angle.

A: You wouldn't have it associated with the dynamic coupler, since that would be part of the drive system. But you would see a reduction associated with other components.

PO Sur-Reply 13.

As Patent Owner points out,

the reason to combine the teachings of the prior art must be directed to the specific combination of elements that a person of skill in the art would allegedly bring together, and the Petition must explain the way in which the elements would allegedly be brought together to achieve the claimed invention.

Id. at 49.

The burden rests with Petitioner to explain and prove that a person of ordinary skill the art would have modified the asserted references in the

manner proposed by Petition. *See* 35 U.S.C. § 316(e); *Magnum Oil*, 829 F.3d at 1380–81 (holding that because petitioner “bears the burden of proof,” the Board “must base its decision on arguments that were advanced by [petitioner]”); 35 U.S.C. § 312(a)(3); 37 C.F.R. §§ 42.22(a)(2), 42.104(b)(4)–(5). Petitioner fails to carry that burden here.

We further consider a combination that alternatively removes Mackamul’s dynamic coupler and replaces it with Johnson ’521’s worm and worm gear. Patent Owner argues that Petitioner does not describe “with particularity what features of Mackamul a worm gear would replace in Petitioner’s proposed combination.” PO Resp. 46–48. The problem with considering the replacement of Mackamul’s dynamic coupler is twofold: Petitioner relies on aspects of the dynamic coupler for other claim limitations and has not adequately supported such a combination. For example, Petitioner relies on drive section 120, dynamic coupler 140, lever arm 132 and torque element 124 to satisfy multiple claim elements, as described above. Pet. 43, 50–51. Thus, Patent Owner argues persuasively that Petitioner fails to explain how Johnson ’521’s worm gear would interact with Mackamul’s lever arm 132 and torque element 124, if the worm gear replaces the dynamic coupler. PO Resp. 47. Stated plainly, Petitioner cannot both rely on aspects of Mackamul’s dynamic coupler for some claim elements but also argue that Johnson ’521’s worm and worm gear would replace the dynamic coupler. Accordingly, to the extent Petitioner proposes such a replacement, Petitioner fails to provide sufficient arguments supported by credible evidence that the proposed combination would teach the limitations of claim 1.

Further, Petitioner’s purported justification for the combination, discussed above, relates to replacing the “linear drive mechanism 118 of Mackamul with a single drive motor for rotating a worm drive shaft as taught by Johnson ’521.” Pet. 46. That justification comes from Mackamul’s statements regarding the drive mechanism 118, not the broader structure of Mackamul’s dynamic coupler. See Pet. 46–47 (citing Ex. 1005 ¶¶ 83, 50, 10). Accordingly, we find both that Petitioner has not adequately justified a combination that includes replacing Mackamul’s dynamic coupler with a structure from Johnson ’521 and that Petitioner has not shown that such a combination would teach the limitations of claim 1.

(3) *Petitioner’s “Optional” Reliance on Johnson ’355*

Petitioner argues, “[o]ptionally, should the reasons to combine Johnson ’521 with Mackamul not be found sufficient, Petitioner submits Johnson ’355 teaches very specifically that a worm drive would have been advantageous as the alternate drive in Mackamul.” Pet. 48 (citing Ex. 1010, 7:9–17; Ex. 1016 ¶ 161). Petitioner contends that Johnson ’355 provides “strong additional motivation.” *Id.* Specifically, Petitioner reasons that “[i]t would have been obvious to have substituted the Johnson ’521 single drive motor with a shaft with multiple worm drives, both as a substitute as taught by Johnson ’355 and alternately to provide better tracking resolution as taught by Johnson ’355” (*id.* at 49 (citing Ex. 1016, ¶ 164)), and that the proposed substitution would result in little frictional load or wear (*id.* at 50 (citing Ex. 1016 ¶ 165)).

We understand Petitioner as using Johnson ’355 to bolster its reasoning for modifying the combined teachings of Mackamul and Johnson ’521. The addition of Johnson ’355, however, does not remedy the

deficiencies in Petitioner's arguments directed to the proposed modification based on Mackamul and Johnson '521. Again, Petitioner fails to explain whether the dynamic coupler is removed or replaced by the worm gear, and the addition of a worm drive does not add clarity to Petitioner's proposed modification. As such, Petitioner's optional rationale to modify Mackamul based on Johnson '355 is flawed for the same reasons as the proposed modification based on Mackamul and Johnson '521 alone, discussed above. PO Resp. 51–55.

Based on the complete record, Petitioner does not provide sufficient arguments and credible evidence to support a finding that Petitioner's proposed combination of Mackamul and Johnson '521 teaches or suggests all of the limitations of claim 1, and Petitioner's reasons for modifying Mackamul's linear drive mechanism using Johnson '521's worm and worm gear, and Johnson '355's single motor worm drive, are supported by rational underpinnings.

Summary

In view of the foregoing, Petitioner does not provide sufficient arguments and credible evidence to support a finding that the proposed modification of Mackamul using the teachings of Johnson '521, or Johnson '521 and Johnson '355, teaches or suggests all of the limitations of claim 1.

(4) Worm-gear Box Limitation

We also address the parties' arguments directed to the additional requirement in claim 1 regarding:

a worm-gear box assembly directly mounted to one or more support columns anchored to the ground and connected to the each solar tracker assembly for providing motion by the driving apparatus to the each solar tracker assembly to avoid transmitting of external forces exerted on the each solar tracker assembly to

the plurality of linked drive shafts between the worm-drive gear boxes and to transmit the external forces to the one or more anchored support columns, said worm-gear box assembly affixed and driven by the at least one drive shaft;

Ex. 1001, 12:47–56 (“worm-gear box limitation”).

Petitioner recognizes that Mackamul does not disclose the “worm-gear box assembly,” the “to avoid transmitting of external forces exerted on the each solar tracker assembly to the plurality of linked drive shafts *between the worm-drive gear boxes*” or “said worm-gear box assembly affixed and driven by the at least one drive shaft” claim elements. Pet. 51–52 (citing Ex. 1016 ¶ 173). Referring to its discussion of Johnson ’521 with regard to the drive mechanism for rotating the drive shafts claim element, Petitioner reiterates that Johnson ’521 “discloses a worm and worm gear combination affixed and driven by a drive shaft for providing motion to each row of a plurality of solar collectors.” *Id.* at 52 (citing Ex. 1010, 7:9–17).

Petitioner proposes to

replace each of the linear driving sections of Mackamul to provide a worm and worm gear at each row of solar panels as taught by Johnson ’521. Such worm and worm gears would be supported at each row 104 and directly connected to foundations 114 as the linear driving section is in Mackamul and would be connected by linked drive sections affixed thereto and driven by a single drive motor as discussed in section [1.b] above.

Id. (citing Ex. 1016, ¶ 175).

Patent Owner counters that Petitioner does not identify the claimed “worm-gear box” that avoids the transmission of external forces to the drive shafts and transfers external forces to the support columns. PO Resp. 57–58. According to Patent Owner, this additional structural component could be a second gear, or a structural component as shown in Figure 2 of the ’249

patent that, in combination with the worm and worm gear, isolates the drive shaft from external forces, in order to transmit the external forces to the support structure. *Id.* at 57 (citing Ex. 2001 ¶¶ 63–67, 76–85, 132–133). Patent Owner argues that neither Mackamul, Johnson ’521, nor Johnson ’355 describes an additional structural component that isolates the drive shaft from external forces. *Id.*

In reply, Petitioner counters that it explained why a worm/worm gear are a worm-gear box in disputing Patent Owner’s proposed claim construction. Pet. Reply. 26. Specifically, Petitioner argues that the ’249 patent does not provide any special meaning for “worm-gear box assembly,” “worm-gear box,” and “worm-drive gear boxes,” and that these terms “should be given their ordinary and customary meaning, as would be understood by a POSITA, at the time of the invention, considering the claim language, specification, and prosecution history.” Pet. Reply. 6 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312, 1327 (Fed. Cir. 2005)). To support its contention that a worm/worm gear are a worm-gear box, Petitioner points to the following passage in the ’249 patent:

FIGS. 3A and 3B show the worm-gear assemblies. One of the worm-gear assemblies 26 and 26’ are provided at each tracker location and are driven by drive shaft or by drive mechanism. **Typically, this assembly contains worm 36 and worm-gear 38.**

Id. (citing Ex. 1001, 8:9-23 (emphasis added)). Petitioner understands this passage to mean that “worm-gear drive box includes a worm and worm-gear and does not require “additional structure.” *Id.* at 7.

We agree with Petitioner that the ordinary meaning applies. Nonetheless, we disagree with Petitioner’s argument that the phrase “this assembly contains worm 36 and worm-gear 38” in the passage referenced

above infers no additional structure. A general purpose dictionary definition of “contains” is “to have within: HOLD.”⁸ Thus, we understand the Specification’s statement to be consistent with a worm-box assembly where worm 36 and worm-gear 38 are located within a structure.

More significantly, however, is the fact that the claim language recites that the worm-gear box assembly operates “to avoid transmitting external forces on the each solar tracker assembly to the plurality of linked drive shafts . . . and to transmit the external forces to the one or more anchored support columns.” Thus, the claim language itself requires aspects of the worm-gear box assembly that go beyond just a worm and worm-gear. Patent Owner argues persuasively that Petitioner fails to demonstrate that either Johnson reference identifies “an additional structural component that, in conjunction with the worm and worm gear, isolates the drive shafts from external forces.” PO Resp. 57.

For example, we are persuaded by Patent Owner’s argument that Johnson ’355 “explicitly states that no intermediate mechanical structure is present” with its worm and worm gear. *Id.* Also persuasive is Patent Owner’s argument that neither Johnson reference disclose “any structure working with the worm and worm gear to isolate the drive shafts from external forces.” *Id.* at 58.

Based on the complete record, we are persuaded by Patent Owner’s arguments and evidence and find that neither Mackamul, Johnson ’521, nor Johnson ’355, discloses the “worm-gear box assembly,” the “to avoid transmitting of external forces exerted on the each solar tracker assembly to

⁸ See <https://www.merriam-webster.com/dictionary/contain> (last viewed September 25, 2019). Ex. 3001.

the plurality of linked drive shafts *between the worm-drive gear boxes*” or “said worm-gear box assembly affixed and driven by the at least one drive shaft” claim elements.

Petitioner provides an alternative argument in case we adopt a narrower construction of a worm-gear box. Pet. 54–55. Specifically, that (1) Sampayo discloses a casing sealing a worm gear and worm (Pet 54 (citing Ex. 1009, Figure 3)), and (2) placing the worm gear and worm in Sampayo’s casing would have been a known substitution (*id.* (citing Ex. 1016 ¶ 181)). Petitioner explains that it is generally known to seal the worm gear and worm combination in a casing “to add stability and/or to provide protection to the gearing.” Pet. 54–55 (citing Ex. 1009, Ex. 1013, Ex. 1014; and Ex. 1016 ¶ 182).

Even if we were to accept Petitioner’s reliance on Sampayo, Petitioner does not address how the combination manages external forces, as required by the claim language. Patent Owner argues persuasively that “Petitioner makes no effort to explain how the gear box of Sampayo would be combined with Mackamul and both Johnson references to construct a system that avoids the transmission of forces to the linked drive shafts and transmits those forces to the support columns.” PO Resp. 60 (citing Ex. 2001 ¶ 127). We agree. Petitioner does not identify whether it is relying on the worm and worm-gear of Johnson ’521 or Johnson ’355 or both. Petitioner also does not explain how Sampayo’s casing would satisfy the “to avoid transmitting of external forces exerted on the each solar tracker assembly to the plurality of linked drive shafts *between the worm-drive gear boxes*” or “said worm-gear box assembly affixed and driven by the at least one drive shaft” claim elements.

Further, Petitioner's reliance on Sampayo does not remedy the issues discussed above in connection with Petitioner's combination of Mackamul and Johnson '521.

Based on the complete record, we are not persuaded that Petitioner's arguments and evidence support a finding that the proposed combination based on Mackamul, Johnson '521, Johnson '355 and Sampayo discloses the claimed invention.

(5) Summary

In view of the foregoing, we conclude Petitioner has failed to establish by a preponderance of the evidence that claim 1 is unpatentable as obvious based on Mackamul, Johnson '521, Johnson '355, Sampayo, the '249 patent APA, and Shingleton.

b. Claim 9

Claim 9 is similar to claim 1, and is directed to a method for tracking the movement of the sun using a plurality of solar trackers. Ex. 1001, 13:12–38. Petitioner relies on its argument and evidence directed to claim 1 in describing how the elements of claim 9 are satisfied by the proposed combination of Mackamul, Johnson '521, Johnson '355, the '249 patent APA, and Sampayo. Pet. 59–65. Petitioner also relies on the same rationales as asserted with respect to claim 1 for the proposed combination of Mackamul, Johnson '521, Johnson '355, the '249 patent APA, and Sampayo. *Id.* Thus, for the reasons discussed above, we determine that Petitioner has failed to demonstrate by a preponderance of the evidence that claim 9 is unpatentable as obvious.

c. Dependent Claims 2, 8, 10, and 14

Because we are not persuaded by Petitioner's arguments directed to claims 1 and 9, Petitioner's further arguments directed to claims 2, 8, 10, and 14 do not solve the deficiencies of claim 1. For the same reasons discussed above in connection with claims 1 and 9, we determined that Petitioner has failed to demonstrate by a preponderance of the evidence that claim 2, 8, 10, or 14 are unpatentable as obvious.

E. Obviousness Based on Additional References

Because we are not persuaded by Petitioner's arguments in connection with independent claims 1 and 9, we likewise are not persuaded by Petitioner's further arguments directed to dependent claims 5, 6, 7, 13, and 14, which do not solve the deficiencies of claims 1 and 9. In view of the foregoing, we conclude that Petitioner has failed to demonstrate by a preponderance of the evidence that claims 5, 6, 7, 13, or 14 would have been obvious.

III. CONCLUSION

Based on our further review of the record, and for the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 2, 5–10, 13, and 14 of the '249 patent are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 8–10, 14	§ 103(a)	Mackamul, Johnson '521, Johnson '355, Sampayo, Admitted Prior Art (APA), Shingleton		1, 2, 8–10, 14
5, 6, 13	§ 103(a)	Mackamul, Johnson '521, Dorian, Johnson '355, Sampayo, Admitted Prior Art (APA), Shingleton		5, 6, 13
7, 14	§ 103(a)	Mackamul, Johnson '521, Appelqvist, Johnson '355, Sampayo, Admitted Prior Art (APA), Shingleton		7, 14
Overall Outcome				1, 2, 5–10, 13, 14

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 5–10, 13, and 14 are not unpatentable under 35 U.S.C. § 103; and

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.

IPR2018-00801
Patent 8,459,249 B2

PETITIONER:

Jennifer O'Connell
William Gehris
David Petroff
Cary Kappel
DAVIDSON, DAVIDSON & KAPPEL, LLC
joconnell@ddkpatent.com
wgehris@ddkpatent.com
dpetroff@ddkpatent.com
ckappel@ddkpatent.com

PATENT OWNER:

Paul V. Storm
FOLEY GARDERE
pvstorm@foley.com

Lucas I. Silva
FOLEY & LARDNER LLP
lsilva@foley.com