

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLTAGE, LLC,
Petitioner,

v.

SHOALS TECHNOLOGIES GROUP, LLC,
Patent Owner.

IPR2024-00876
Patent 10,992,254 B2

Before JEFFREY W. ABRAHAM, AVELYN ROSS, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

MCMANUS, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background*

Voltage, LLC (“Petitioner”) filed a Petition (Paper 2, hereinafter “Pet.”) requesting *inter partes* review of claims 1–15 of U.S. Patent No. 10,992,254 B2 (Ex. 1001, “the ’254 patent”). Shoals Technologies Group, LLC (“Patent Owner”) filed a Preliminary Response (Paper 6, hereinafter “Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. *See* 37 C.F.R. § 42.4(a) (“The Board institutes the trial on behalf of the Director.”). An *inter partes* review may not be instituted unless “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c).

Upon consideration of the evidence and arguments in the Petition (including its supporting testimonial evidence) and the evidence and arguments in the Preliminary Response (including its supporting testimonial evidence), we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to at least one challenged claim of the ’254 patent. Accordingly, we decline to institute an *inter partes* review of claims 1–15 based on the grounds articulated in the Petition.

B. *Real Parties in Interest*

Petitioner identifies itself and Ningbo Voltage Smart Production Co., a limited liability company formed under the laws of the People’s Republic of China, as real parties in interest. Pet. 1. Patent Owner identifies itself as the real party in interest. Patent Owner Mandatory Notices (Paper 4), 2.

C. Related Matters

The parties identify the following related matters:

International Trade Commission Investigation No. 337-TA-1365, *In the Matter of Certain Photovoltaic Connectors and Components Thereof*; and

Shoals Technologies Group, LLC v. Voltage, LLC et al., Docket No. 1:23-cv-00365 (M.D.N.C.).

Pet. 2; Paper 4, 2.

D. The '254 Patent

The '254 patent is titled “Lead Assembly for Connecting Solar Panel Arrays to Inverter.” Ex. 1001, code (54). The '254 patent generally relates to “assemblies for connecting solar panel arrays to an inverter, without the need of a combiner box.” *Id.* at 1:17–19.

The '254 patent teaches that, conventionally, solar panels were configured such that each panel was individually connected to a combiner box as shown in the figure below.

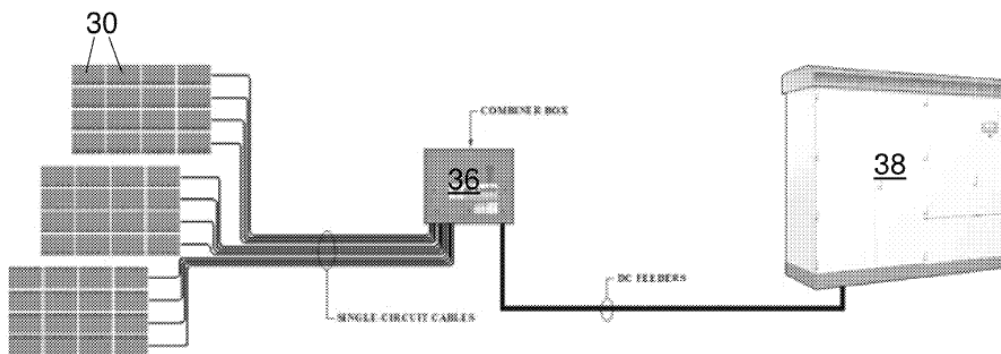


Figure 1, above, “depicts a conventional wiring configuration with each solar panel individually wired to a central combiner box.” *Id.* at 2:17–19.

Figure 1 depicts solar panels 30 connected by cables to combiner box 36.

Id.; *see also id.* at 1:20–22. The '254 patent teaches that the arrangement shown in Figure 1 was simplified and improved by the use of wire harness 34 as shown below.

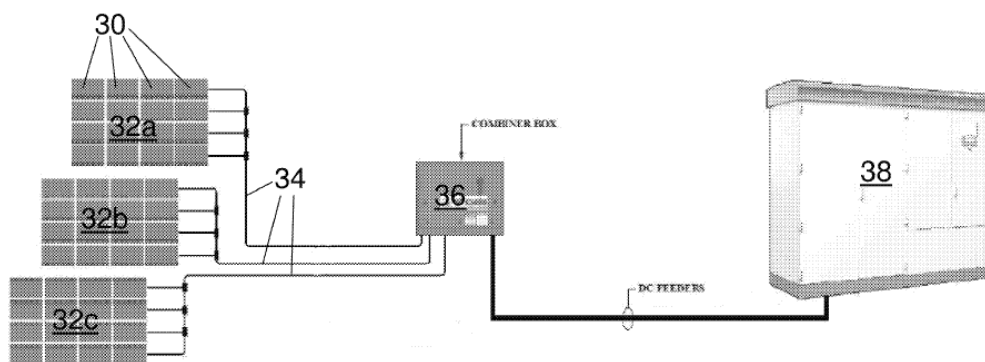


Figure 2, above, shows a configuration where “wire harnesses 34 connect multiple solar panels 30 in an array 32, so each array has a single input via wire harness 34 into the combiner box.” *Id.* at 1:32–34. This is taught to be an improvement as it “drastically reduced the number of connections going into a combiner box, which is safer, more reliable, easier to install, maintain and troubleshoot, and saves money over the conventional configuration of FIG. 1.” *Id.* at 1:35–38. Although the configuration of Figure 2 is taught to be an improvement over that of Figure 1, the '254 patent indicates that the configuration of Figure 2 is still suboptimal as it requires a combiner box:

Unfortunately, however, a combiner box is still a necessary component in known solar power installations because the energy coming from solar arrays must be combined prior to going into the inverter. Combiner boxes are problematic because they are clumsy, prone to damage and malfunctioning, must be periodically maintained, and require extensive planning and skill for installation. Due to the many connections going into a

combiner box, a combiner box cannot easily be moved without disconnecting and reconnecting all the connections and wiring, which requires considerable manpower, danger, and expense.

Id. at 1:39–49.

The '254 patent teaches a lead assembly where no combiner box is necessary. The Specification states that “[t]he present invention is a lead assembly including at least one drop line joined to a feeder cable at a compression lug.” *Id.* at 1:58–60. The '254 patent further teaches that, “[i]n use, the drop line is connected to solar arrays, and the feeder cable is connected to an inverter In this manner a plurality of solar arrays are electrically coupled together, with a common feeder cable connecting them all to the inverter.” *Id.* at 1:61–66. The '254 patent teaches that, in this arrangement, “[a] combiner box is not necessary, and in fact would be redundant.” *Id.* at 2:2–3. A figure depicting an exemplary inventive embodiment is reproduced below.

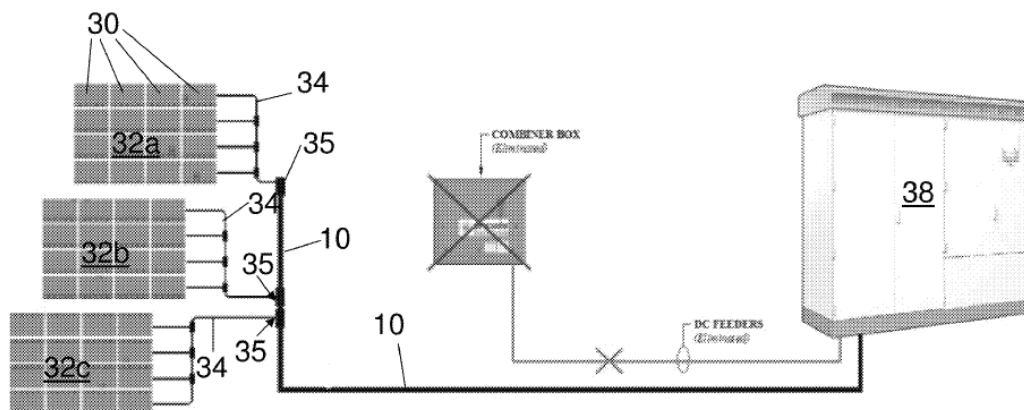
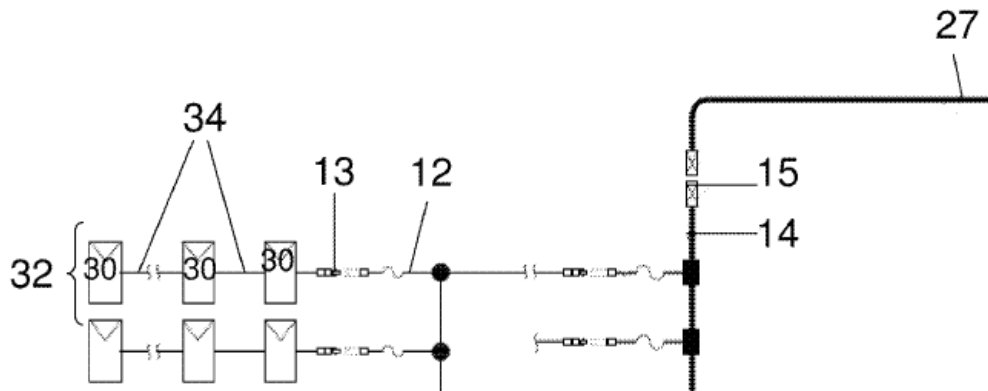


Figure 3, above, “depicts the present invention of a plurality of wire harnesses coupled to a lead assembly that connects to an inverter, with the unnecessary combiner box shown for demonstration only.” *Id.* at 2:24–27. In Figure 3, wire harness 34 includes a number of branches each connecting to

one solar panel and a central trunk that terminates in wire harness connector 35. *Id.* at 4:35–37.

Each drop line connector 13 is taught to be connected to wire harness 34 as shown in the figure below.



A portion of Figure 10 is reproduced above. The figure depicts solar panels 30, wire harness 34, drop line connector 13, drop line 12, feeder cable 14, feeder cable connector 15, and trunk buss jumper 27. *Id.* at 4:9–23 (listing of structure numbers).

An exemplary lead assembly is shown in Figure 5 reproduced, in part, below.

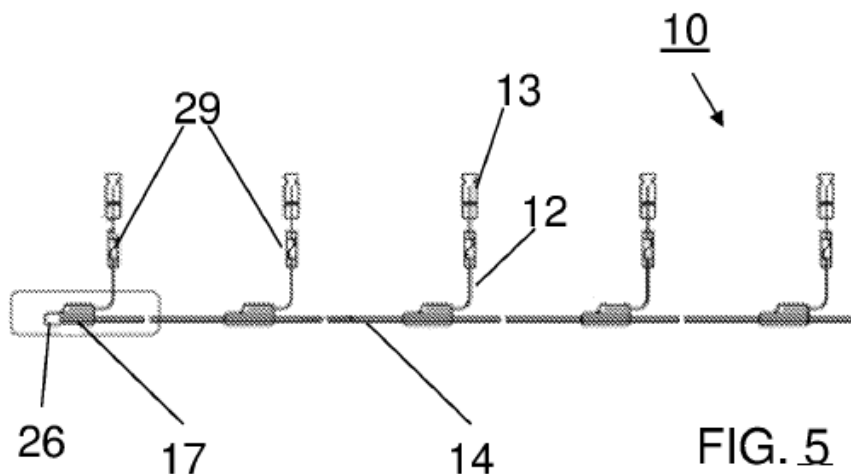


Figure 5 depicts lead assembly 10. *Id.* at 2:30–31. The '254 patent teaches that “lead assembly 10 generally includes drop line 12 joined to feeder cable 14 at joint 17.” *Id.* at 4:48–49. Figure 5 further depicts in-line fuses 29 and drop line connectors 13.

An exemplary joint 17 is shown in the figure below.

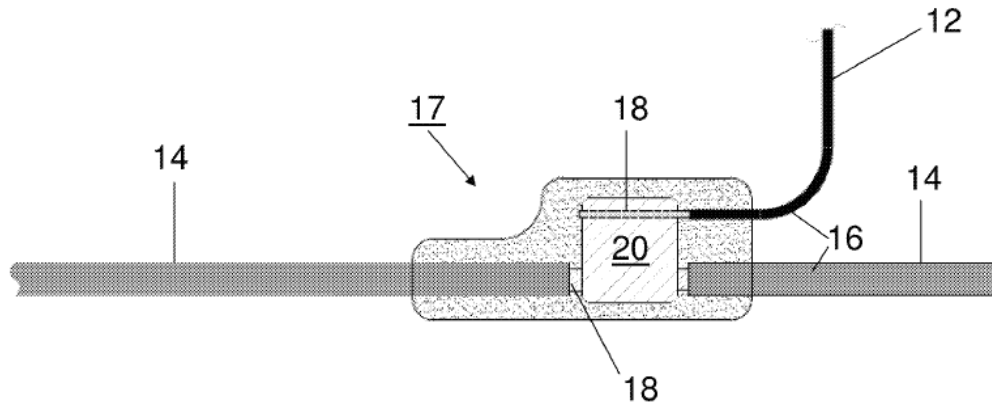


Figure 7 depicts joint 17, including drop line 12, feeder cable 14, and compression lug 20. *Id.* at 4:9–15 (listing of structure numbers).

The '254 patent further teaches that the nexus of the feeder cable and drop line may be surrounded by an undermold which is, in turn, surrounded by an overmold as shown below.

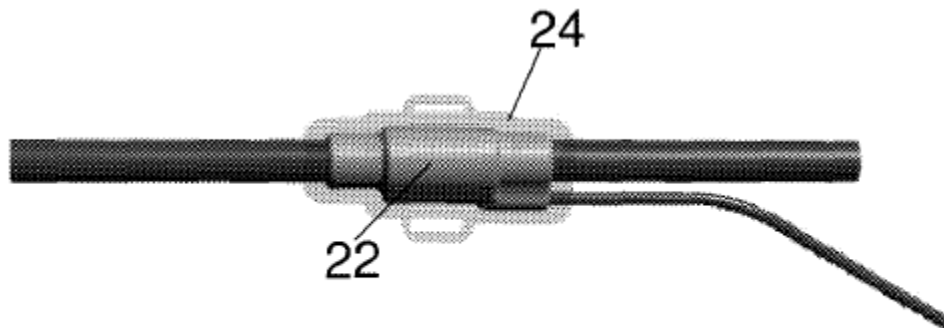


FIG. 48

Figure 48, above, depicts undermold 22 surrounded by overmold 24 (shown in lighter gray shading). *Id.* at 3:33–34, 5:65–66.

The Specification teaches that “[a]n embodiment of the present invention preferably has the following specifications: [v]oltage rating of 600 VDC/1000 VDC/1500 VDC; [m]aximum branch current of 30 amps per string; [m]aximum overcurrent protection of 30 amps per string; maximum trunk cable size of 750 MCM; and [m]aximum ambient operating temperature of 50° C.” *Id.* at 6:18–23.

The Specification teaches that “[t]he resulting assembly is profoundly durable, resistant to environmental factors such as temperature fluctuations, debris, and moisture, and is strong enough to be buried.” *Id.* at 6:2–5.

E. Representative Claims

Independent claims 1, 7, and 14 are representative of the challenged claims, and are reproduced below.¹

1. A lead assembly for use in a solar energy installation including:
 - A. A first drop line and a second drop line, said first drop line terminating in a drop line connector;
 - B. At least one 30 amp feeder cable terminating in a feeder cable connector, said first drop line and said at least one feeder cable electrically coupled at a nexus;
 - C. A means for securing said nexus, said securing means selected from the group consisting of compression lug, soldering, splicing, crimping, and combinations thereof;
 - D. An undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said at

¹ We follow Petitioner’s practice of subdividing certain claim elements as indicated by lower case Roman Numerals in brackets. *See* Pet. vii–xi.

least one feeder cable, said inner surface surrounding and fully encasing said securing means, [i] said inner surface comprised of a first aperture concentric with said securing means and said at least one feeder cable, said first aperture extending continuously through said undermold in said longitudinal direction and having a first diameter, [ii] said at least one feeder cable continuously extending through said first aperture, and [iii] a second aperture concentric with said first drop line and parallel to said first aperture, said second aperture only partially extending through said undermold in said longitudinal direction, said second aperture having a second diameter smaller than said first diameter, said first drop line extending from said second aperture; and

- E. An overmold surrounding said undermold and forming an undermold-overmold interface only at said outer surface, [i] wherein said lead assembly combines power from a plurality of solar arrays and transmits that power to an inverter in a solar energy installation lacking a combiner box between said solar arrays and said inverter, and [ii] wherein said lead assembly has a voltage rating of 1500 VDC.

7. A solar power system comprising:

- A. A first plurality of solar panels electrically coupled by a first wire harness to form a first solar array;
- B. A second plurality of solar panels electrically coupled by a second wire harness to form a second solar array;
- C. A lead assembly including [i] a first drop line electrically connected to said first wire harness, and [ii] a 30 amp feeder cable electrically connected to a component selected from the group consisting of a trunk buss jumper, an inverter, a connection unit, a recombiner, and a disconnect unit, [iii] said first drop line and said feeder cable electrically connected at a first nexus secured by a compression lug, [iv] said compression lug surrounded by an undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said feeder cable, said inner surface surrounding

and fully encasing said compression lug, [v] said inner surface comprised of a first aperture concentric with said compression lug and said feeder cable, said first aperture extending continuously through said undermold in said longitudinal direction and having a first diameter, [vi] said feeder cable extending continuously through said first aperture, and [vii] a second aperture concentric with said first drop line and parallel to said first aperture, said second aperture only partially extending through said undermold in said longitudinal direction, said second aperture having a second diameter smaller than said first diameter, said first drop line extending from said second aperture, [viii] with said undermold surrounded by an overmold and forming an undermold-overmold interface only at said outer surface, [ix] wherein said lead assembly has a voltage rating of 1500 VDC; and

- D. A second drop line electrically connected to said second wire harness, [i] said second drop line electrically connected to said feeder cable at a second nexus, [ii] wherein the solar power system doesn't include a combiner box upstream of said component.
14. A method of constructing a solar power installation including the steps of:
- A. Connecting a first plurality of solar panels to a first wire harness to form a first solar array;
 - B. Connecting said first wire harness to a first drop line of a lead assembly;
 - C. Connecting a second plurality of solar panels to a second wire harness to form a second solar array;
 - D. Connecting said second wire harness to a second drop line of said lead assembly; and
 - E. Electrically coupling said lead assembly to an inverter without electrically coupling to a combiner box; [i] wherein said lead assembly includes said first drop line electrically connected to said first wire harness, and a 30 amp feeder cable terminating in a feeder cable connector, said first drop line and said feeder cable electrically connected at a first nexus secured by a means for securing said nexus,

said securing means selected from the group consisting of compression lug, soldering, splicing, crimping, and combinations thereof, said securing means surrounded by an undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said feeder cable, said inner surface surrounding and fully encasing said securing means, said inner surface comprised of a first aperture concentric with said securing means and said at least one feeder cable, said first aperture extending continuously through said undermold in said longitudinal direction and having a first diameter, said feeder cable continuously extending through said first aperture, and a second aperture concentric with said first drop line and parallel to said first aperture, said second aperture only partially extending through said undermold in said longitudinal direction, said second aperture having a second diameter smaller than said first diameter, said first drop line extending from said second aperture, [ii] with said undermold surrounded by an overmold and forming an undermold-overmold interface only at said outer surface, [iii] wherein said lead assembly has a voltage rating of 1500 VDC.

F. Prior Art

Petitioner relies upon the following prior art references in support of the asserted grounds of unpatentability.

Reference	Pub. Date	Exhibit
U.S. Patent No. 6,268,559 B1 ("Yamawaki")	July 31, 2001	Ex. 1006
"Solar Line – Photovoltaic Interconnections System – Helios," Amphenol Industrial Solar Technologies ("Amphenol")	Nov. 2012	Ex. 1007
Chinese Patent No. 2,785,100Y ("Shao")	May 31, 2006	Ex. 1008 (translation)/ Ex. 1012 (original)
Japanese Patent No. 4080663 ("Tamura")	Apr. 23, 2008	Ex. 1009 (translation)/ Ex. 1013 (original)

Chinese Patent Application Pub. No. 102332345 A (“Yu”)	Jan. 25, 2012	Ex. 1015 (translation) Ex. 1016 (original)
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Petitioner has submitted the Declaration of Thomas W. Kenny (Ex. 1003) (“Kenny Declaration”) and the Declaration of Gary Joseph (Ex. 1024) as exhibits. Patent Owner has submitted the Declaration of Joshua Weiner (Ex. 2001) as an exhibit.

G. Asserted Grounds of Unpatentability

Petitioner contends that the challenged claims are unpatentable based on the following four grounds.

Ground	Challenged Claim(s)	Statutory Basis	References
I	1–5, 7–15	§ 103	Amphenol, Shao, Yamawaki
II	6	§ 103	Amphenol, Shao, Yamawaki, Tamura
III	1–15	§ 103	Amphenol, Yu, Yamawaki, Tamura
IV	1–5, 7–15	§ 103	Yamawaki, Shao

II. DISCUSSION

A. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art at the time of the invention “would have a B.S. degree in electrical engineering, mechanical engineering, or an equivalent such as applied physics or general engineering, and

two years of professional experience relating to the design and/or manufacturing of electrical wiring and connectors.” Pet. 9 (citing Ex. 1003 ¶¶ 49–50).

Patent Owner argues that one of ordinary skill in the art would have had “at least a bachelor’s degree in mechanical or electrical engineering or a related scientific field and at least two years [of] experience working with photovoltaic systems and electrical wiring, with recognition that more education could substitute for experience and that experience combined with training could substitute for formal education.” Prelim. Resp. 12–13 (quoting Ex. 1017 (ITC Claim Construction Order), 12). Thus, the parties dispute only whether a person of ordinary skill in the art must have experience with photovoltaic (solar) systems or whether such experience may be in the broader field of electrical wiring and connectors.

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) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art.” *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

We determine that no express finding is necessary, on the present record, and that the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). Further, for purposes of this institution decision, and on the present record, we

determine that the adoption of either party’s proposal regarding requisite work experience would not change our analysis or conclusions.

B. Claim Construction

Our rules provide that “[i]n an *inter partes* review proceeding, a claim of a patent . . . shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Petitioner puts forward several terms for construction. Pet. 9–11. Patent Owner takes no position on claim construction for purposes of institution on the basis that none of its arguments against institution depend on claim construction. Prelim. Resp. 18.

The Board “need only construe terms that are in controversy, and only to the extent necessary to resolve the controversy.” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (internal citation omitted). We address the construction of certain functional language found in claim 1 below. Otherwise, we have determined that no express claim constructions are required in order to address the points at issue.

C. Principles of Law

1. Legal Standard

A petition for *inter partes* review “may be considered only if . . . the petition identifies, in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3). Petitioner bears “the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed.

Cir. 2016). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

2. Obviousness

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious before the claim's effective filing date to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007); *see also* 35 U.S.C. § 103. Obviousness under Section 103 is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Where a patent claim is composed of several elements known in the prior art “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. at 418.

D. Ground I

For its first ground of unpatentability, Petitioner argues that claims 1–5 and 7–15 would have been unpatentable as obvious over the teachings of Amphenol, Shao, and Yamawaki. Pet. 12–46.

1. Summary of Asserted Art

a. Amphenol

Amphenol is a product catalog titled “Solar Line Photovoltaic Interconnections System.” Ex. 1007, 1.²



Id. On its cover page (above), Amphenol states “Amphenol Industrial Solar Technologies.” *Id.*

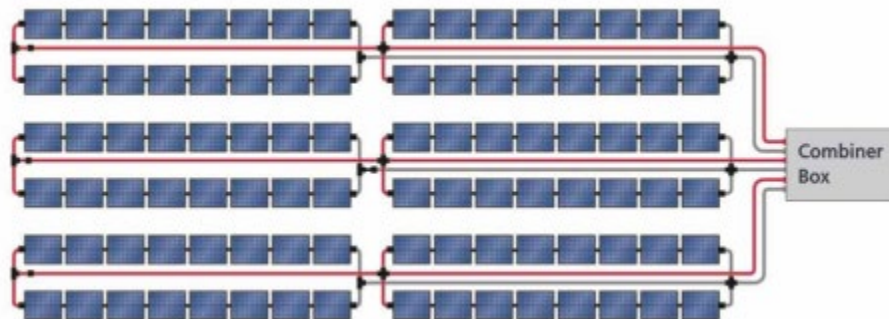
On what appears to be the back cover, Amphenol states “ICS 18-6 Release Date: November, 2012,” as shown below.

² For purposes of the present decision, we will use the Amphenol exhibit pagination provided by Petitioner rather than the original catalog pagination.



Ex. 1007, 1 (annotated with red box).

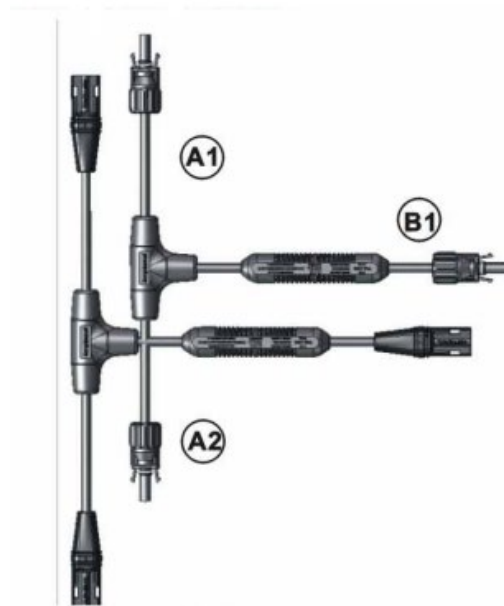
Amphenol includes the following diagram, which Petitioner describes as a “solar energy installation.” Pet. 16.



Ex. 1007, 5. Amphenol lacks any explanatory text describing this diagram.
See id. Amphenol additionally includes the following diagram.



Id. Amphenol describes these structures as “Cable Assy and Diversity Junctions.” *Id.*; *see also* Pet. 21. Amphenol additionally includes the diagram reproduced below.



Id. at 13. A heading above this and one other diagram states “T/X-Junction cable assembly ordering configuration.” *Id.*

b. Shao

Shao is a Chinese patent titled “Power Cable with Bidirectional K-Shaped Branch.” Ex. 1008, code (54). Shao has a filing date of January 13, 2005 and an issue date of May 31, 2006. *Id.*, code (22), (45).

Shao describes its invention as follows:

a power cable with a bidirectional K-shaped branch, which comprises a trunk conductor, branch-line conductors, a trunk insulation layer, branch-line insulation layers, a connector and an outer sheath, wherein the power cable is provided with the K-shaped branch connector, one joint and two branch-line conductor out-leads are provided for the trunk conductor and the branch-line conductors, and directions of the branch-line conductor out-leads are opposite.

Id. at 4–5. Figures 1 and 2 of Shao are reproduced below.

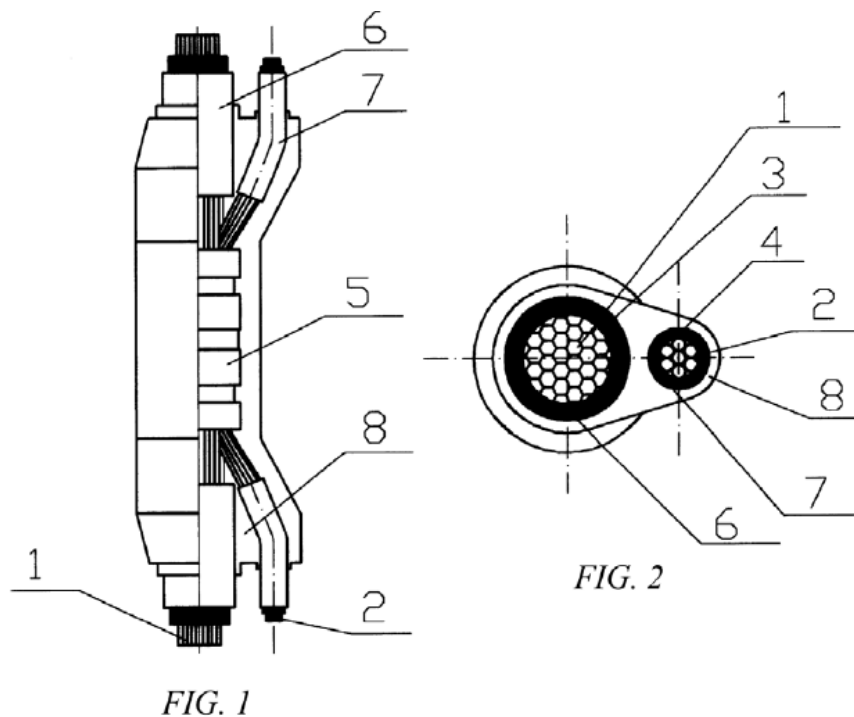


Figure 1 depicts a power cable with a bidirectional K-shaped branch. *Id.* at 4–5. Figure 2 shows the same structure in cross-section. *Id.* at 6. The device of Shao includes trunk conductor 1, branch-line conductors 2, and connector 5. *Id.* at 6.

c. Yamawaki

Yamawaki is a United States Patent titled “Photovoltaic Generation System, Wiring Apparatus for Photovoltaic Generation System, and Wiring Structure Therefor.” Ex. 1006, code (54). Yamawaki was issued July 31, 2001. *Id.*, code (45). It states that it generally relates to a solar energy installation having a reduced number of electric wires “and which can be easily laid with a lower possibility of wrong wiring.” *Id.* at 2:45–51. Figure 1 from Yamawaki is reproduced below.

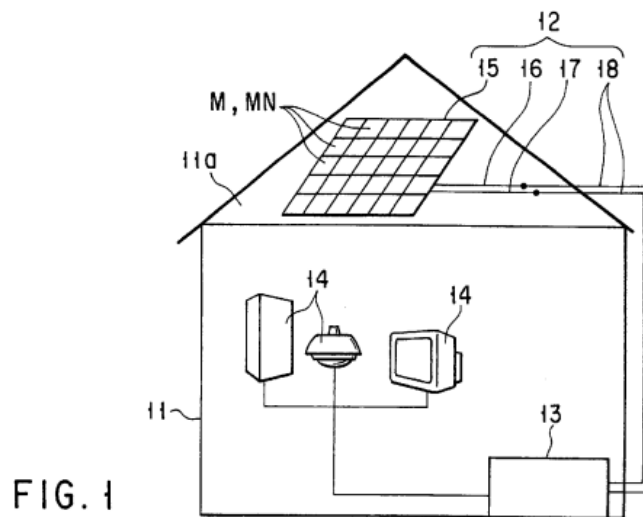


Figure 1 is described as “a conceptual diagram showing the relations between a photovoltaic generation system according to a first embodiment of the present invention.” *Id.* at 6:1–3. The system depicted in Figure 1 shows “photovoltaic panel (so-called solar-cell panel) 15 on a roof 11a, wiring apparatuses 16 and 17 for fetching the output of the panel 15, and a pair of lead-in wires 18 for conducting electric power . . . into the house.” *Id.* at 7:54–59. Yamawaki further teaches that “[t]he photovoltaic panel 15 is

composed of a plurality of photovoltaic modules M or photovoltaic module units MN.” *Id.* at 7:62–64.

Figure 3, showing a photovoltaic panel, is reproduced below.

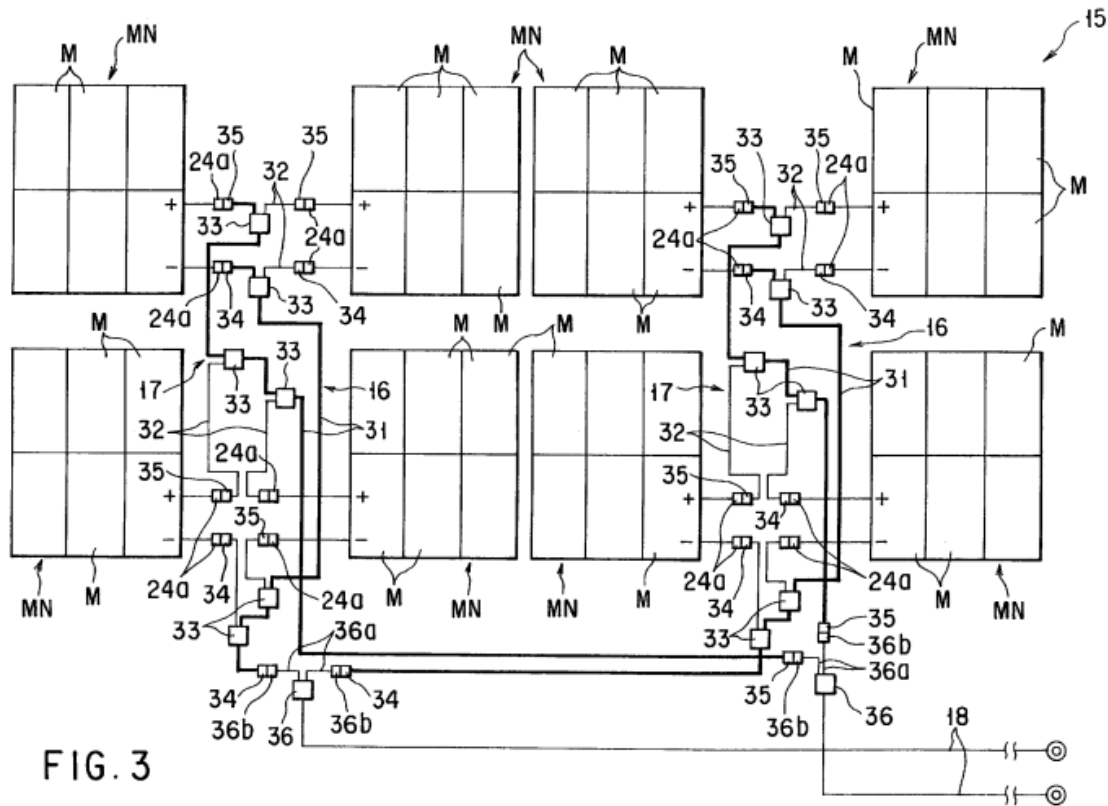


FIG. 3

Yamawaki states that “[a]s shown in FIG. 3, the panel 15 is composed of, for example, eight module units MN. Each module unit MN includes six modules M. The six modules M that constitute each module unit MN are connected in series and/or parallel with one another.” Ex. 1006, 8:15–19.

Yamawaki additionally teaches a junction covered by a molded body. *Id.* at 10:17–22. This is depicted in the Figures 9A and 9B below.

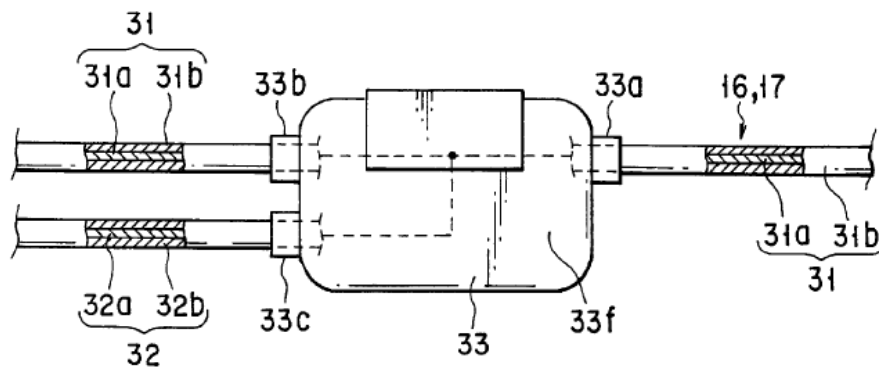


FIG. 9A

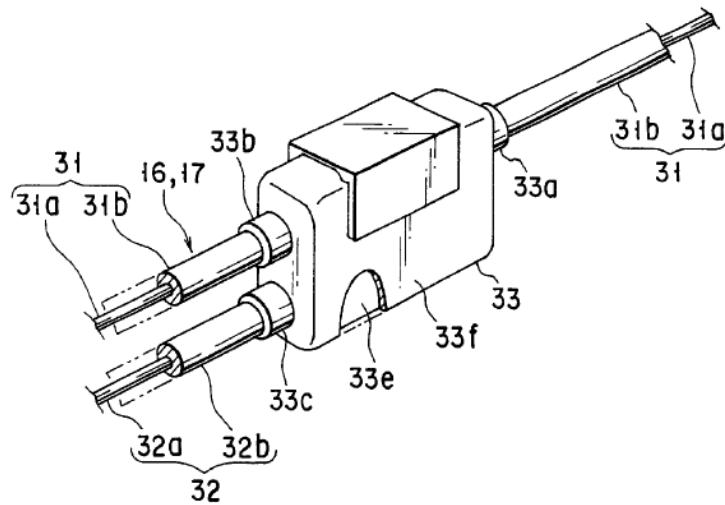


FIG. 9B

Figures 9A and 9B of Yamawaki show “a molded body 33e of an electrically insulating synthetic resin material and a cover member 33f that covers the outer surface of the body 33e.” *Id.* at 10:20–22.

2. Claims Asserted to be Unpatentable

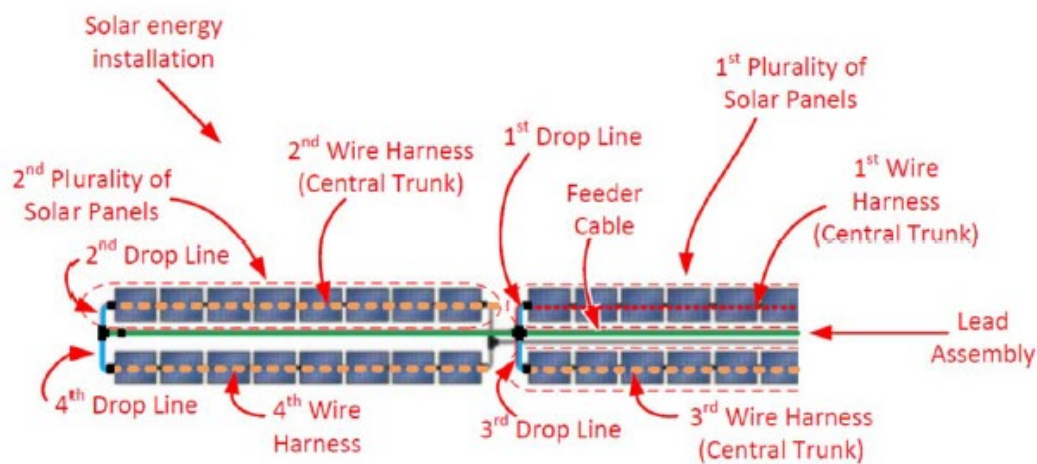
a. Claim 1

i. Preamble

The preamble of claim 1 recites “[a] lead assembly for use in a solar energy installation.” Ex. 1001, 6:43–44. Petitioner argues that Amphenol discloses a lead assembly for a solar energy installation. Pet. 16 (citing Ex. 1007, 5). Patent Owner does not specifically address the preamble of claim 1 but generally denies that Amphenol teaches a lead assembly. *See* Prelim. Resp. 49 (“What Dr. Kenny labels as a lead assembly is, in fact, a wire harness.”); *see id.* at 49–55.

ii. Element 1.A

Claim element 1.A requires a “first drop line and a second drop line, said first drop line terminating in a drop line connector.” Ex. 1001, 6:45–46. Petitioner argues that Amphenol discloses drop lines and drop line connectors as shown in the following annotated figure.



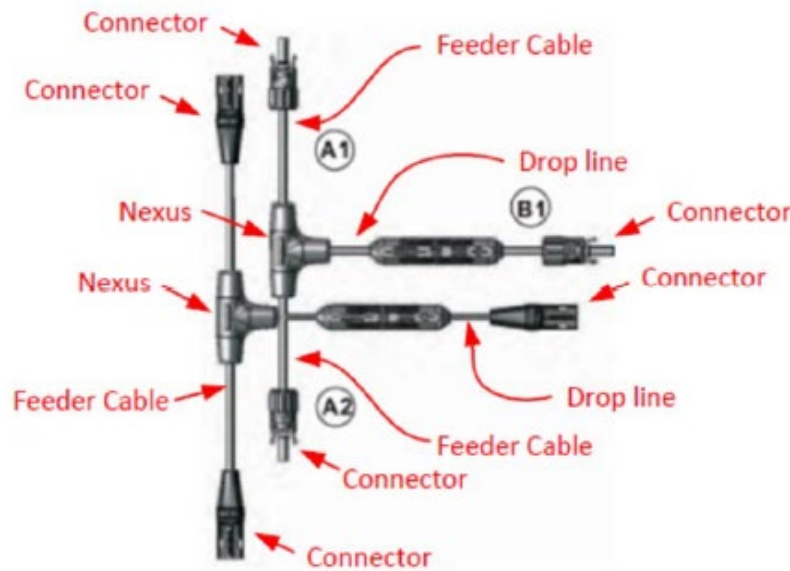
Pet. 17. The figure above is an annotated version of a figure from Amphenol. *See* Ex. 1007, 5 (unannotated figure); *see also* Kenny Declaration ¶ 132 (annotated figure).

Petitioner asserts that the figure depicts several drop lines (shown in blue), a feeder cable (shown in green), and drop line connectors (small black boxes). Pet. 17.

Patent Owner does not specifically address claim element 1.A but generally denies that Amphenol teaches drop lines. *See* Prelim. Resp. 55 (arguing that, because Amphenol does not teach a lead assembly, “Amphenol also fails to disclose the parts that make up the lead assembly, including, for example, . . . ‘drop line.’”). Patent Owner refers to the figure in Amphenol as “just an unadorned, stylized illustration.” *Id.* at 48.

iii. Element 1.B

Claim element 1.B requires “[a]t least one 30 amp feeder cable terminating in a feeder cable connector, said first drop line and said at least one feeder cable electrically coupled at a nexus.” Ex. 1001, 6:47–49. Petitioner argues that the following diagram, in conjunction with certain specifications found in the Amphenol catalog, discloses feeder cables terminating in feeder cable connectors.



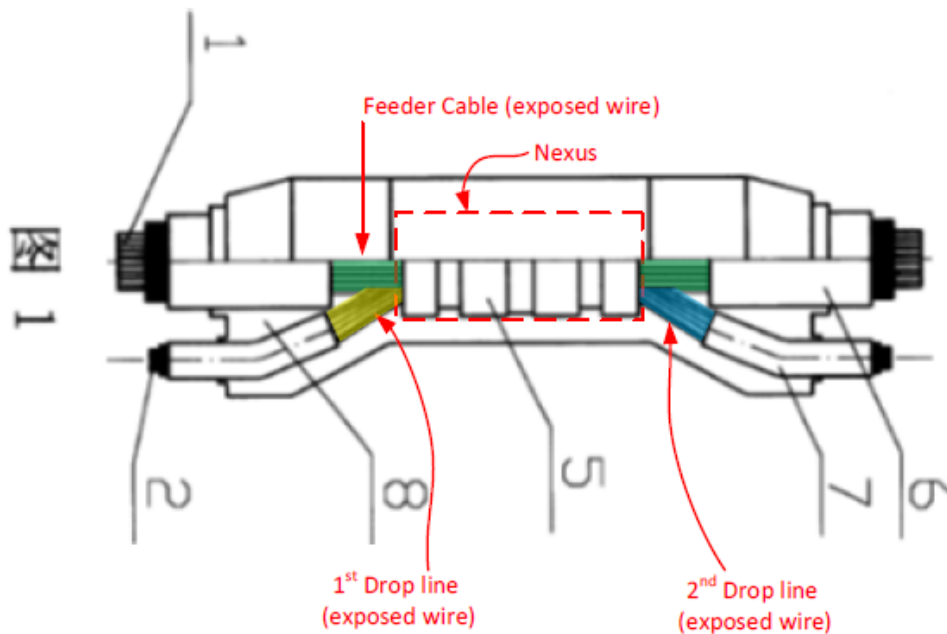
EX1007, p.21, top image (1st-annotation)

Pet. 18. The image above is an annotated figure showing an Amphenol T-junction cable assembly. *Id.* The Amphenol catalog lists several options for the main cable size and branch cable size as shown below.

Main cable size:	Branch cable size:
☐ 8AWG(10.0mm ²)	☐ 8AWG(10.0mm ²)
☐ 10AWG(6.0mm ²)	☐ 10AWG(6.0mm ²)
☐ 12AWG(4.0mm ²)	☐ 12AWG(4.0mm ²)
☐ 14AWG(2.5mm ²)	☐ 14AWG(2.5mm ²)

Ex. 1007, 21. Petitioner asserts that one of ordinary skill in the art “would recognize that either 8AWG or 10AWG cables are rated for 30 amps; thus, Amphenol discloses at least one 30 amp feeder cable.” Pet. 18.

Petitioner relies on Shao as teaching the claimed coupling at a nexus as shown in Figure 1 below. *Id.* at 18–19.



EX1008, FIG. 1 (1st-annotation)

The figure above is Petitioner’s annotated version of Shao’s Figure 1. *Id.* at 19. Petitioner argues that one of skill in the art would have had reason to combine the teachings of Shao relating to electrical coupling with the above teachings of Amphenol “to provide cable junctions with increased reliability.” *Id.* at 19.

Patent Owner does not specifically address claim element 1.B but generally denies that Amphenol teaches feeder cables. *See* Prelim. Resp. 55 (arguing that, because Amphenol does not teach a lead assembly, “Amphenol also fails to disclose the parts that make up the lead assembly, including, for example, ‘a feeder cable.’”).

iv. Element 1.C

Claim element 1.C requires “[a] means for securing said nexus, said securing means selected from the group consisting of compression lug, soldering, splicing, crimping, and combinations thereof.” Ex. 1001, 6:50–53.

Petitioner argues that “Shao provides a C-shape clamp that is crimped on the feeder cable and drop lines, thus disclosing a means for securing the nexus.” Pet. 20 (citing Kenny Declaration ¶ 140). Petitioner further relies on Figure 1 of Shao, reproduced above. *Id.* Petitioner further asserts that “it would have been obvious to a POSITA [person of ordinary skill in the art] to use a clamp, as taught by Shao, to maintain contact between the three conductive elements.” *Id.*

Patent Owner does not contest Shao’s disclosure, although it does contend that Shao is not analogous art. Prelim. Resp. 56–62.

v. Element 1.D

Claim element 1.D requires “[a]n undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said at least one feeder cable, said inner surface surrounding and fully encasing said securing means.” Ex. 1001, 6:50–53.

Petitioner directs us to Amphenol’s disclosure of certain “diversity junctions,” shown below.

Cable Assy and Diversity Junctions



EX1007, p.5, bottom image

Pet. 21. Petitioner contends that a person of ordinary skill in the art “would understand that each diversity junction (i.e., undermold) disclosed by Amphenol could provide a substrate for an overmold.” *Id.*

Petitioner additionally directs us to Shao’s teaching of “a feeder cable’s electrical coupling to drop lines at a nexus that is covered by a sheath of injection molding material, which is an undermold that fully encases the nexus.” *Id.* (Shao’s annotated Figure 1 is reproduced above with respect to our discussion of claim element 1.B). Petitioner argues that “[i]t would have been obvious to a POSITA to use the undermold taught by Shao to encase the exposed cables and the clamp holding together the feeder and branch cables of Amphenol to better protect those elements from damage and/or exposure.” *Id.* at 22.

Patent Owner does not specifically address claim element 1.D but generally denies that Amphenol teaches either a feeder cable or an undermold. *See* Prelim. Resp. 55 (arguing that, because Amphenol does not teach a lead assembly, “Amphenol also fails to disclose the parts that make up the lead assembly, including, for example, ‘a feeder cable’ . . . [and an] ‘undermold’”). Patent Owner further argues that Shao is not analogous art. *Id.* at 56–62.

vi. Element 1.D.i

Claim element 1.D.i requires that the “inner surface [of the undermold be] comprised of a first aperture concentric with said securing means and said at least one feeder cable, said first aperture extending continuously through said undermold in said longitudinal direction and having a first diameter.” Ex. 1001, 6:56–62.

Petitioner argues that this feature is taught by Shao. Petitioner asserts that “‘said inner surface comprised of a first aperture’ refers to the passage that extends completely through the undermold (22) in the longitudinal direction. Shao’s FIG. 1 above discloses this geometric feature.” Pet 23 (internal citations omitted).

Patent Owner does not specifically address claim element 1.D.i but argues that Shao is not analogous art. *Id.* at 56–62.

vii. Element 1.D.ii

Claim element 1.D.ii requires that the feeder cable “continuously extend[] through said first aperture.” Ex. 1001, 6:62–64.

Petitioner argues that Shao’s trunk conductor 1 continuously extends through an aperture in its undermold and, thus, teaches this element. Pet. 24–25. Petitioner further argues that one of ordinary skill in the art would have used the configuration of Shao “since it is the most natural arrangement of wiring elements. Additionally, a POSITA would understand that using the cable junction design of Shao would increase reliability, improved resistance to environmental factors, provide a low profile installation configuration, and would be easy to install.” *Id.* at 25 (internal citation omitted).

Patent Owner does not specifically address claim element 1.D.ii. Patent Owner argues that Shao is not analogous art. *Id.* at 56–62.

viii. Element 1.D.iii

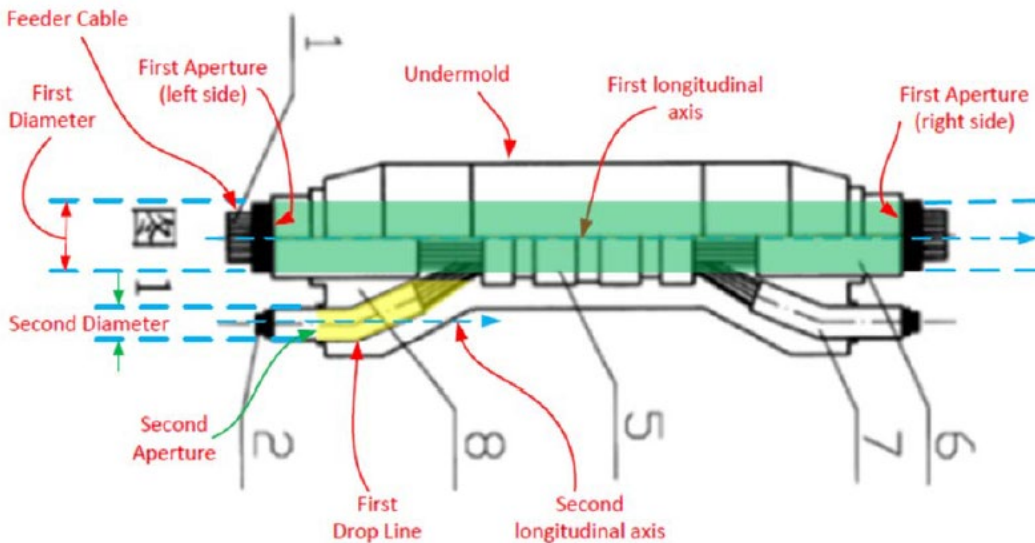
Claim element 1.D.iii requires as follows:

a second aperture concentric with said first drop line and parallel to said first aperture, said second aperture only partially extending through said undermold in said longitudinal direction,

said second aperture having a second diameter smaller than said first diameter, said first drop line extending from said second aperture.

Ex. 1001, 6:64–7:3.

Petitioner argues that Shao discloses a second aperture as shown in Figure 1 below.



EX1008, FIG. 1 (2nd-annotation)

Pet. 25. The figure above is an annotated version of Shao's Figure 1. *Id.*

Patent Owner does not specifically address claim element 1.D.iii.

Patent Owner argues that Shao is not analogous art. *Id.* at 56–62.

ix. Element 1.E

Claim element 1.E requires “[a]n overmold surrounding said undermold and forming an undermold-overmold interface only at said outer surface.” Ex. 1001, 7:4–6.

Petitioner relies on Yamawaki as teaching an overmold surrounding an undermold to form an interface. Pet. 27. Patent Owner does not address claim element 1.E.

x. Element 1.E.i

Claim element 1.E.i requires that “said lead assembly combines power from a plurality of solar arrays and transmits that power to an inverter in a solar energy installation lacking a combiner box between said solar arrays and said inverter.” Ex. 1001, 7:6–10.

Petitioner argues that the cited prior art inherently possesses the capability to fulfill the claimed function. Pet. 29. Petitioner asserts that Amphenol discloses lead assemblies that combine power from multiple arrays. *Id.* at 30. Petitioner further asserts that Yamawaki teaches solar arrays with cables connected directly to an inverter without use of a combiner box. *Id.* (citing Ex. 1006, Fig. 1). Petitioner argues that “[a] POSITA would have been motivated to combine/route power from many solar arrays to an inverter, as taught by Yamawaki, to provide a simplified system that is easier to install and more reliable.” *Id.* at 32.

Patent Owner does not specifically address claim element 1.E.i.

xi. Element 1.E.ii

Claim element 1.E.ii requires that “said lead assembly has a voltage rating of 1500 VDC.” Ex. 1001, 7:10–11.

Petitioner asserts that “Amphenol discloses lead assemblies with a voltage rating of 1500 VDC (i.e., between 600VDC and 2000VDC). Thus, limitation 1.E.ii is disclosed by Amphenol.” Pet. 22 (internal citation omitted).

This limitation is not addressed by Patent Owner.

b. Claim 1 – Analysis

On the present record, we determine that Petitioner has not shown a reasonable likelihood that it would prevail with respect to any claim subject to Ground I.

i. Claim Limitation 1.B

With respect to claim limitation 1.B, which requires a 30 amp feeder cable, Petitioner asserts that Amphenol lists feeder cables of various gauges (thicknesses) that may be selected for lead assemblies and that a person of ordinary skill in the art “would recognize that either 8AWG or 10AWG cables are rated for 30 amps; thus, Amphenol discloses at least one 30 amp feeder cable.” Pet. 18. Petitioner, however, does not explain *why* one would have had reason to choose a cable rated for 30 amps rather than one of the other feeder cables disclosed having some other rating.

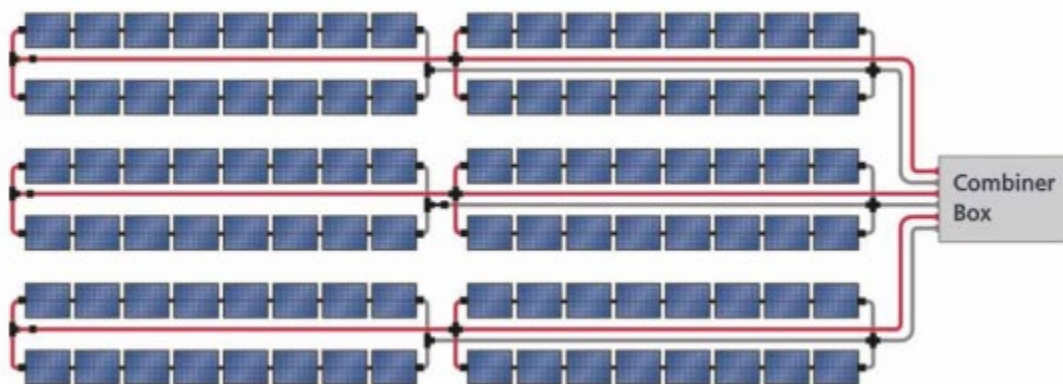
“Whether a rejection is based on combining disclosures from multiple references, combining multiple embodiments from a single reference, or selecting from large lists of elements in a single reference, there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful.” *In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017). Here, Petitioner does not supply any reasoning or evidence, in the cited references or elsewhere, that would lead one of ordinary skill in the art to employ a feeder cable rated for 30 amps over the other cables listed in Amphenol. *See* Pet. 18; Ex. 1003 ¶ 135. That such cables were known in the prior art is not, of itself, a sufficient basis for combination with the other cited teachings of the art.

ii. Claim Limitation 1.E.i

Petitioner additionally asserts that Amphenol and Yamawaki teach claim limitation 1.E.i. Claim limitation 1.E.i requires that the lead assembly combines power from a plurality of solar arrays and “transmits that power to an inverter in a solar energy installation lacking a combiner box between said solar arrays.” Ex. 1001, 7:6–10.

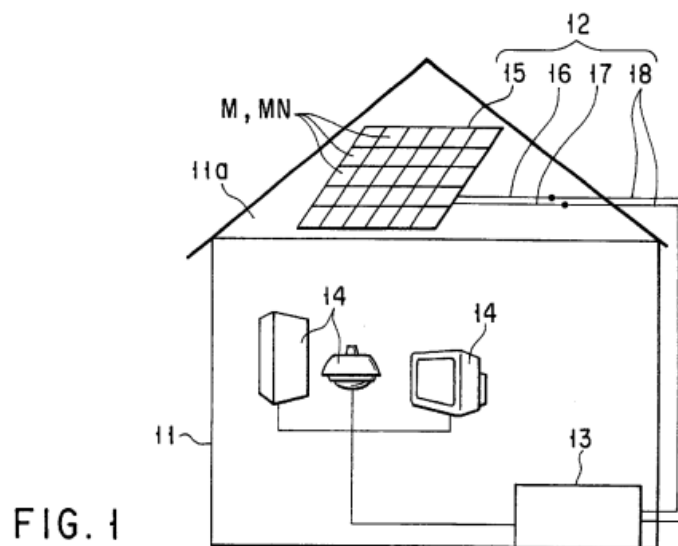
Although claim 1 is to an apparatus (a lead assembly), this limitation includes functional language (“combines” and “transmits”). We construe this limitation to require that the lead assembly have structure capable of performing the recited act. *See, e.g., Microprocessor Enhancement Corp. v. Texas Instruments Inc.*, 520 F.3d 1367, 1375 (Fed. Cir. 2008) (where claims reciting a computer processor that performs several functions were construed to be “clearly limited to a . . . processor possessing the recited structure and *capable* of performing the recited functions”). Accordingly, we construe the claim to require structure capable of combining and transmitting power to an inverter without use of a combiner box.

Petitioner relies on the following diagram from Amphenol.



Ex. 1007, 5. The figure above is an unannotated diagram from Amphenol. As found in the exhibit, the figure is not accompanied by any explanatory text. *Id.*; *see also* Prelim. Resp. 48 (referring to the figure as a “stylized illustration”). Petitioner describes this figure as a solar energy installation having multiple solar arrays. Pet. 17 (annotation), 30. It appears from this figure that the current from Amphenol’s solar panels is directed to a combiner box prior to connection to any downstream inverter. *See* Ex. 1007, 5 (structure labeled “Combiner Box”).

Petitioner additionally relies on the teachings of Yamawaki. Pet. 30–33. Petitioner asserts that “Yamawaki’s FIG. 1 shows that power is gathered through cables and junctions that are combined to form a single pair of lead-in wires 18 that are connected directly to an inverter.” *Id.* at 31. Petitioner further asserts that “[t]he resulting system would avoid problems described by Yamawaki by relying on branch cables connected to trunk cables in a simplified system that directs power from solar arrays directly to the inverter without intervening combiner boxes.” *Id.* at 32. Figure 1 of Yamawaki is reproduced below.



Yamawaki describes Figure 1 as “a conceptual diagram showing the relations between a photovoltaic generation system according to a first embodiment of the present invention.” Ex. 1006, 6:1–3. The system depicted in Figure 1 shows “photovoltaic panel (so-called solar-cell panel) 15 on a roof 11a, wiring apparatuses 16 and 17 for fetching the output of the panel 15, and a pair of lead-in wires 18 for conducting electric power . . . into the house.” *Id.* at 7:54–59. Yamawaki further teaches that “[t]he photovoltaic panel 15 is composed of a plurality of photovoltaic modules M or photovoltaic module units MN.” *Id.* at 7:62–64. Thus, Yamawaki discloses a single solar panel 15 that connects directly to an inverter 13.

The Specification of the ’254 patent teaches that an “array” is a “plurality of solar panels.” Ex. 1001, 4:30–32; *see also id.* at 7:25–26. Accordingly, the cited portions of Yamawaki, teaching a single solar panel, differ from limitation 1.E.i, which requires the combination of power from “a plurality of solar arrays.” Ex. 1001, 7:6–11.

Petitioner concludes that a “POSITA would have been motivated to combine/route power from many solar arrays [directly] to an inverter, as taught by Yamawaki, to provide a simplified system that is easier to install and more reliable.” Pet. 32. We do not find this persuasive. Yamawaki has not been shown to teach the combination of power from “many solar arrays,” or even a single solar array.

To the extent that Petitioner contends that the cited portion of Yamawaki discloses multiple panels, so as to constitute the combination of power from a plurality of arrays of panels, it is Petitioner’s burden to address

the plain language of the reference, and Petitioner failed to satisfy its burden here.

Amphenol teaches the use of multiple panels but relies on a combiner box. Accordingly, the cited references have not been shown to teach or suggest a lead assembly that combines power from a plurality of solar arrays without the use of a combiner box (claim element 1.E.i).

iii. Claim Element 1.E.ii

Claim element 1.E.ii requires that “said lead assembly has a voltage rating of 1500 VDC.” Ex. 1001, 7:10–11. Petitioner asserts that “Amphenol discloses lead assemblies with a voltage rating of 1500 VDC (i.e., between 600VDC and 2000VDC).” Pet. 33 (citing Ex. 1007, 13).

The portion of Amphenol referred to by Petitioner is reproduced below.

Cable properties:
Voltage:
☐ 600V ☐ DC1000V ☐ DC2000V DC

Ex. 1007, 13 (excerpt). This appears to disclose a T-junction with a voltage of DC2000V DC, among others. *Id.*

As discussed above, Petitioner must show that there would have been some reason for one of skill in the art to select the claimed voltage rating among those disclosed in the cited art. *See In re Stepan Co.*, 868 F.3d at 1346 n.1 (“there must be a motivation to make the combination”). Petitioner, however, does not provide any rationale whatsoever as to *why* a person of ordinary skill in the art would have been motivated to select a lead assembly with the claimed voltage rating rather than some other voltage rating. Pet.

12–15, 33. Nor does Petitioner address the technical ramifications of a lead assembly’s voltage rating. *Id.* Accordingly, Petitioner has not shown sufficiently that a person of ordinary skill in the art would have had reason to modify the system to have the claimed voltage rating.

iv. Conclusion

In view of Petitioner’s failure to show that one of ordinary skill in the art would have had reason to combine the references in a manner that would result in claim elements 1.B, 1.E.i, and 1.E.ii, we determine that Petitioner has not shown a reasonable likelihood that claim 1 would have been unpatentable on the basis set forth in Ground I.

c. Claims 2–5

Petitioner asserts that claims 2–5 would have been obvious in view of the teachings of Amphenol, Shao, and Yamawaki. Pet. 33–37. Patent Owner does not address these claims on an individual basis.

Claims 2–5 depend from claim 1 and incorporate its limitations. Ex. 1001, 7:12–23. Petitioner does not supplement its analysis with respect to claim 1 in arguing that claims 2–5 would have been obvious. Pet. 33–37. We have not found Petitioner’s arguments regarding claim 1 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

d. Claims 7–13

Independent claim 7 is broadly similar to claim 1. Ex. 1001, 7:24–8:2. It includes limitations requiring a 30 amp feeder cable (element 7.C.ii), a

lead assembly having a voltage rating of 1500 VDC (element 7.C.ix), and that the solar power system not include a combiner box upstream of a component to which the feeder cable is connected (element 7.D.ii).

Petitioner relies on the same references and reasoning discussed above as teaching these elements. Pet. 40, 42. We have not found Petitioner's arguments and evidence put forward with respect to the analogous limitations of claim 1 to be persuasive of disclosure of these claim elements. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 7 would have been unpatentable.

Claims 8–13 depend from claim 7 and incorporate its limitations. Ex. 1001, 8:3–13. Petitioner does not supplement its analysis with respect to claim 7 in arguing that claims 8–13 would have been obvious. Pet. 42–44. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

e. Claims 14 and 15

Claim 14 recites a “method of constructing a solar power installation.” Ex. 1001, 8:14. Despite being drafted as a method claim, it requires several of the same structural elements as claims 1 and 7. Claim 14 includes limitations that require a 30 amp feeder cable (element 14.E.i) and a lead assembly having a voltage rating of 1500 VDC (element 14.E.iii). Claim 14 additionally requires the step of connecting two solar arrays to a lead assembly (elements 14.A through D) and electrically coupling the lead assembly to an inverter without electrically coupling to a combiner box (element 14.E).

Petitioner relies on the same references and reasoning as it relied upon as teaching analogous claim limitations found in claim 1. Pet. 45. We have not found Petitioner's arguments and evidence put forward with respect to the analogous limitations of claim 1 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 14 would have been unpatentable.

Claim 15 depends from claim 14. Ex. 1001, 8:54–57. Petitioner does not supplement its analysis with respect to claim 14 in arguing that claim 15 would have been obvious. Pet. 46. We have not found Petitioner's arguments regarding claim 14 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 15 would have been unpatentable.

E. Ground II

For its second ground of unpatentability, Petitioner argues that claim 6 would have been unpatentable as obvious over the teachings of Amphenol, Shao, Yamawaki, and Tamura. Pet. 46–49. Claim 6 requires that the lead assembly of claim 1 have an overmold that is injection molded. Ex. 1001, 7:22–23.

1. Asserted Art³

Tamura is a Japanese patent titled “Method for molding cable branch portion” and issued April 23, 2008. Ex. 1009, codes (45), (54). A figure from Tamura is reproduced below.

³ Amphenol, Shao, and Yamawaki are discussed above in connection with Ground I.

[Fig. 1]

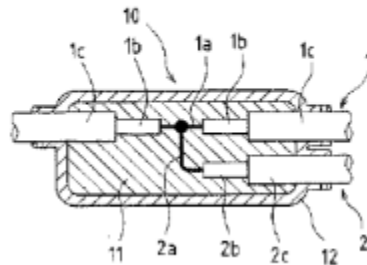


Figure 1 depicts a “molded structure for a branch portion of a CV cable.” *Id.* ¶ 14. The figure shows trunk cable 1, branch cable 2, inside molded portion 11, and outside molded portion 12. *Id.* Tamura teaches “a resin is injected into the forming die . . . and the outside molded portion covering the inside molded portion is molded.” *Id.* ¶ 11. Tamura teaches that, by practicing its method, “waterproofing performance can be enhanced.” *Id.* ¶ 9.

2. Claim 6

Claim 6 of the '254 patent depends from claim 1. Ex. 1001, 7:22–23. Petitioner does not directly address the limitations of independent claim 1 in its briefing regarding Ground II (claim 6). Pet. 48–49. Petitioner impliedly relies on its reasoning and evidence regarding claim 1 set forth in support of Ground I. *Id.*

We have not found Petitioner’s arguments regarding claim 1 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 6 would have been unpatentable.

F. Ground III

For its third ground of unpatentability, Petitioner argues that claims 1–15 would have been unpatentable as obvious over the teachings of Amphenol, Yu, Yamawaki, and Tamura. Pet. 49–70.

1. Asserted Art⁴

Yu is a Chinese patent application titled “Method for Manufacturing Prefabricated Flexible Branch Cable.” Ex. 1015, code (54). It was published January 25, 2012. *Id.*, code (43). Yu includes the figure reproduced below.

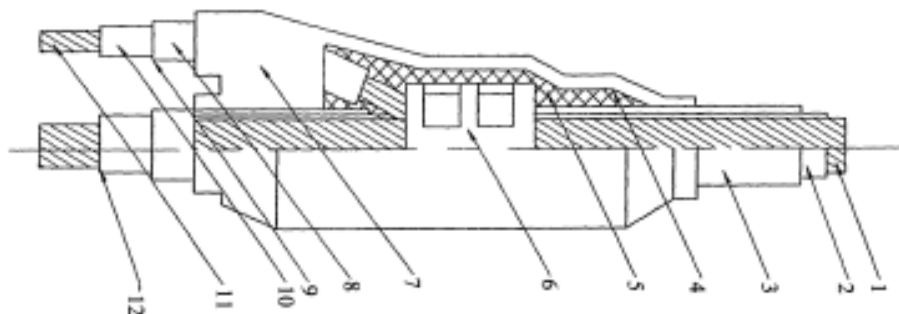


Figure 1 of Yu depicts a “single-core prefabricated branch cable.” Ex. 1015

¶ 9. Yu describes the figure as follows:

The prefabricated flexible branch cable comprises a main cable conductor 1 and a branch cable conductor 11. A main insulation layer 2 and a main outer sheath 3 are sequentially provided outside the main cable conductor 1, a branch insulation layer 10 and a branch outer sheath 8 are sequentially provided outside the branch cable conductor 1, between the main insulation layer 2 and the main outer sheath 3 . . . the main cable conductor 1 and the branch cable conductor 11 are crimped by means of a C-shaped clamp 6 with a ridge by an automatic hydraulic

⁴ Amphenol, Yamawaki, and Tamura are discussed above in connection with Grounds I and II.

machine, after the crimping is completed, injection molding of a connector insulation layer 5 is performed.

Id.

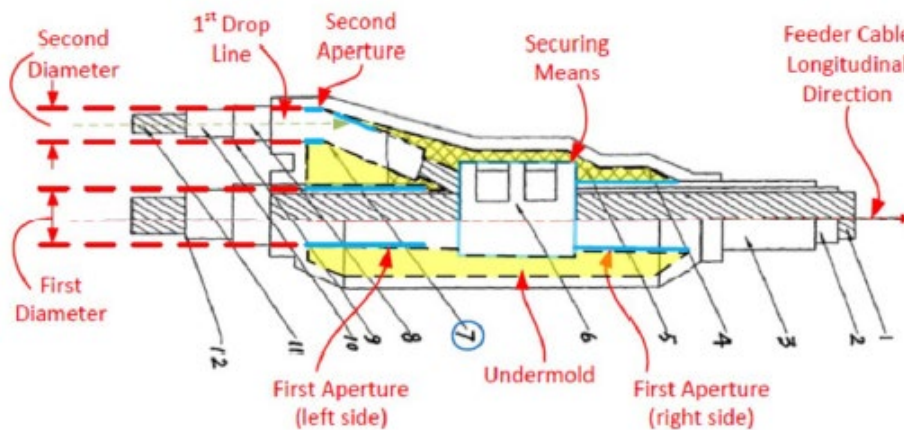
2. Claims Asserted to be Unpatentable

Petitioner argues that claims 1–15 would have been obvious over the teachings of Amphenol, Yu, Yamawaki, and Tamura. Pet. 52–70.

a. Claim 1

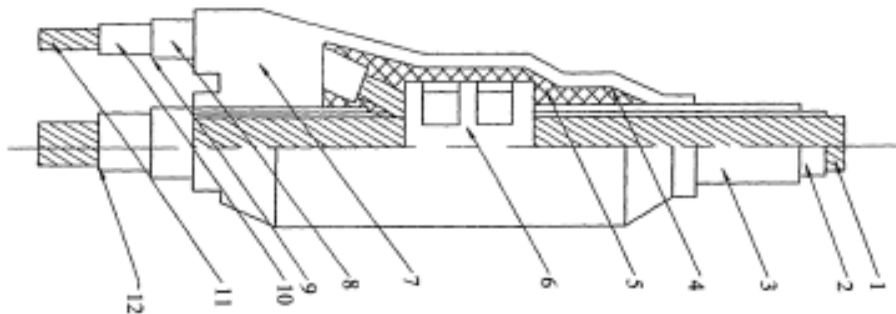
Petitioner’s asserted basis of unpatentability in Ground III is generally similar to that in Ground I other than Yu, rather than Shao, being relied upon as teaching the connection of the drop line and feeder cable at a nexus secured by a C-shaped clamp. Pet. 52–63. Petitioner relies on its arguments and evidence put forth with respect to Ground I as teaching several claim elements. Petitioner relies on its earlier briefing with respect to claim element 1.B (30 amp feeder cable). *Id.* at 52. Petitioner additionally relies on its earlier briefing with respect to claim element 1.E.i (lack of a combiner box). *Id.* at 62–63. Petitioner further relies on its earlier briefing with respect to claim element 1.E.ii (voltage rating of 1500 VDC). *Id.* at 63. As discussed above, we have not found Petitioner’s arguments regarding claim elements 1.B, 1.E.i, and 1.E.ii set forth with respect to claim 1 in Ground I to be persuasive.

Additionally, Petitioner relies on a modified version of Yu’s Fig. 1, which is reproduced below, as disclosing “a second aperture . . . parallel to said first aperture” (claim element 1.D.iii). Pet. 57–58.



Id. at 58. The figure above is an annotated version of Yu's Figure 1. *Id.*

While this annotated figure may suggest that the first and second apertures (in blue) are parallel for at least a portion of their length, this is less apparent when one views Yu's Figure 1, which is reproduced below.



Ex. 1015, Fig. 1. The figure above is Figure 1 of Yu as published without annotation or modification. Petitioner relies on connector insulation layer 5 (shown in cross-hatching) as teaching the claimed undermold. Pet. 54. The figure shows the branch cable 11 extending through the cross-hatching (undermold) but does not show any portion of the second aperture extending through connector insulation layer 5 (undermold/cross-hatching) parallel to the first aperture.

In its annotated figure, Petitioner annotates a portion of the figure that is not cross-hatched as “undermold.” *Id.* at 58 (shown in yellow). This has the effect of extending the putative undermold, and thus the second aperture, in a leftward direction to reach a portion of the branch cable 11 parallel to the feeder cable 1 (shown in blue). Such interpretation goes beyond the teaching of the reference.

Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 1 would have been unpatentable over the cited references.

b. Claims 2–6

Petitioner asserts that claims 2–6 would have been obvious in view of the teachings of Amphenol, Yu, Yamawaki, and Tamura. Pet. 63–67. Patent Owner does not address these claims on an individual basis.

Claims 2–6 depend from claim 1. Ex. 1001, 7:12–23. Petitioner does not supplement its analysis with respect to claim 1 in arguing that claims 2–6 would have been obvious. Pet. 63–67. We have not found Petitioner’s arguments regarding claim 1 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

c. Claims 7–13

Independent claim 7 is broadly similar to claim 1. Ex. 1001, 7:24–8:2. It includes limitations requiring

- a 30 amp feeder cable (element 7.C.ii);
- that the second aperture be parallel to the first aperture (element 7.C.vii);

a lead assembly having a voltage rating of 1500 VDC (element 7.C.ix); and

that the solar power system not include a combiner box upstream of a component to which the feeder cable is connected (element 7.D.ii).

In arguing that claim 7 would have been unpatentable, Petitioner relies on the same references and reasoning discussed above (in connection with claim 1) as teaching these elements. Pet. 67–68. We have not found Petitioner’s arguments and evidence put forward with respect to the analogous limitations of claim 1 to be persuasive of disclosure of these claim elements, *supra*. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 7 would have been unpatentable.

Claims 8–13 depend from claim 7 and incorporate its limitations. Ex. 1001, 8:3–13. Petitioner does not supplement its analysis with respect to claim 7 in arguing that claims 8–13 would have been obvious. Pet. 68. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

d. Claims 14 and 15

Claim 14 recites a “method of constructing a solar power installation.” Ex. 1001, 8:14. Despite being drafted as a method claim, it requires several of the same structural elements as claims 1 and 7. Claim 14 includes limitations that require a 30 amp feeder cable (element 14.E.i), a second aperture parallel to the first aperture (element 14.E.i), and a lead assembly having a voltage rating of 1500 VDC (element 14.E.iii). Claim 14 additionally requires the step of connecting two solar arrays to a lead assembly (elements 14.A through D) and electrically coupling the lead

assembly to an inverter without electrically coupling to a combiner box (element 14.E).

Petitioner relies on the same references and reasoning as it relied upon as teaching analogous claim limitations found in claim 7. Pet. 69. We have not found Petitioner's arguments and evidence put forward with respect to the analogous limitations of claim 7 (or claim 1) to be persuasive with respect to claim elements 14.E, 14.E.i, and 14.E.iii. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 14 would have been unpatentable.

Claim 15 depends from claim 14. Ex. 1001, 8:54–57. Petitioner does not supplement its analysis with respect to claim 14 in arguing that claim 15 would have been obvious. Pet. 70. We have not found Petitioner's arguments regarding claim 14 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 15 would have been unpatentable.

G. Ground IV

For its fourth ground of unpatentability, Petitioner argues that claims 1–5 and 7–15 would have been unpatentable as obvious over the teachings of Yamawaki and Shao. Pet. 70–100.

1. Claim 1

a. Preamble, Elements 1.A, and 1.B

Petitioner argues that Yamawaki discloses a lead assembly that discloses the preamble as well as claim elements 1.A and 1.B. Pet. 71–74.

Claim element 1.B requires, *inter alia*, a “30 amp feeder cable terminating in a feeder cable connector.” Ex. 1001, 6:47–49. Petitioner does

not assert that Yamawaki includes an explicit teaching of a 30 amp feeder cable but argues that “[t]o the extent that Yamawaki does not explicitly disclose that the feeder cable is rated for 30 amps, a POSITA would understand that the selection of feeder cable amperage capacity, of at least 30 amps, is an obvious design choice in view of well-known electric codes and standards.” Pet. 74.

“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. at 421. Here, Petitioner’s single sentence is insufficient to show any design incentive, predictability, or other reason why adoption of a 30 amp feeder cable is an improvement to some solar systems. *Cf. Cutsforth, Inc. v. MotivePower, Inc.*, 636 F. App’x 575, 578 (Fed. Cir. 2016) (unpublished) (vacating a Board determination of obviousness on the basis that a statement that a proposed modification to the prior art “is a design choice and is obvious . . . alone is not enough to explain” a finding of obviousness).

Petitioner’s declarant supplies evidence that wire gauge is known to correlate with ampacity. Ex. 1003 ¶ 395. This, however, does not provide any reasoning as to why one of skill in the art would have selected a feeder cable rated for 30 amps as opposed to some other value.

Accordingly, Petitioner has not shown that a person of ordinary skill in the art would have had reason to practice claim element 1.B.

b. Elements 1.C, 1.D, and 1.E

Petitioner relies on Shao as teaching claim element 1.C (means for securing the nexus) and on Yamawaki as teaching claim element 1.D (undermold). Pet. 74–75.

Petitioner relies on Shao as teaching claim element 1.D.i (first aperture), 1.D.ii (feeder cable), and 1.D.iii (second aperture). *Id.* at 77–80.

Petitioner relies on Yamawaki as teaching the overmold of claim element 1.E. *Id.* at 80. Petitioner argues that a person of ordinary skill in the art would have applied an overmold as taught by Yamawaki to the undermold of Shao. *Id.* at 81.

c. Elements 1.E.i and 1.E.ii

Claim element 1.E.i requires that the “lead assembly combines power from a plurality of solar arrays.” Ex 1001, 7:6–7. We construe the functional language of claim element 1.E.i as discussed above.

Petitioner asserts that Yamawaki “discloses a lead assembly (i.e., wiring apparatus 16) that combines power from a plurality of solar arrays (photovoltaic modules M, photovoltaic module units MN).” Pet. 82. The portion of Yamawaki cited by Petitioner refers to a single “photovoltaic panel 15” composed of “a plurality of photovoltaic modules M.” Ex. 1006, 7:54–64; *see also id.*, Fig. 1.

The Petition includes a reproduction of Yamawaki’s Figure 3 without explanation. Pet. 83. Yamawaki states that “[a]s shown in FIG. 3, the panel 15 is composed of, for example, eight module units MN.” Ex. 1006, 8:15–16.

The Specification of the ’254 patent teaches that an “array” is a “plurality of solar panels.” Ex. 1001, 4:30–32; *see also id.* at 7:25–26. Accordingly, the disclosure of Yamawaki appears to differ from limitation 1.E.i, which requires the combination of power derived from “a plurality of solar arrays.” Ex. 1001, 7:6–11.

Claim element 1.E.ii requires that the lead assembly have “a voltage rating of 1500 VDC.” *Id.* at 7:11–12. Petitioner argues that such limitation “is an obvious design choice amongst well-known options.” Pet. 84. Petitioner further refers to a statement by the Examiner during patent prosecution that “it would have been obvious . . . to vary the voltage rating of the lead assembly according to the ultimate electrical requirements of the system” and that the applicant has not shown “the criticality of the lead assembly having a voltage rating of 1500 VDC.” *Id.* (quoting Ex. 1002-151).

Such arguments, without more, are insufficient to show that the voltage rating is a mere design choice. Petitioner has not addressed the context of such limitation. Simply asserting that a limitation is a design choice, of itself, is inadequate to show unpatentability. *See Fanduel, Inc. v. Interactive Games LLC*, 966 F.3d 1334, 1344 (Fed. Cir. 2020) (affirming a Board decision that “reasonably found that simply calling the addition of a look-up table ‘an obvious design choice’ did not fill that gap” in petitioner’s reasoning).

In view of the foregoing, we determine that Petitioner has not shown a reasonable likelihood that claim 1 would have been unpatentable in view of the cited references.

2. Claims 2–5

Petitioner asserts that claims 2–5 would have been obvious in view of the teachings of Yamawaki and Shao. Pet. 84–88. Patent Owner does not address these claims on an individual basis.

Claims 2–5 depend from claim 1 and therefore incorporate all of its limitations. Ex. 1001, 7:12–23. Petitioner does not supplement its analysis

with respect to claim 1 in arguing that claims 2–5 would have been obvious. Pet. 84–88. We have not found Petitioner’s arguments regarding claim 1 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

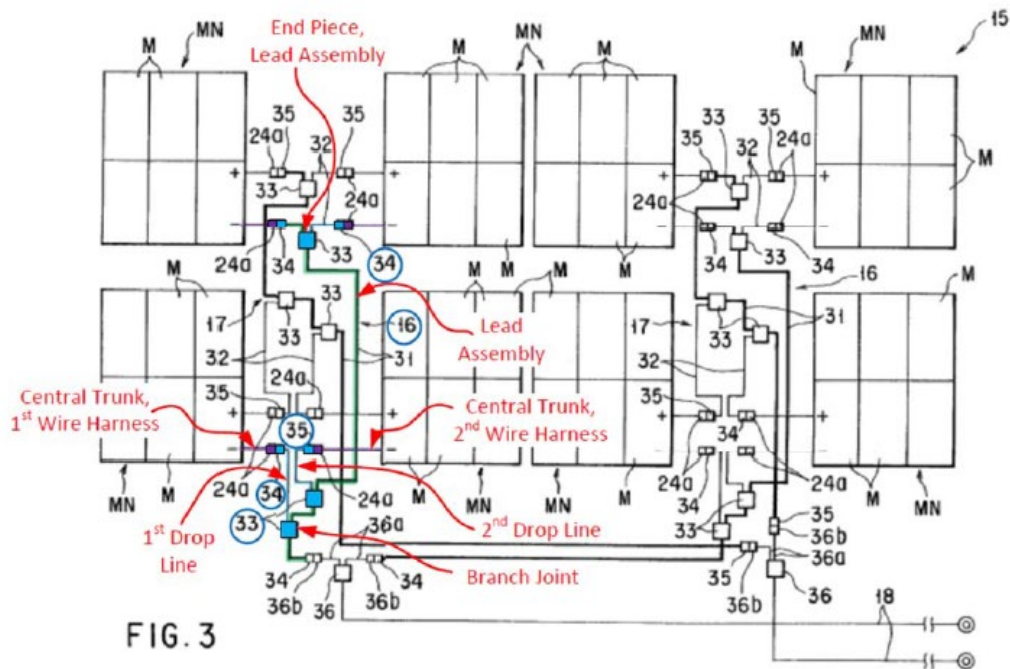
3. *Claim 7*

Independent claim 7 is broadly similar to claim 1. Ex. 1001, 7:24–8:2. It includes limitations requiring

- a first plurality of solar panels coupled by a wire harness to form a first solar array (element 7.A);
- a second plurality of solar panels coupled by a wire harness to form a second solar array (element 7.B);
- a 30 amp feeder cable (element 7.C.ii); and
- a lead assembly having a voltage rating of 1500 VDC (element 7.C.ix).

Ex. 1001, 7:23–56.

With respect to limitation 7.A, Petitioner argues that each photovoltaic module (designated “M”) of Yamawaki is a solar panel. Accordingly, Petitioner argues that each module unit (designated “MN”) shown in Yamawaki’s Figure 3, reproduced below, discloses a solar array. Pet. 88–89. Petitioner makes a similar assertion with respect to claim element 7.B. *Id.* at 89–90.



Pet. 89. The figure above is an annotated version of Yamawaki's Figure 3.

As discussed above, Petitioner's assertion that each module "M" is a solar panel appears to be inconsistent with the teachings of Yamawaki.

Yamawaki teaches as follows:

The photovoltaic generation system 12 comprises a **photovoltaic panel (so-called solar-cell panel) 15** on a roof 11a, wiring apparatuses 16 and 17 for fetching the output of the panel 15, and a pair of lead-in wires 18 for conducting electric power fetched by means of the apparatuses 16 and 17 into the house. . . . **The photovoltaic panel 15 is composed of a plurality of photovoltaic modules M or photovoltaic module units MN.** Each module M includes a plurality of photovoltaic cells (so-called solar cells) that are arranged in a matrix. **Each module unit MN includes a plurality of modules M that are arranged in a matrix.**

* * *

As shown in FIG. 3, **the panel 15 is composed of, for example, eight module units MN.** Each module unit MN includes six

modules M. The six modules M that constitute each module unit MN are connected in series and/or parallel with one another, depending on the required output.

Ex. 1006, 7:54–8:20 (emphasis added). Yamawaki teaches that the entirety of Figure 3 depicts one photovoltaic panel as indicated by the number 15 in the upper right corner. If Petitioner advocates some other understanding of Yamawaki, it must explain why we should reach such understanding and do so with particularity. *See* 35 U.S.C. § 312(a)(3).

In view of the cited disclosure of Yamawaki, it is not apparent that each module unit MN is an array of solar panels as asserted by Petitioner. Accordingly, we determine that Petitioner has not demonstrated that claim elements 7.A and 7.B are taught or suggested by Yamawaki.

In arguing that claim elements 7.C.ii (30 amp feeder) and 7.C.ix (voltage rating of 1500 VDC) are taught by Yamawaki, Petitioner relies on its briefing set forth in support of claim elements 1.B and 1.E.i. Pet. 92. As we have not found such arguments and evidence to be persuasive of disclosure of these claim elements, we determine that Petitioner has not carried its burden in this regard.

In view of the foregoing, we determine that Petitioner has not shown a reasonable likelihood that claim 7 would have been unpatentable over the cited references.

4. Claims 8–13

Claims 8–13 depend from claim 7 and therefore incorporate each of its limitations. Ex. 1001, 8:3–13. Petitioner does not supplement its analysis with respect to claim 7 in arguing that claims 8–13 would have been

obvious. Pet. 96–99. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that these dependent claims would have been unpatentable.

5. Claims 14 and 15

Claim 14 recites a “method of constructing a solar power installation.” Ex. 1001, 8:14. Despite being drafted as a method claim, it requires several of the same structural elements as claims 1 and 7. Claim 14 includes limitations that require a 30 amp feeder cable (element 14.E.i) and a lead assembly having a voltage rating of 1500 VDC (element 14.E.iii). Claim 14 additionally requires the step of connecting two solar arrays to a lead assembly (elements 14.A through D) “without electrically coupling to a combiner box” (element 14.E).

In arguing that claim elements 14.E.i (30 amp feeder) and 14.E.iii (voltage rating of 1500 VDC) are taught by Yamawaki, Petitioner relies on its briefing set forth in support of its argument in Ground IV that analogous elements of claim 1 are taught by Yamawaki. Pet. 100. As we have not found such arguments and evidence to be persuasive of disclosure of these claim elements, we determine that Petitioner has not carried its burden in this regard.

In arguing that claim elements 14.A through D are taught by Yamawaki, Petitioner relies on its briefing set forth in support of its argument in Ground IV that analogous elements of claim 7 are taught by Yamawaki. *Id.* at 99–100. For the reasons discussed above, we have not found such argument persuasive.

In view of the foregoing, we determine that Petitioner has not shown a reasonable likelihood that claim 14 would have been unpatentable over the cited references.

Claim 15 depends from claim 14 and incorporates each of its limitations. Ex. 1001, 8:54–57. Petitioner does not supplement its analysis with respect to claim 14 in arguing that claim 15 would have been obvious. Pet. 100. We have not found Petitioner’s arguments regarding claim 14 to be persuasive. Accordingly, on the present record, Petitioner has not shown a reasonable likelihood that claim 15 would have been unpatentable.

H. Matters Not Considered at Present

Patent Owner argues that the Petition should be denied for failure to address Patent Owner’s known evidence of secondary considerations of nonobviousness. Prelim. Resp. 19–22.

Patent Owner additionally argues that Petitioner has not adequately shown that Amphenol (Ex. 1007) was publicly accessible before the priority date of the ’254 patent. *Id.* at 40–47.

Patent Owner additionally argues that Shao is not analogous art to the ’254 patent. Prelim. Resp. 56–62. Patent Owner argues that Shao is neither from the same field of endeavor as the ’254 patent nor reasonably pertinent to the particular problem with which the inventor is involved. *Id.* at 56.

Because we have determined, based on the present record, that Petitioner has not shown that the cited references would have rendered the claims of the ’254 patent unpatentable, we need not address these matters at present.

III. CONCLUSION

The Petition fails to show there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition. *See* 35 U.S.C. § 314(a); 37 C.F.R. § 42.108. Accordingly, we deny the Petition.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied, and no trial is instituted.

IPR2024-00876
Patent 10,992,254 B2

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