

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AFFORDABLE WIRE MANAGEMENT, LLC,
Petitioner,

v.

CAMBRIA COUNTY ASSOCIATION FOR
THE BLIND AND HANDICAPPED, INC.,
Patent Owner.

IPR2024-00178
Patent 11,349,291

**PATENT OWNER'S RESPONSE TO
PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 11,349,291**

**CONTAINS CONFIDENTIAL
PROTECTIVE ORDER MATERIAL**

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Exhibit	Description
2001	Declaration of Edward C. Kern, Jr., Ph.D.
2002	U.S. Patent No. 5,740,994 ("Laughlin")
2003	Defendant Affordable Wire Management, LLC's Initial Invalidity Contentions
2004	Transcript of Deposition of Omid Beik, Ph.D., July 9, 2024
2005	Wind and Solar Systems: Design, Analysis and Operation, Third Edition
2006	Declaration of Allen Garrett Smith
2007	CAB Cable Rings & Saddles for Solar Panel Wiring (2013)
2008	SunPower Field Process Change Review 1 Development Review
2009	Intersolar Award Finalist – Photovoltaics (2014)
2010	Email dated April 7, 2015
2011	Email dated April 10, 2015
2012	Email dated July 2, 2015
2013	Email dated September 15, 2015
2014	Email dated September 21, 2015
2015	Email dated October 2, 2015
2016	PV Magazine "The Array Changers: 50 Key Components Making PV Shine"
2017	Email dated January 18, 2016
2018	SolarPro Magazine (July/August 2016)
2019	Email dated May 20, 2016
2020	RP Construction Services Press Release (July 26, 2018)
2021	NECA Show Stopper Award (2018)
2022	Electrical Contractors Magazine (January 2019)
2023	Top Solar Component Products (2019)
2024	Top Solar Components and Equipment (2021)
2025	PV Magazine Award (2021)
2026	Leadership in Solar Energy Award (2022)
2027	Leadership in Solar Energy Award (2023)
2028	Declaration of Mitchel F. Bowman
2029	CV of Mitchel F. Bowman
2030	SunEdison, CAB Prototyping at SolarTac
2031	Email dated November 14, 2014
2032	Email dated August 17, 2015

2033	Declaration of William F. Brooks, PE
2034	CV of William F. Brooks, PE
2035	Solar Market Insight Report, 2023 Year in Review
2036	National Renewable Energy Laboratory, Spring 2014 Solar Industry Update
2037	Brooks, Engineering, Cable Management in Solar PV Arrays: A Review of Requirements in the 2017 and 2020 Editions of the National Electrical Code and how CAB Solar Hangers Meet These Requirements (November 25, 2020)
2038	Declaration of Edward C. Kern, Jr., Ph.D.
2039	CV of Edward C. Kern, Jr., Ph.D.
2040	[RESERVED]
2041	CAB Solar Cable Management Installation Guide (January 28, 2022)
2042	Solar Project Quote Request/CAB Quote #1
2043	Intertek, Authorization to Mark
2044	Declaration of Jonathan D. Putnam, Ph.D.
2045	CV of Jonathan D. Putnam, Ph.D.
2046	Solar Sales Figures Spreadsheet #1
2047	Comparison of Solar Cable Management Systems
2048	Compare CAB Solar vs. Trenching or Cable Tray
2049	Cost Comparison of CAB Standard vs Integrated Cable Management System
2050	Solar Project Quote Request/CAB Quote #2
2051	Solar Project Quote Request/CAB Quote #3
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2053	Solar Project Quote Request/CAB Quote #5
2054	Solar Project Quote Request/CAB Quote #6
2055	National Electric Code (2014)
2056	Solar Sales Figures Spreadsheet #2
2057	Solar Project Drawings
2058	Declaration of Denise L. Studinary
2059	Declaration of Joseph William Novak, PE, MSE, MBA, S.P.
2060	Solar Pro Magazine (February/March 2013)

Patent Owner Cambria County Association for the Blind and Handicapped, Inc. (“CAB” or “Patent Owner”) submits its Response to Petitioner Affordable Wire Management, LLC’s (“AWM”) Petition for *Inter Partes* Review (Paper 1) of claims 1-10, 14-22, and 24-25 of U.S. Patent No. 11,349,291 (“‘291 Patent”) (EX1001).

I. BACKGROUND: SOLAR INSTALLATIONS AND THE NEED FOR CABLE MANAGEMENT

PV energy generation differs from traditional generation resources (e.g., coal or nuclear power stations) in that the latter generate power at one location, whereas PV energy generation is a spatially distributed generation resource in which power is aggregated from smaller to larger currents. EX2038, ¶34. The spatially distributed nature of PV energy generation presents challenges that do not exist in traditional generation resources. *Id.*, ¶38; *see also id.*, ¶35. These unique challenges include and relate to, for example, aggregating and collecting power in a PV array, transmitting power output to combiners and inverters in PV output (or source) circuits, and proper management of ground faults that occurred in the system. *Id.*

A. EARLY PHOTOVOLTAIC (“PV”) SYSTEMS

Early commercial PV systems were off-grid, required direct current (“DC”) cables only, and used fixed (non-tracking) solar panels. EX2038, ¶39; *see also* EX2033, ¶14. The first solar applications that produced electricity for bulk power

markets also used fixed solar panels and used only DC cables. EX2038, ¶40.

Subsequent arrays used panels capable of single axis tracking, which introduced the need for control cabling and alternating current (“AC”) cables. *Id.*, ¶41.

Utility-scale solar installations began to be developed in the early to mid-2000's, and a typical installation at that time had a capacity of ~1MW. EX2038, ¶40; EX2033, ¶29. In only a few years, solar installations with capacities of over 100MW were being developed. EX2033, ¶29. The rapid transition to multi-megawatt installations, together with changes to the National Electric Code (“NEC”), resulted in a significant increase in the quantity and length of power cables in a PV array, and the need to manage them, as well as challenges associated with the necessary wire management. EX2038, ¶¶43-45.

B. THE NEED FOR IMPROVED SYSTEMS FOR CABLE MANAGEMENT

In a utility-scale PV installation (both presently and as of the priority date of the '291 Patent), DC collector cables (a/k/a “string cables”) collect DC current generated by the numerous solar cells within solar panels. EX2038, ¶47; EX2033, ¶39; *see also* EX1001, 1:25-27. Multiple string cables that are attached to the solar panels and that collect the DC power are input to combiner boxes (of which there are many in a PV installation), which combine the bundles of string cables and output them as “feeder cables.” The outputs from the various combiner boxes need

to be combined again before they are routed to an inverter. EX2038, ¶¶47-48, EX2033, ¶39; EX1001, 1:25-27. The inverter converts the DC current to AC current, and the AC current then is connected to the grid. EX2038, ¶48; EX2033, ¶39; *see also* EX1001, 1:25-27. As solar power plants evolved to include the use of more sophisticated tracker systems, other types of cables also are present in a PV installation, such as AC current cables and data cables which typically are supported together with or in close proximity to the DC cables. EX2037, ¶50; EX2033, ¶40; EX1001, 1:27-31, 43-45.

Initially, cable management in increasingly large PV arrays was accomplished by trenching (i.e., burying cables) and by the use of rigid metal cable trays. EX2038, ¶¶48, 52, 53; EX2033, ¶¶22-23, 41; EX2059, ¶41. Those methods were well understood and established methods of cable management that were known to comply with NEC requirements, but were also known to have disadvantages. EX2038, ¶¶52-55; EX2033, ¶¶41-42. Cable trays are expensive, must be designed to match the features and layout of an array in which they are installed, and are cumbersome to install. EX2038, ¶54; EX2033, ¶42. Trenching is less expensive than using cable trays, but it is extremely labor intensive, and buried cables are more prone to failure and are difficult to maintain. EX2038, ¶52; EX2033, ¶41. Trenching also makes it difficult to access areas of a PV installation

while the trenches are open, and to add capacity to a PV array after construction.

Id., ¶¶52, 53.

In 2014, the NEC was amended to require AC and DC cables to be separated from each other. EX2038, ¶56; EX1001, 2:3-6; EX2055, Art. 690.31(B).

Additionally, because AC and DC power cables were known to interfere, i.e., cause cross induction, with nearby signal and data wires, there also was a known need to separate AC and DC power cables from signal and data wires. EX2038, ¶57 (citing EX1001, 1:37-56), ¶58. Notably, however, the NEC code provision for separating DC and AC cables in PV arrays does not mention or contemplate utilizing cable hangers suspended from a messenger wire for separating the various kinds of electrical cables within a solar installation array. EX2038, ¶56. In fact, NEC Art. 690.31(B) specifically states that DC and AC cables shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting. *Id.*

As of the priority date, however, there was no cable management solution for PV installations that addressed the disadvantages of trenching and cable trays, satisfied the NEC's requirement that AC cables be separated from DC cables, and permitted those types of cables to be separated from signal wires. EX2038, ¶59; *see also* EX2033, ¶38. The invention claimed in the '291 Patent accomplished all of those objectives.

II. THE '291 PATENT AND ITS PROSECUTION HISTORY

A. THE '291 PATENT

The '291 Patent, "Locking cable hanger and method of using," issued May 31, 2022, to inventors Allen Garrett Smith, Frank Edward Hodge, David James Prasko, and Timothy Joseph Wedding, and is assigned to CAB. EX1001. The '291 Patent is one of a number of patents that claim priority from U.S. Patent Application No. 14/556,117, filed November 29, 2014. *Id.* Although the '291 Patent discusses cable hangers, methods of using cable hangers, and systems utilizing cable hangers in organizing various electrical cables, the claims of the '291 Patent are specifically directed to systems and methods *of organizing electrical cables extending from solar panels*. *Id.*, 10:24-13:8 (emphasis added).

Independent claims 1 and 6 are representative.

1. A system for organizing a plurality of electrical cables extending from a plurality of solar panels, the system comprising:
 - a messenger wire structured to be supported a distance above the ground; and
 - a plurality of cable hangers structured to be disposed along, and suspended from, the messenger wire, each cable hanger having a plurality of cable carrying surfaces, each cable

carrying surface being structured to support at least one electrical cable of the plurality of electrical cables,

wherein adjacent cable carrying surfaces of the plurality of cable carrying surfaces are separated by a cable carrier divider.

6. A system for organizing a plurality of electrical cables extending from a plurality of solar panels, the system comprising:

a messenger wire structured to be supported a distance above the ground; and

a plurality of cable hangers structured to be disposed along, and suspended from, the messenger wire, each cable hanger having a plurality of cable carrying surfaces, each cable carrying surface being structured to support at least one electrical cable of the plurality of electrical cables, wherein each cable hanger of the plurality of cable hangers comprises:

a high tensile strength wire with two opposing ends and configured intermediate of said ends to form a plurality of substantially U-shaped configurations each having a cable carrying surface of the plurality of cable carrying surfaces located thereon;

outermost lateral spaced apart opposing sides forming the boundary of said hanger;

opposite shoulders extending toward each other from said spaced apart opposite sides, each of said

shoulders having an arrangement structured to engage the messenger wire so as to securely hold the hanger on the messenger wire.

EX1001, 10:24-37; 10:49-11:5.

The specification discusses the “need for electrical cables to extend from a power or signal source to a location of application.” *Id.*, 1:20-22. In describing the types of electrical cables and other wires used in solar plant installations, the specification explains that

[D]irect current wires attach first to the solar panels and then run to combiner boxes before extending further to power inverters. In addition, alternating current power cables are used to power the motors that control the trackers, devices that rotate the solar panels to follow the sun in order to obtain maximum power during daylight hours.

Id., 1:25-31. The specification also addresses the solar industry's recent increased use of tracker systems and associated signal wiring used to provide feedback to the power plant operators. *Id.*, 1:43-56; 2:1-3.

The specification also states that in solar power plants “there are various sized wires and bundles of wires with an almost unlimited variety of wire bundle sizes” *Id.*, 1:57-59. The specification also identifies some of the harsh environmental conditions to which solar plants are subject, stating that the “stifling

heat of the desert where solar power plants are usually located [can reach 120 degrees F].” *Id.*, 2:37, 49-50.

The specification also discusses cable management methods used as of the November 2014 priority date, and the NEC’s requirement to separate AC from DC cables:

Prior to 2014, AC and DC cables could be bundled immediately adjacent to, and touching, one another in a wire management system for the solar panels. In the new National Electric Code of 2014, the AC and DC cables must not be immediately adjacent to one another, but must have a degree of separation from one another. Power carrying cables have a tendency to induce errors or interfere with the signal wires that are located in close proximity to them. This new requirement also applies to other applications outside the solar power industry, such as the mining and electrical industries.

Id., 1:32-42. The ‘291 Patent further explains:

Because of the increased use of trackers in solar power plants, there is increased use of category five cables and other data wiring. This type of control wiring is used to give power plant operators feedback from the solar power plant array on what angles the panels are stationed, and what the proper angle should be to maximize power output from the sun. . . . The type of

wiring used in collecting data is sensitive to cables used for AC and DC power and because of that sensitivity, data wiring cannot be bundled with power cables and must be supported by a separate carrier that is at least one inch away from all power cables.

Id., 1:43-56. The specification states, and Dr. Kern also describes, that “[b]ecause of [the] changes [to the NEC], the wire management systems are much more complex, especially given the vast number of wires involved in a utility scale solar power plant.” *Id.*, 2:6-9; EX2038, ¶80. The ‘291 Patent, therefore, provides an improved cable management system that addresses these challenges. *See* EX2038, ¶74.

Claim 1 of the ‘291 Patent claims a system for organizing a plurality of electrical cables extending from a plurality of solar panels. As claimed, a plurality of cable hangers are structured to support the plurality of electrical cables, each hanger having multiple cable carrying surfaces separated by a cable carrier divider, and further structured to be disposed along, and suspended from, a messenger wire. EX1001, 10:24-37; EX2038, ¶81. The claimed system is depicted in Figure 1 and in an annotated version of Figure 2 of the ‘291 patent, reproduced below. The system shown in annotated Figure 2 includes a messenger wire **12** and a plurality of cable hangers **10** suspended from the messenger wire **12**. Annotated Figure 2 also illustrates a plurality of electrical cables positioned in side-by-side hanger

surfaces separated from each other, as well as a data cable in a separate data carrier loop.

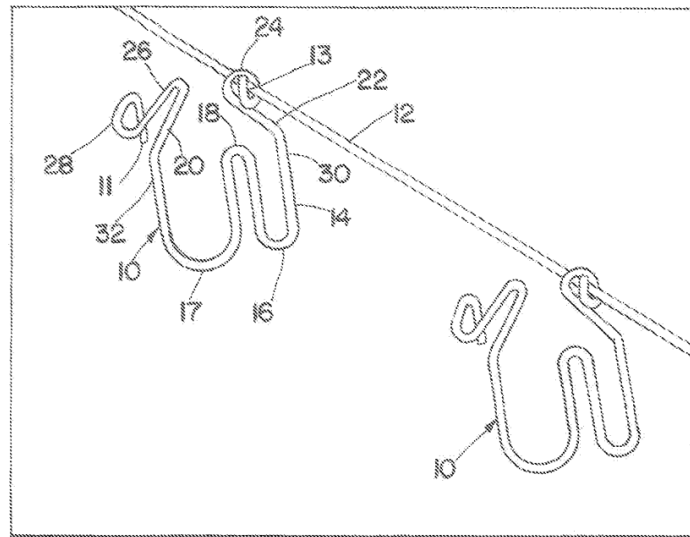


Fig. 1

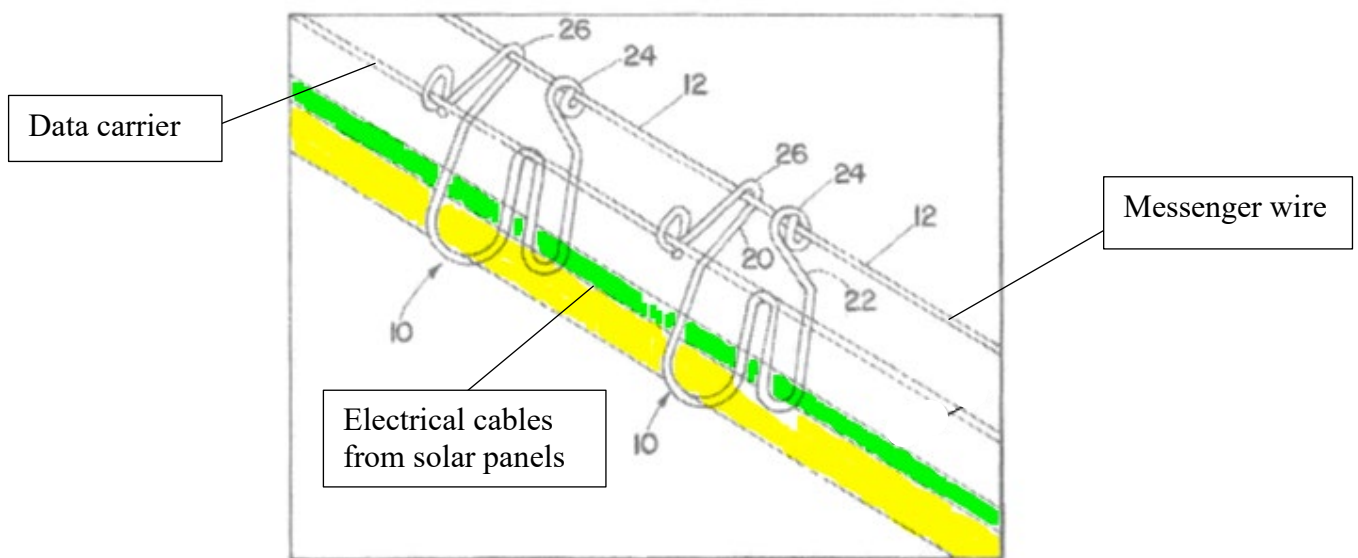


Fig. 2

Id., 5:19-20; 6:50-54; 7:27-41; FIGS. 2, 4; *see also* EX2038, ¶81.

While Figure 2 above shows only one cable in each of two cable carrying surfaces, dependent claims 2-4 recite cable hangers with at least three, four and five cable carrying surfaces, respectively, each structured to support at least one of the plurality of electrical cables. *See* EX1001, 10:38-46; *see also, e.g.*, FIG. 23; EX2038, ¶82. The '291 Patent states that "[w]hat is important is that the hanger **10** provides a sufficient separation between both cable carrier formations **16, 17** and a further sufficient separation between the two carriers formations **16, 17**, and the data carrier loop **28**" EX1001, 7:14-17.

The systems and methods of the '291 Patent, therefore, provide for separating a plurality of DC and AC cables extending from solar panels from each other and to be separated from data carrying wires. EX2038, ¶83. Providing sufficient separation in this way protects against errors and interference between the wires. *Id.*

B. PROSECUTION HISTORY

U.S. Patent Application Ser. No. 17/349,447 (which issued as the '291 Patent) was filed on June 16, 2021, and claims priority to U.S. Application No. 14/556,117, filed on November 29, 2014, now issued as U.S. Patent No. 9,722,405. EX1001, Cover.

During prosecution of the '291 Patent, the Examiner rejected the claims, in part, based upon what the Examiner initially understood to constitute Applicant's

own admitted prior art disclosed in the specification, in combination with *Carr*, U.S. Patent No. 2,384,440 (EX1005). EX1015, 149-163. The Examiner's rejection states

Applicant discloses that the prior discloses a system for organizing a plurality of electrical cables extending from a plurality of solar panels; a messenger wire structured to be supported a distance above ground; and a plurality of cable hangers structured to be disposed along, and suspended from, the messenger wire (see pages 2 and 3 of the specification).

EX1015, 152.

The Applicant overcame the rejection by submitting a declaration from one of the inventors, Allen Garrett Smith, explaining that the Examiner had misunderstood the disclosures in the specification, and that any references in the specification to “any use of known/existing cable hanger systems (i.e., systems utilizing a messenger wire suspended therefrom) . . . were to arrangements and/or components thereof used in the mining and/or electrical . . . industries,” whereas “any references to the use of arrangements or portions thereof in regard to the solar industry were not to any publicly known/available arrangement by any other(s) as none existed at such time.” *Id.*, 202. The declaration also explained that any references to systems or components of systems in the solar industry “were to CAB's own testing/development which were undertaken non-

publicly/confidentially and/or within one year from the filing date of the patent application from which the present application claims priority.” *Id.*

The next office action following the submission of the inventor's declaration was the issuance of a Notice of Allowability issued in response to the declaration. EX1015, 206-213. The Notice of Allowability included the following reasons for allowance:

The prior art does not disclose or suggest a system for organizing a plurality of electrical cables extending from a plurality of solar panels, with a plurality of cable hangers disposed along a messenger wire, with cable carrying surfaces structured to support at least one cable and separated by a cable carrier divider.

Id., 211; *see also id.*, 253-258 (Corrected Notice of Allowability).

III. PETITIONER'S ASSERTED PRIOR ART

A. CAVENEY (U.S. PATENT NO. 7,520,476)

Caveney, titled “Cable Support System,” issued on April 21, 2009. EX1003. *Caveney* is directed to “a cable support system, and more particularly, to a multi-tiered system for supporting high-performance cabling.” *Id.*, 1:6-8. *Caveney*'s specification states that prior art “[m]ulti-tiered systems for supporting high-performance cabling have been used in the telecommunications industry.” *Id.*, 1:9-10. *Caveney* discloses that its cable supports are “secured directly to any fastener

or structure” *Id.*, 3:3. The structures explicitly disclosed in *Caveney* are an I-beam, a ladder rack, a joist, a ceiling or a wall. *Id.*, 2:65-3:9. The fasteners explicitly disclosed in *Caveney* are an I-beam clamp bracket, a threaded rod, a screw-on beam clamp bracket, a hammer-on beam clamp bracket, a C-purlin bracket, a Z-purlin bracket, a drop wire bracket, a floor support post bracket and a ladder rack bracket. *Id.*

Figure 3 of *Caveney*, reproduced below, depicts its cable support system.

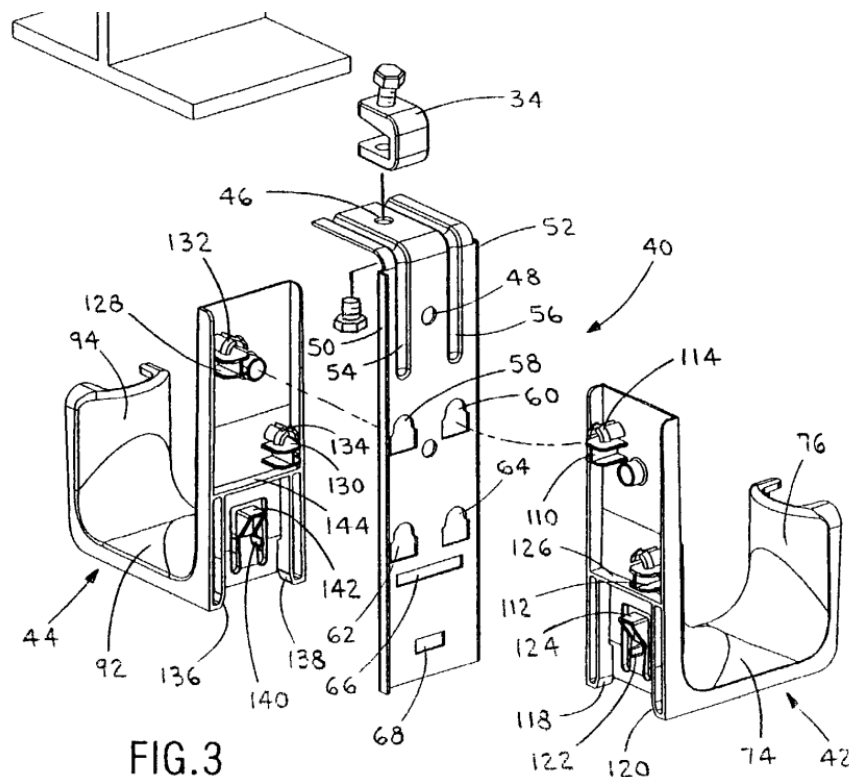
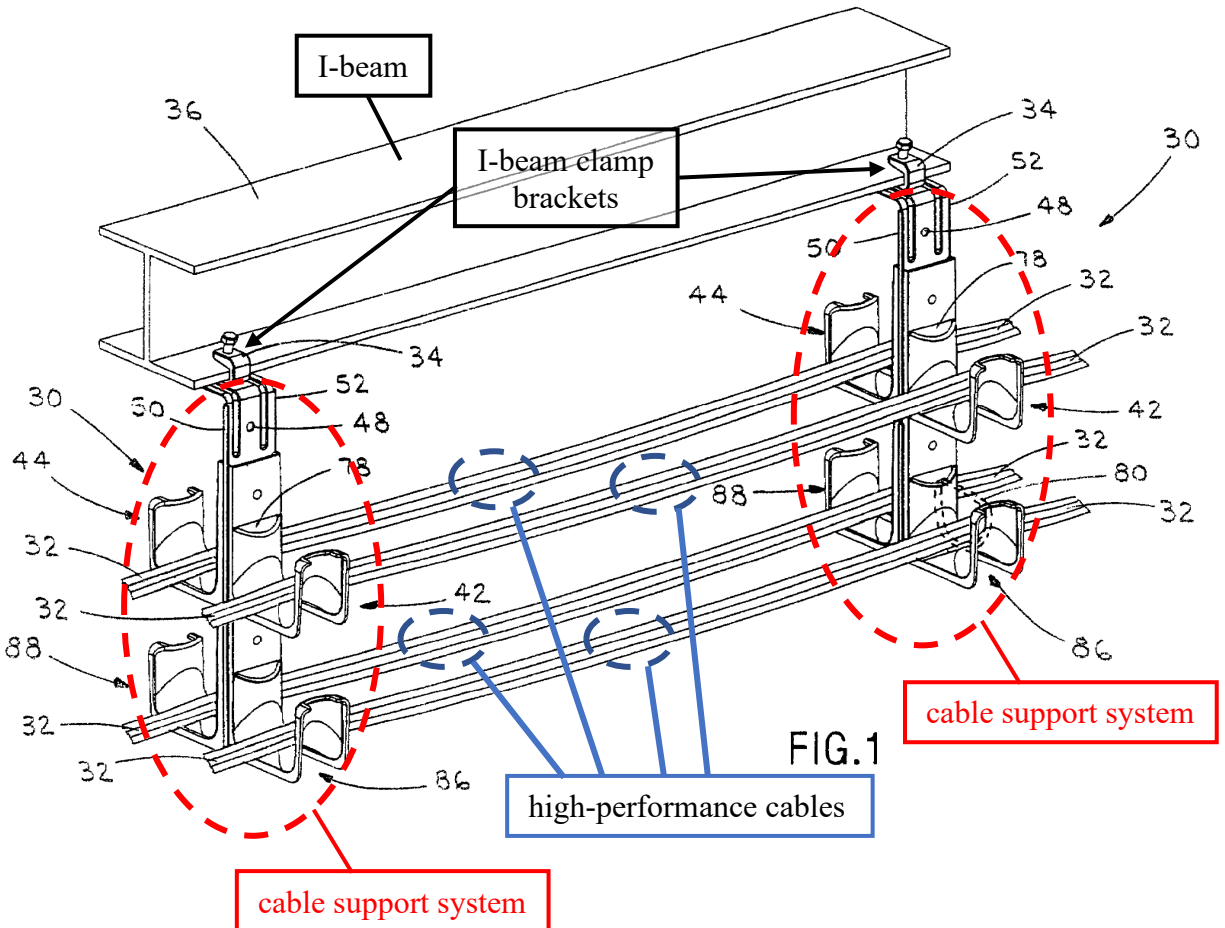


Figure 1 of *Caveney* (an annotated version of which is reproduced below) shows two of the multi-tiered cable support systems **30** secured to an I-beam clamp

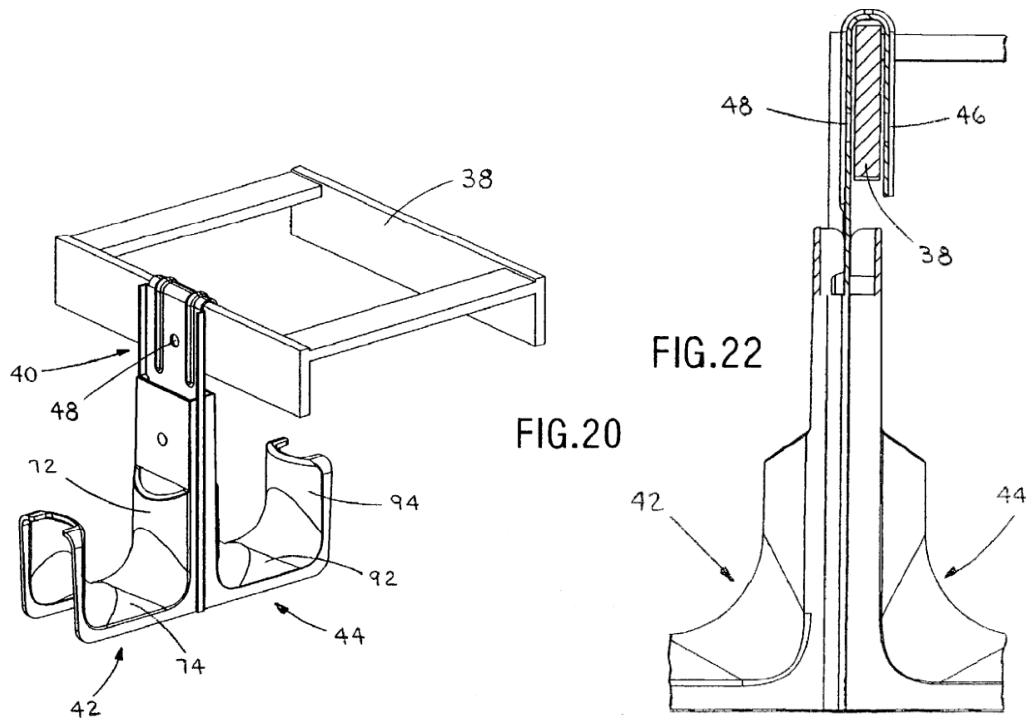
bracket **34**, and the I-beam clamp bracket **34** attached to I-beam **36**. *Id.*, 2:65-66;

FIG. 1.



Id., FIG. 1 (annotated).

Figures 20 and 22 of *Caveney*, reproduced below, show *Caveney*'s cable support system attached to a ladder rack. As depicted in Figure 22, the hanger portion of the cable support system includes apertures **46** and **48** for use in securing the hanger plate to a ladder rack. EX1003, 3:21-25, 5:63-67.



EX1003, Figs. 20, 22.

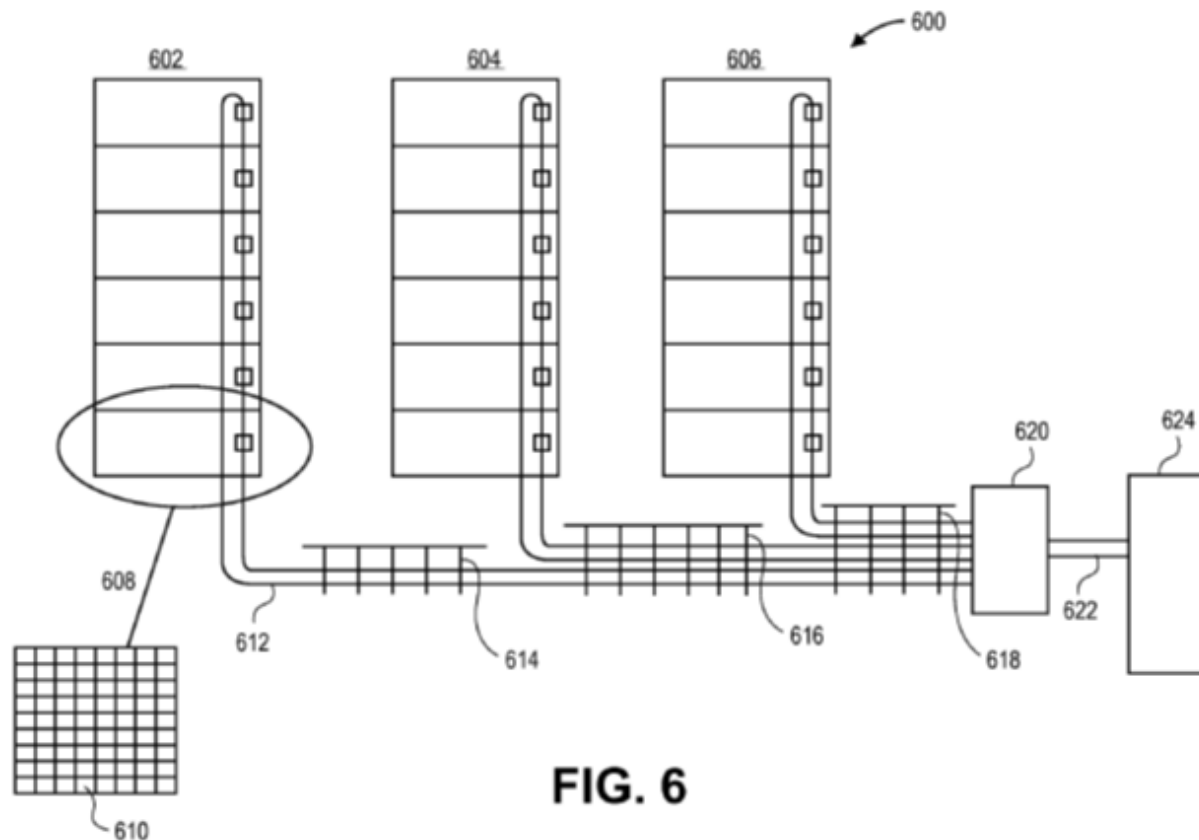
B. ALMY (U.S. PUB. NO. 2010/0139731)

Almy, a U.S. patent publication, U.S. Pub. No. 2010/0139731, titled “Wire-Based Hanging Wire-Way for Photovoltaic Modules or Module Groups,” was filed on March 2, 2009. EX1004. *Almy* describes a “[w]ire-based hanging wire-way for photovoltaic modules or module groups.” *Id.*, 1 (Abstract). *Almy* states that “[g]round based power distribution networks require significant cabling between photovoltaic modules or discrete groups of modules” *Id.*, [0004]. *Almy* further states that “[t]o meet electrical code, the cabling is usually placed in a metal wire tray or conduit,” but that “metal wire trays or conduits can be both expensive and cumbersome to build.” *Id.* Thus, “additional improvements are needed in the

evolution of photovoltaic systems which include arrays of photovoltaic modules and ground based power distribution networks.” *Id.*

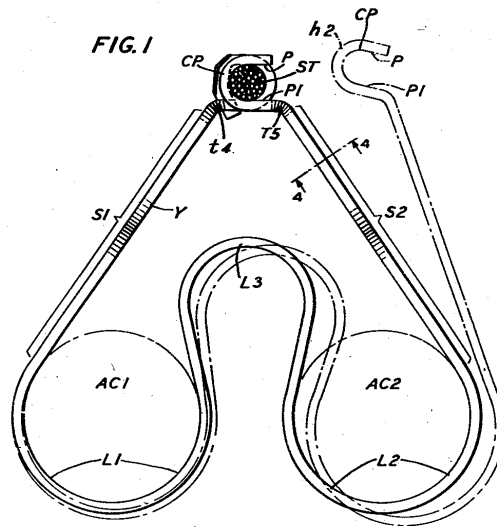
Almy's wire-based hanging wire-way only supports bundles of DC power cables, and nowhere does *Almy* reference any kind of cables other than DC cables. As explained in *Almy*'s specification and shown in Figure 6 (reproduced below), bundles of electrical cables extending from each of photovoltaic module groups **602**, **604** and **606** (e.g., bundle of electrical cables **612** extending from photovoltaic module group **602**) are all connected to combiner box **620**, which is coupled to inverter **624**. *Id.*, 11, [0034]. Inverter **624** “combines lines from several combiner boxes and converts DC current to AC current.” *Id.* All of the cables extending from the solar panels in *Almy* and bundled in *Almy*'s wire-loops are exclusively DC

power cables. EX2038, ¶104.



C. CARR (U.S. PAT. NO. 2,384,440)

Carr, titled “Hanger Device,” issued on September 11, 1945, and was assigned to Bell Telephone Laboratories, Inc. EX1005. *Carr* discloses a hanger device for the purpose of supporting “two parallelly disposed aerial conducting cables” for “carrier transmission,” i.e., telecommunications cables, for the purpose of minimizing cross induction effect between the cables. *Id.*, 1:1-7, 27-34. A hanger taught by *Carr* is shown in Figure 1:



Id., FIG. 1. Figure 1 shows Carr's hanger device on a "supporting strand," with one aerial conducting cable in each of the spaced loops of the hanger. *Id.*, 1:36-38.

Carr's stated objective is to

[T]he provision of a hanger device of a simple and cheap construction which is capable of supporting two aerial conducting cables in an efficient manner and in large spaced relation to each other so as to minimize the cross induction effect between the cables, a single supporting strand being employed for the two cables.

Id., 1:27-34. Carr discloses only "aerial conducting cables" for "carrier transmission" (which are for transmitting voice communications), and does not disclose or describe its hanger device as supporting electrical power carrying cables. EX2038, ¶110.

IV. APPLICABLE LEGAL STANDARDS

A. OBVIOUSNESS

Obviousness is a question of law based on underlying determinations of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). A claim is unpatentable as obvious, under 35 U.S.C. § 103, if the differences between the claimed invention and the prior art are such that the subject matter, as a whole, would have been obvious before the effective filing date of the invention to a person having ordinary skill in the art to which the claimed invention pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham*, 383 U.S. at 17-18.

A thorough and complete *Graham* analysis is especially important where, such as here, the claimed invention is comparatively technologically simple:

[W]here the invention is less technologically complex, the need for *Graham* findings can be important to ward against falling into the forbidden use of hindsight. Simply because the technology can be easily understood does not mean that it will satisfy the legal standard of obviousness. In fact, objective consideration of simple

technology is often the most difficult because, once the problem and solution appear together in the patent disclosure, the advance seems self-evident. Instead, the proper analysis requires a form of amnesia that “forgets” the invention and analyzes the prior art and understanding of the problem at the date of invention.

Mintz v. Dietz & Watson, Inc., 679 F.3d 1372, 1379 (Fed. Cir. 2012).

An obviousness determination requires finding that a person of ordinary skill in the art (“POSITA”) “would have been motivated to combine [or modify] the teachings of the prior art . . . [and] would have had a reasonable expectation of success in doing so.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367-68 (Fed. Cir. 2016) (explaining that reasonable expectation of success and motivation to combine are “two different legal concepts”).

B. BURDEN OF PROOF

Petitioner must demonstrate obviousness by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.”) (citing 35 U.S.C. § 312(a)(3) (requiring inter partes review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”))). 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). Petitioner cannot satisfy its burden with “mere conclusory statements” and instead must “articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

VI. CLAIM CONSTRUCTION

A. THE PREAMBLE OF CLAIMS 1 AND 6 IS LIMITING

The preamble of independent claim 1 recites: “A system for organizing a plurality of electrical cables *extending from a plurality of solar panels*, the system comprising:”. EX1001, 10:24-26 (emphasis added). The preamble of independent claim 6 is identical. *Id.*, 10:49-51.

“In general, a preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quotation omitted). The object of this examination is to develop an understanding of what the inventors actually invented and intended to encompass by the claim. *Id.*

An antecedent relationship demonstrates a clear intent to limit the claims using both the preamble and the body of the claim. *Bio-Rad Lab'ys, Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1371 (Fed. Cir. 2020). Additionally, “[c]lear reliance on the preamble during prosecution to distinguish the claimed invention

from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.”

Catalina Mktg, 289 F.3d at 808-09. Here, the preamble is limiting because it serves as an antecedent basis for limitations in the claims, and because the Applicant relied on the preamble during prosecution to distinguish it from prior art.

The preambles of Claims 1, 6, and 24 recite “*a* plurality of electrical cables extending from a plurality of solar panels.” Subsequently, each claim recites “each carrying cable surface being structured to support at least one electrical cable of *the* plurality of electrical cables” in the body. The antecedent relationship demonstrates an intention to define the claimed invention with the preamble. *See Catalina*, 289 F.3d at 808 (“[D]ependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention.”).

Additionally, as described *supra* (Section II.B.), the applicant relied on the preamble to overcome the Examiner's rejection. CAB explicitly asserted that the prior art failed to disclose “a system for organizing a plurality of electrical cables extending from a plurality of solar panels” and submitted an inventor declaration in support of this assertion. The Examiner explicitly recited the prior art's failure to teach or disclose a system for organizing a plurality of electrical cables extending from a plurality of solar panels in the reasons for allowance on the Notice of

Allowability. CAB's reliance on the preambles during prosecution demonstrate a clear intent that the preambles be construed as limiting the scope of the claims.

Finally, Dr. Kern confirms that a POSITA would understand the preamble of claims 1 and 6 to be limiting. EX2038, ¶¶84-87. Specifically, a POSITA would understand that the type of electrical cables organized and separated by the recited cable hangers in the body of the claim are specifically electrical cables extending from a plurality of solar panels, i.e., electrical cables in a solar power plant array. EX2038, ¶85; EX1001, 1:25-62. Only the preamble defines the scope of the electrical cables that the system of claims 1 and 6 organizes. This preamble is essential, therefore, to a POSITA's proper understanding of the scope of the invention claimed in the '291 Patent. *Id.*

Finally, the preamble of claim 1 is essential to understand the limitations and claim terms in the claim body, i.e., the preamble confirms that “*the* plurality of electrical cables” recited in the body of the claims are the electrical cables extending from solar panels as recited in the preamble. A POSITA can only understand the scope of claims 1 and 6 in light of the limitation of the preamble that defines the electrical cables being organized as the electrical cables extending from solar panels.

Moreover, Dr. Beik confirms that a POSITA would understand the “plurality of electrical cables” recited in claims 1 and 6 are cables extending from solar

panels. He specifically understands that the reference to *“the plurality of electrical cables”* recited in the second element of the body of the claim is referring to the “plurality of electrical cables *extending from a plurality of solar panels* recited in the preamble.” *See* EX2004, 65:21-66:7; 67:17-22; 72:14-20.

B. “Organizing a plurality of electrical cables extending from a plurality of solar panels”

A POSITA would understand that “organizing a plurality of electrical cables extending from a plurality of solar panels” as recited in independent claims 1 and 6 (and their dependent claims) would have an ordinary and customary meaning, i.e., *separating the electrical cables extending from the solar panels*. EX2038, ¶88; *see also* EX2004, 67:17-69:3. Dr. Beik concedes that this plain and ordinary meaning is in accord with his own understanding of the claim language. Dr. Beik explicitly acknowledged that the ‘291 patent is about, “[c]able management, supporting cables, *separation of cables*.” EX2004, 62:2-4 (emphasis added); *see also id.*, 86:6-14.

CAB’s proposed construction also aligns with the Board’s preliminary findings. In the Institution Decision, the Board took issue with CAB’s proposed construction in its Preliminary Response that limited “electrical cables” to any particular type of electrical cable in the solar power plant array. Paper 17, 9. The Board agreed, however, that the purpose of the claimed cable hangers is to

“separate [those] electrical cables so that AC and DC cables do not interfere with one another or category five electrical cables.” *Id.*, 10; *see also id.*, 31 (finding that Petitioner had preliminarily shown that a POSITA would have combined *Carr* and *Almy* to “separate[] electrical cables and prevent[] the cross-induction effect between conductors.”).

CAB's proposed construction also aligns with the '291 Patent's specification. As explained above, at the time of the invention of the '291 Patent, the NEC mandated for the first time that “AC and DC cables must not be immediately adjacent to one another, but must have a degree of separation from one another.” EX1001, 1:34-37; *see also id.*, 2:1-9. Additionally, as stated in the '291 Patent, “[b]ecause of the increased use of trackers in solar power plants, there is increased use of category five cables and other data wiring [This] type of wiring . . . is sensitive to cables used for AC and DC power and because of that sensitivity, data wiring cannot be bundled with power cables and must be supported by a separate carrier that is at least one inch away from all power cables.” *Id.*, 1:43-56; EX2038, ¶¶89-90. The '291 Patent addresses the new requirements of the 2014 NEC to separate DC and AC power cables from each other, and also addresses the need to separate DC and AC power cables from data wiring. *See* EX1001, 3:58-4:2, 4:63-67, 7:14-17, 10:2-9; EX2038, ¶91.

Additionally, in his own declaration, Dr. Beik explains the need for magnetic fields not to cross, and the NEC's requirements to separate the different kinds of cables. *See* EX1002, ¶¶32, 41-42; *see also*, EX2004, 61:21-63:2; EX2038, ¶92. Similarly, a POSITA would understand the '291 patent's "system for organizing a plurality of electrical cables extending from a plurality of solar panels" to be a system for *separating the electrical cables extending from the solar panels*.

VIII. NONE OF THE PETITION'S ASSERTED GROUNDS OF INVALIDITY SHOW HOW THE ASSERTED PRIOR ART REFERENCES WOULD HAVE RENDERED THE CLAIMS OF THE '291 PATENT OBVIOUS

A. GROUND 1: CAVENEY IN VIEW OF THE KNOWLEDGE OF A POSITA DOES NOT RENDER OBVIOUS CLAIMS 1-5 OR 9-10

1. Caveney's "Structures" Do Not Include, And Therefore Caveney Does Not Disclose, The Claimed Messenger Wire

Petitioner contends that *Caveney* discloses "a messenger wire structured to be supported a distance above the ground." Paper 1, 25-26; EX1002, ¶¶59-61. Petitioner does not assert that *Caveney* explicitly discloses a messenger wire (*see* Paper 1, 22-30; Paper 17 at 15), and instead, relying on Dr. Beik, contends that a POSITA would understand that a messenger wire is included among the various "structures" disclosed in *Caveney*. Paper 1, 25 (citing EX1002, ¶¶59-60). Dr. Beik supports Petitioner in asserting that, as disclosed by Caveney, "'structure' is broadly defined in an open-ended manner and includes a wide variety of physical

constructs.” EX1002, ¶59. As such, according to Dr. Beik, *Caveney*'s cable support system hanger can be attached to a messenger wire just as it could be attached to any other structure disclosed in *Caveney*. EX2038, ¶114; *see also* EX2004, 110:10-13 (stating that, “[w]ith modifications” *Caveney*'s hanger can attach to any kind of structure). Dr. Beik relies on the language of *Caveney*'s specification, set forth below:

FIG. 1 shows two multi-tiered cable support systems 30 secured to a fastener, such as I-beam clamp bracket 34. The I-beam clamp bracket 34 is attached to a structure, such as I-beam 36. As shown in FIG. 20, cable support system 30 may be attached directly to a structure, such as ladder rack 38. However, it is likewise contemplated that cable support system 30 may be secured directly to any fastener or structure, including but not limited to a threaded rod, a screw-on beam clamp bracket, a hammer-on beam clamp bracket, a C-purlin bracket, a Z-purlin bracket, a drop wire bracket, a floor support post bracket, a ladder rack bracket, a joist, a ceiling or a wall.

Id., ¶59 (quoting EX1003, 2:65-3:9). According to Dr. Beik, that passage broadly defines the term “structure” to include virtually any kind of structure whatsoever, such that *Caveney* “places no particular importance on the ‘structure’ itself.” EX1002, ¶¶ 59-60.

A POSITA would not understand *Caveney's* to be as open-ended and broadly defined as Petitioner and Dr. Beik would have it. EX2038, ¶¶117-120. A POSITA would recognize that *Caveney's* “structures”—e.g., the explicitly identified I-beam, ladder rack, joist, ceiling, or wall—are all pre-existing interior structures of a building to which *Caveney's* hangers (that support high-performance cabling) are fastened, and that the other hardware identified in *Caveney*, including “threaded rod,” are fasteners. EX2038, ¶¶121; *see also* Paper 17 at 15 (citing EX1003 1:5-10, 2:65-3:25, Figs. 1, 3-7, 10-13, 20-22), 18, 22. While a POSITA would understand that *Caveney's* list of “structures” is not exhaustive, a POSITA also would understand that other, unidentified “structures” also are pre-existing interior structures in a building, and that those structures do not include a messenger wire. EX2038, ¶118; *see also* Paper 17 at 15, 18, 22. And while Dr. Beik contends that *Caveney's* “structures” *could* include structures exterior to a building, he offers no objective explanation as to why a POSITA would conclude that *Caveney's* structures include exterior structures, and relies solely on his own reading of *Caneney*. *See, e.g.*, EX2004, 112:15-115:5.

That a POSITA would understand *Caveney's* “structures” to include only pre-existing interior structures in a building, and exclude a messenger wire, is supported by *Laughlin*, which *Caveney* cites and on which *Caveney* purports to improve. *See generally* EX2038, ¶¶119-120. *Laughlin* states that “the trend is to

install category 5 [cable] for all applications *in commercial buildings*” and discloses that its “supports may be positioned on or suspended from anything or any surface *in the utilitarian part of a building such as the area above a drop ceiling*.” EX2002, Abstract, 1:21-21. (emphases added); EX2038, ¶120. A POSITA therefore would understand that *Laughlin*’s supports, over which *Caveney*’s cable support systems are purportedly an improvement, are fastened to pre-existing internal structures of a building. *See* EX2038, ¶¶119-120. They are not structures that include a messenger wire structured to support cable hangers and current wires in a solar power plant array.

2. Caveney Does Not Disclose a Plurality of Cable Hangers Structured to be Disposed Along, and Suspended From, a Messenger Wire

Petitioner and Dr. Beik further contend that *Caveney*’s cable support system, with the use of a “threaded rod,” could be structured to be attached to a messenger wire as easily as to an I-beam or ladder rack. In his declaration, Dr. Beik attempted to equate *Caveney*’s “threaded rod” to a messenger cable “because both structures have a circular cross-section.” EX1002, ¶60; Paper 1, 25-26; *see generally* EX2004, 115:6-122:8. The portion of *Caveney* on which Dr. Beik relies, however, makes clear that the “threaded rod” is among the types of *fasteners* used to secure *Caveney*’s hanger to a pre-existing structure. EX2038, ¶122; *see also* Paper 17 at 16-17. The “threaded rod” is not one of the pre-existing building “structures” to

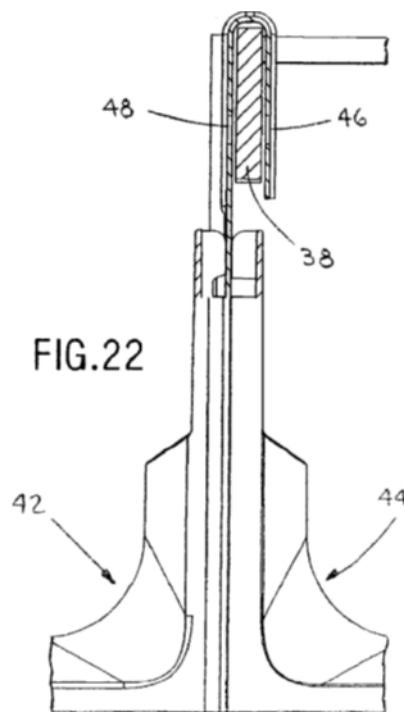
which *Caveney's* hanger is fastened. EX2038, ¶121. Dr. Beik ultimately conceded this point during at his deposition. EX2004, 116:19-117:8.

At his deposition, nevertheless, Dr. Beik offered additional, somewhat confusing, theories (not raised in his declaration or in the Petition analyzing this claim limitation) for why *Caveney's* hangers are structured to be disposed along and supported from a messenger wire. As best as can be discerned, one such theory is that because a “threaded rod” and a messenger wire are essentially the same in that they both have a circular shape, apertures **46** and **48** of *Caveney's* cable supports have circular holes, those apertures could receive a messenger wire as readily as they could receive a threaded rod. EX2004, 117:13-20, 119:18-22. Presumably, Dr. Beik would simply have the messenger wire threaded through apertures **46** and **48**, thus securing the hanger to the messenger wire. Alternatively, Dr. Beik posits that one could simply replace *Caveney's* ladder rack 38 with a messenger wire, and use the threaded rod to somehow secure *Caveney's* hanger to the messenger wire. EX2004, 121:17-25.

Dr. Beik's first alternative, in which he would seem to thread the messenger wire through apertures **46** and **48**, seems to be an extension of his original argument that a threaded rod and messenger wire are the same thing, because they both have circular shapes. But as clearly shown in Figure 22 of *Caveney*, shown below, and as the Board correctly understood in its Institution Decision (Paper 17,

21), apertures **46** and **48** are structured to receive a threaded rod *fastener* that secures the hanger to either side of the ladder rack structure **38**. EX2038, ¶125.

Apertures **46** and **48** are not structured to receive the *structure* itself, in Dr. Beik's hypothesis, the messenger wire threaded through those apertures intended for the *fasteners*, from which the hanger is suspended.



EX1003, FIG. 22.

As for Dr. Beik's other alternative theory, replacing the *Caveney's* ladder rack **38** with a messenger wire, in the first instance, it is not even clear how a POSITA *could* secure *Caveney's* hanger to a messenger wire using a threaded rod. But for purposes of an obviousness analysis, what is even more important is that

Dr. Beik offers no explanation with rational underpinnings why a POSITA *would* be motivated to so modify *Caveney's* disclosure. And that is what Petitioner must demonstrate: that a POSITA *would* be motivated to modify *Caveney's* disclosure in a manner that would achieve the claimed invention with a reasonable expectation of success in doing so. *See, e.g., Intelligent Bio-Sys., Inc.*, 821 F.3d at 1367-68 (obviousness determination requires finding that a POSITA “*would have been motivated* to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.”) (emphasis added). *See also* 35 U.S.C. § 316(e) (in an IPR, “the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence.”); *In re Magnum Oil Tools Int'l*, 829 F.3d at 1375 (Peticioner must “articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.”).

Peticioner and its expert fail to make that showing. In fact, when asked why a POSITA would modify *Caveney* as suggested, Dr. Beik, in an attempt to shift the burden to CAB, simply asked “why wouldn't POSITAs” do so. EX2004, 122:9-123:2.

In fact, as Dr. Kern has opined, a POSITA would have no reason or motivation make the substitution Dr. Beik suggests. EX2038, ¶126. *Caveney's* cable support system is intended to be used with pre-existing building structures,

which is more efficient and less expensive than introducing a new component—a messenger wire—as Dr. Beik suggests. EX2038, ¶126. Moreover, it would require a stretch of imagination to see how Dr. Beik's proposed modifications, whether threading a messenger wire through two separate apertures of each and every hanger, or using *Caveney's* fastener to secure each hanger to a messenger wire, would accomplish the efficiency that *Caveney* was purporting to achieve by using already existing building structures.

Petitioner fails to demonstrate by a preponderance of the evidence that *Caveney* discloses the '291 Patent's claimed messenger wire, or the claimed cable hangers structured to be disposed along, and suspended from, a messenger wire. *Caveney*, therefore, does disclose or render obvious independent claim 1 or dependent claims 2-5 and claim 9-10, which depend directly or indirectly from claim 1.

B. GROUND 2: *CAVENEY* AND *ALMY* IN VIEW OF THE KNOWLEDGE OF A POSITA DOES NOT RENDER OBVIOUS CLAIMS 14-18 OR 21-22

1. A POSITA Would Not Have Been Motivated to Combine *Caveney* and *Almy* With a Reasonable Expectation of Success

Petitioner and Dr. Beik contend that a POSITA would have been motivated to replace *Almy's* wire loops with *Caveney's* cable hangers to support *Almy's* bundle of electrical cables between photovoltaic modules or module groups. Both

Petitioner and Dr. Beik assert that the combination “would have achieved predictable benefits of improving wire runs in solar installations by separating conductors and implementing a more robust hanger.” Paper 1, 37; EX1002, ¶78. They further assert that using *Caveney*'s hangers to separate *Almy*'s electrical cables would serve the purpose of preventing cross-linking. Paper 1, 38; EX1002, ¶78. As in Ground 1, however, neither Petitioner nor Dr. Beik offer any explanation with rational underpinnings as to why or how a POSITA would modify *Caveney*'s hanger to be structured to be suspended from a messenger wire so as to use *Caveney*'s hangers to replace *Almy*'s wire loops.

That is, *Caveney*'s hangers attach to pre-existing building structures—rigid, fixed structures such as an I-beam or ladder rack, in order to maximize efficiency by utilizing those pre-existing building structures. EX2038, ¶134. Petitioner fails to explain with rational underpinnings why a POSITA would have been motivated to attempt to use *Caveney*'s cable support system – which are structured to attach to pre-existing building structures and which support data cables – instead of *Almy*'s wire loops – which are already structured to be suspended from *Almy*'s messenger wire and which bundle DC power cables in an outdoor PV installation. EX2038, ¶135. In fact, Petitioner fails to explain how a POSITA even *could* combine *Caveney* and *Almy* in order to achieve the claimed invention with a reasonable expectation of success.

The obviousness analysis for Ground 2 is no different when combining *Caveney's* hanger with *Almy's* messenger wire than the analysis when applying *Caveney's* hanger with an undisclosed messenger wire in Ground 1. *Caveney's* cable support systems are structured to be secured to fixed, rigid building structures by fasteners and are **not** structured to be secured to a flexible messenger wire. See Paper 17 at 26-27, 28. Petitioner does not explain how suspending *Caveney's* hangers from *Almy's* messenger wire would be any more of a feasible solution, or result in any more of a robust hanger, than suspending *Caveney's* hangers from any other messenger wire.

In short, the combination of *Caveney* and *Almy* does not cure the deficiencies of *Caveney* alone. EX2038, ¶¶136-137. Petitioner does not even try to cure *Caveney's* deficiencies in Ground and only doubles down on them. In the end, however, Petitioner does nothing more than use the claims as a “roadmap to reconstruct the claimed invention using disparate elements from the prior art—i.e., the impermissible *ex post* reasoning and hindsight bias that *KSR* warned against.” *TQ Delta LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1360 (Fed. Cir. 2019).

With respect to the assertion that replacing *Almy's* wire loops with *Caveney's* hangers would prevent cross-linking by separating *Almy's* cables, there is no reason to separate *Almy's* cables for this purpose. As will be discussed more fully in Section VIII.C. below, relating to the *Carr* and *Almy* combination asserted in

Ground 3, *Almy* only discloses bundling DC cables, and there is no cross-linking effect between DC cables only.

2. Caveney In View Of Almy Does Not Disclose The Limitations of Claim 14

Although *Almy*, unlike *Caveney*, discloses a messenger wire, neither Petitioner nor Dr. Beik rely on *Almy* for its disclosure of a messenger wire. They only rely on *Almy* for its disclosure of the “solar plant,” “a plurality of solar panels” and “a plurality of electrical cables extending from the plurality of solar panels” limitations of independent claim 14. *See* Paper 1, 39-41; EX1002, ¶¶80-85. For the messenger wire limitation, and all other limitations, Petitioner and Dr. Beik rely solely on *Caveney*. EX1002, ¶¶86-89.

Specifically, for the limitations “a system for organizing the plurality of electrical cables,” “a messenger wire supported a distance above the ground adjacent the solar panels,” Dr. Beik relies on *Caveney*, not *Almy*, to disclose those limitations, incorporating his analysis set forth in his Ground 1. *See* EX2038, ¶142 (citing EX1002, ¶¶86-87). For the limitations relating to the claimed plurality of cable hangers, with each cable hanger having a plurality of cable carrying surfaces structured to support the electrical cables, Dr. Beik relies only on *Caveney* for these limitations, again relying solely on his analysis of these limitations set forth in his Ground 1. *Id.* (citing EX1002, ¶¶88-89). Stated differently, for the claimed

system for organizing a plurality of electrical cables from a plurality of solar panels in independent claim 14, Dr. Beik relies on his analysis in Ground 1 that *Caveney* discloses the same system claimed in independent claim 1, which parallels the claimed system in independent claim 14. *Id.*, ¶143 (citing EX1002, ¶86).

For the reasons discussed *supra* (Section VIII.A.), *Caveney* does not disclose or render obvious the system claimed in claim 1. For the same reasons, *Caveney* does not disclose claim 14's system for organizing a plurality of electrical cables extending from a plurality of solar panels in independent claim. EX2038, ¶144.

Dependent claims 15-18, 21 and 22 all depend directly or indirectly from independent claim 14. Petitioner and Dr. Beik rely solely on *Caveney* for disclosing or rendering these claims obvious. *See* Paper 1, at 41-42; EX1002, ¶¶90-95. For the reasons stated above relating to independent claim 14, Petitioner has not shown that *Caveney* discloses or renders obvious those claims.

Accordingly, Petitioner has failed to demonstrate by a preponderance of the evidence that the combination of *Caveney* and *Almy* in view of the knowledge of a POSITA renders obvious claims 14-18, or 21-22 of the '291 Patent. EX2038, ¶146.

C. GROUND 3: CARR IN VIEW OF ALMY AND THE KNOWLEDGE OF A POSITA DOES NOT RENDER OBVIOUS CLAIMS 1-10, 14-22, OR 24-25

As with the *Caveney* and *Almy* combination asserted in Ground 2, Petitioner and Dr. Beik both contend that replacing *Almy*'s wire loop with *Carr*'s hanger

“would have achieved predictable benefits of improving wire runs in solar installations by separating conductors and implementing a more robust hanger.” Paper 1, 45; EX1002, ¶98. They further assert that using *Caveney’s* hangers to separate *Almy’s* electrical cables would serve the purpose of minimizing or preventing cross-linking. Paper 1, 45; EX1002, ¶98. A POSITA would not have been motivated to combine *Carr* and *Almy* for either of these reasons.

1. There Would Not Be Any Cross-Induction Effect Between Almy’s Bundled DC Cables

For the ostensible “improvement” of “separating conductors,” Dr. Beik opines that “separation of different types of cables such as data from current-carrying cables would pose significant challenges when using wire loops,” and that “wire loops are not able to provide the required distance between sets of cables for both current-carrying and non-current-carrying to prevent cross linking as set forth by IEEE Standard 142, and NEC Rule 235G.” EX1002, ¶98; *see also* Paper 1, 46. Dr. Beik points to *Carr’s* teaching that there is a benefit to multi-surface hangers to minimize the cross induction effect between the cables, and specifically refers to the advantage of separating *data cables from current-conducting cables*. EX1002, ¶99 (emphasis added); *see also* Paper 17, 31.

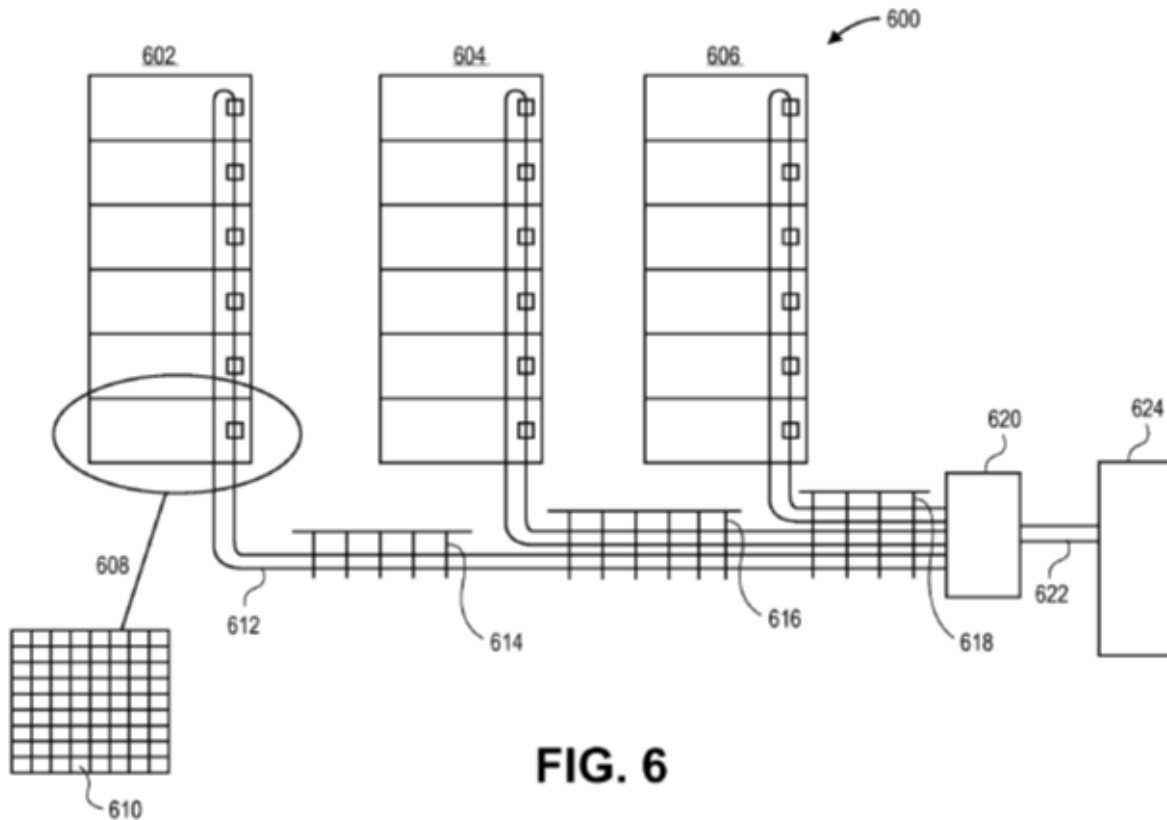
Contrary to Petitioner’s contentions, a POSITA would not have been motivated to replace *Almy’s* wire loops with *Carr’s* hangers to prevent the cross-induction effect between the cables disclosed in *Almy*. EX2038, ¶153. Such a

motivation is absent since there would be no cross-induction effect between *Almy*'s cables, and thus, no need to separate them for that purpose. *Id.*

A POSITA would readily understand that the electrical cables disclosed in *Almy* are DC power cables only that attach to and extend from the PV modules within the PV module groups to the combiner box or that extend from the combiner box and then to the inverter. EX2038, ¶154. A POSITA would also readily understand that *Almy* does not disclose or suggest that there are any AC cables or data cables within the array in close proximity to *Almy*'s DC cables that would give rise to cross-induction concerns. *Id.*

Dr. Kern, backed up by his extensive background and experience, including field experience, in solar power plants, explains in detail the disclosure of *Almy* and its wire-based hanging wire-way system, as diagrammatically shown in Figure 6 of *Almy*.¹ As explained in connection with *Almy*'s Figure 6 (reproduced below), “[e]ach photovoltaic module group **602, 604, and 606** has an associated electrical cable or bundle of electrical cables, e.g., bundle of electrical cables **612** associated with photovoltaic module group **602**.” *Id.*, at 11 [0034].

¹ Dr. Beik has acknowledged that he has no experience in utility-scale solar installations, and has never even been a solar power plant array. EX2004, 47:23-48:1; 107:16-19; 172:21-173:8.

**FIG. 6**

EX1004, FIG. 6. As depicted in Figure 6, the unnumbered DC wires above DC bundled electrical cables **612** connect to the solar cells of each of the various PV modules within the PV module group **602**. The PV modules are connected in series. The bundle of electrical cables **612** are DC collectors of the aggregated DC power from PV module group **602**. The DC power collection process is the same for each PV module group **602**, **604**, and **606**. EX2038, ¶158.

Further, “[t]he electrical cable or bundle of electrical cables [from] each photovoltaic module group **602**, **604**, and **606** is suspended in a plurality of wire-based hanging wire-ways, e.g., wire-based hanging wire-ways **614**, **616** and **618** in FIG 6.” *Id.*, ¶157. Next, “[t]he electrical cables from photovoltaic module groups

602, 604 and 606 are collected in combiner box **620** which connects the electrical cables in parallel. A high current line **622** couples combiner box **620** with an inverter **624** and *converts DC current to AC current.*” *Id.*, ¶158 (emphasis added).

A POSITA would understand that *Almy*'s bundled of electrical cables associated with each photovoltaic module group **602, 604, 606** and suspended in a plurality of *Almy*'s wire-based hanging wire-ways **614, 616, 618** are DC power cables only. EX2038, ¶159. A POSITA would further understand that the cables **622** output from combiner box **620** and input to inverter box **624** are also DC power cables only. *Id.* Therefore, a POSITA would understand that the only type of cables disclosed by *Almy* that are bundled in *Almy*'s wire-based hanging wire-way system are DC cables. *Id.*

Further, other than DC cables, *Almy* does not disclose any type of wires (such as AC cables or data wires) in its solar field array. EX2038, ¶160 (citing EX1004, [0003], [0015]. A POSITA would understand from *Almy*'s Figure 3 that the tracker is driven by a rigid bar drive strut, and that the rigid bar drive strut used to drive the PV module tracker is controlled by a motor that is powered by electrical cables that may include AC or DC power cables. *Id.*, ¶160. However, a POSITA further would understand that these cables that power the motor are not within the solar field array, but rather are on the periphery of the array, and that any

such DC or AC power cables do not extend adjacent to or in close proximity to the DC power cables in the array depicted in *Almy*'s Figure 6. *Id.* Thus, a POSITA would understand that *Almy* does not disclose AC power cables. Dr. Beik acknowledged during his deposition that the cables extending from the PV module groups in *Almy* are “[l]ikely not AC.” EX2004, 148:9-14. Additionally, nothing in *Almy* discloses or even suggests the use of data carrier cables. EX2038, ¶159.

Therefore, a POSITA would understand that *Almy* discloses only DC power cables and that *Almy*'s wire-based hanging wire-way system supports exclusively bundles of DC power cables between photovoltaic modules or module groups. Significantly, a POSITA would understand that *Almy*'s bundles of DC power cables ***do not raise the cross-induction concerns*** such as disclosed by *Carr*. EX2038, ¶163.

Dr. Beik acknowledged that there is no cross-induction effect between bundled DC cables only, such as in *Almy*. EX2004, 154:12-19. Moreover, Dr. Beik also acknowledged that cross-induction occurs when current-carrying cables have a ***“significantly stronger magnetic field due to the higher current than data or controls or sensors and so on.”*** EX2004, ¶85:23-86:2 (emphasis added). Once again, there are no cables other than DC cables disclosed or suggested by *Almy*. Therefore, there would be no “significantly stronger magnetic field due to the

higher current than data or controls or sensors.” EX2038, ¶163. And there would be no concern of magnetic fields crossing. *See* EX1002, ¶32.

Dr. Beik vaguely suggested during his deposition that “transients” (a/k/a harmonics) from power electronic devices (in which Dr. Beik is well-qualified – *see* EX1002, 93-96), which include inverters that convert DC current to AC current, might create a cross-induction effect. EX2004, 81:13-82:7; EX2038, ¶164. But because Dr. Beik is well-versed in power electronics, he would presumably be aware, as Dr. Kern explains, that power inverters in solar arrays are designed and constructed with electrical power filters so as to ensure that transients pose no cross-induction effect. EX2038, ¶¶164-165. In fact, Dr. Beik acknowledged that such filters “remove harmonics unwanted harmonics from distribution grids, transmission grids, generation, end users and so on.” EX2004, 30:3-7. A POSITA would understand that *Almy*’s inverter is of a typical type in a solar power system, that would be properly constructed filters that would protect against harmonics affecting the DC cables. EX2038, ¶165.

Further, while Dr. Beik raised the theoretical issue of transients, he ultimately made clear in his testimony that, even if there was a cross-induction effect caused by harmonics, the cross-induction effect would only be ***between DC cables and data cables***. EX2004, 153:22-154:3. Dr. Beik confirmed, consistent with Dr. Kern’s opinion, that if the cables in *Almy*’s wire loops are only DC cables,

then there is no need to separate them to prevent cross induction. EX2004, 154:4-19; EX2038, ¶166. Whatever the theoretical risk of transients resulting from the inverter's conversion of DC power to AC power, therefore, it is irrelevant when only DC cables are bundled together as in *Almy*, and not with other types of cables such as data cables.

It is worth noting that *Almy* itself makes no mention of cross-induction. Dr. Beik has testified that cross induction was known long before 2014. EX1002, ¶32; EX2004, 77:16-78:5. *Almy* was a SunPower application that was filed in 2009. EX1004, Cover. SunPower was the third largest solar company in the nation, providing PV solar generation systems. EX2006, ¶13. If cross induction had been a concern in the context of *Almy*'s application for a wire-based hanging wire-way that purports to be an improvement over prior art cable trays, cable ties and wire ties (EX1004, [0004], [000015]), one would have expected that *Almy* would have expressly addressed this issue. It would be reasonable to assume that *Almy* is silent about cross induction because he knew that it was not an issue when only DC cables are bundled together.

Thus, contrary to Petitioner's and Dr. Beik's assertions because there would be no cross-induction between *Almy*'s DC cables, a POSITA would have had no motivation to replace *Almy*'s wire loop with *Carr*'s hanger to reduce cross-induction.

Dr. Beik also testified regarding separation of cables for installation and maintenance purposes, but acknowledged that any such issues would relate to the separation of different types of cables for the purpose of being able to distinguish the types from one another. EX2004, 63:3-65:20; *see also* EX2038, ¶168.

However, because *Almy* discloses only DC cables, issues of ease of installation and maintenance are not relevant to *Almy*. EX2038, ¶169.

2. Replacing *Almy*'s Wire Loops With Carr's Hanger Would Not Have Resulted in a More Robust Hanger

Neither would a POSITA have been motivated to replace *Almy*'s "wire loops" with *Carr*'s hanger to provide a "more robust hanger." Dr. Beik mistakenly equates "zip-ties [and] cable-ties" with *Almy*'s wire loops. EX1002 at ¶ 98; EX2038, ¶170. What *Almy* actually states, however, that its wire-based hanging wire-way is *more advantageous* and *intended to replace* the use of "wire-ties" for bundling DC power cables. *See, e.g.*, EX1004, [0003] (referring to the need for improvements over metal wire trays and conduits both of which can be expensive); [0015] ("In accordance with an embodiment of the present invention, a wire-based hanging wire-way is flexible, providing more range of motion and compatibility with on-site customizable support than, say, a rigid bar drive strut having wire-ties coupled thereto."). Clearly, if *Almy*'s wire loops are purported to be an improvement over metal wire trays for bundling DC cables, they must be at least as robust as the metal wire trays.

A POSITA would have understood that *Almy's* wire loops would be more robust than *Carr's* hanger. EX2038, ¶172. *Carr* explicitly discloses its hanger as made of “a simple and cheap construction” for “supporting two aerial conducting cables” i.e., two telecommunication cables. EX1005, 1:27-30. *Almy's* wire loops, on the other hand, are structured to support a bundle of much heavier weight DC cables in a solar power plant array. Thus, a POSITA would have no reason to replace *Almy's* wire loops that support bundles of DC power cables with *Carr's* hanger device, so as to provide a more robust hanger. Nor does Dr. Beik provide any basis with rational underpinnings for his proposition that *Carr's* hanger could be routinely implemented to bundle and support *Almy's* much heavier DC cables. See EX1002, ¶98; EX2038, ¶173.

As with Petitioner's combination of *Caveney* and *Almy*, Petitioner and Dr. Beik purport to identify elements of the claimed invention in *Carr* and *Almy*, and using hindsight disguised as “motivations,” contend that a POSITA would have combined those elements. Petitioner must do more than merely demonstrate that elements of the claimed invention were independently known in the prior art. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F. 3d 1358, 1367 (Fed. Cir. 2017). Dr. Beik's “motivations” are nothing more than a recognition of the need to address cable management issues in PV installations, but “knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular

references to reach” the claimed invention. *Innogenetics, N.V. v. Abbott Laboratories*, 512 F.3d 1363, 1373-74 (2008). Dr. Beik has not articulated why a POSITA would have combined *Carr* and *Almy*, other than a desire to construct the claimed invention. Petitioner’s analysis uses the ‘291 Patent as a “roadmap to reconstruct the claimed invention using disparate elements from the prior art” and should be rejected. *TQ Delta*, 942 F.3d at 1373-74.

Petitioner has failed to demonstrate that a POSITA would have been motivated to combine *Carr* and *Almy*, and has failed to demonstrate that such a combination could reasonably have been expected to achieve the claimed invention. Accordingly, Petitioner has failed to demonstrate by a preponderance of the evidence that claims 1-10, 14-22, and 24-25 are obvious over the combination of *Carr* and *Almy*.

D. OBJECTIVE EVIDENCE OF NON-OBVIOUSNESS FURTHER SUPPORTS THAT THE ‘291 PATENT’S CLAIMS ARE VALID

Objective indicia of nonobviousness (a/k/a secondary considerations) may include long-felt but unsolved need, commercial success, copying, industry praise, and expert skepticism. *Mintz*, 679 F.3d at 1379. Objective indicia are “relevant to the obviousness inquiry ‘if there is a nexus between the claimed invention and the [objective indicia of nonobviousness].’” *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d

1299, 1312 (Fed. Cir. 2006)). “[A] patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product is the invention disclosed and claimed.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (internal quotation omitted). That is, presuming nexus is appropriate “when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.” *Id.* (internal quotation omitted). CAB’s expert and fact witness declarations include and describe objective indicia that further demonstrate Petitioner’s inability to show by clear and convincing evidence that the ‘291 Patent claims are obvious.

It is well-established that objective evidence are “essential safeguards that protect against hindsight bias,” *Liqwd, Inc. v. L’Oreal USA, Inc.*, 941 F.3d 1133, 1136-37 (Fed. Cir. 2019), and “must be considered before reaching an obviousness conclusion.” *Dome Patent L.P. v. Lee*, 799 F.3d 1372, 1383 (Fed. Cir. 2015). “Such evidence may often be the most probative and cogent evidence of nonobviousness” *Liqwd, Inc.*, 941 F.3d at 1136-37 (citation and internal quotation omitted).

Here, numerous objective indicia of nonobviousness are applicable with respect to the ‘291 patent, including long-felt but unmet need, industry skepticism,

industry praise for the invention, and copying. Much of this information, was publicly available at the time Petitioner filed its petition.

1. CAB Is Entitled To A Presumption Of Nexus Between The Evidence And The Claimed Invention Because Its Commercial Products And Systems Are Coextensive With Claims 1 and 6

The Federal Circuit has held that “if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus.” *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000). As Dr. Kern has analyzed in his declaration, CAB’s Standard System² is coextensive with at least claims 1 and 6 from the ‘291 Patent. EX2038, ¶¶180-197, App. A.

² CAB’s Standard System for its above-ground messenger wire supported cable management system includes mid-pier kits, end-pier kits, galvanized steel messenger wire, and multi-carrier cable hangers of various configurations for supporting and separating various electrical cables within a PV array. EX2038, ¶188; EX2044, ¶10.

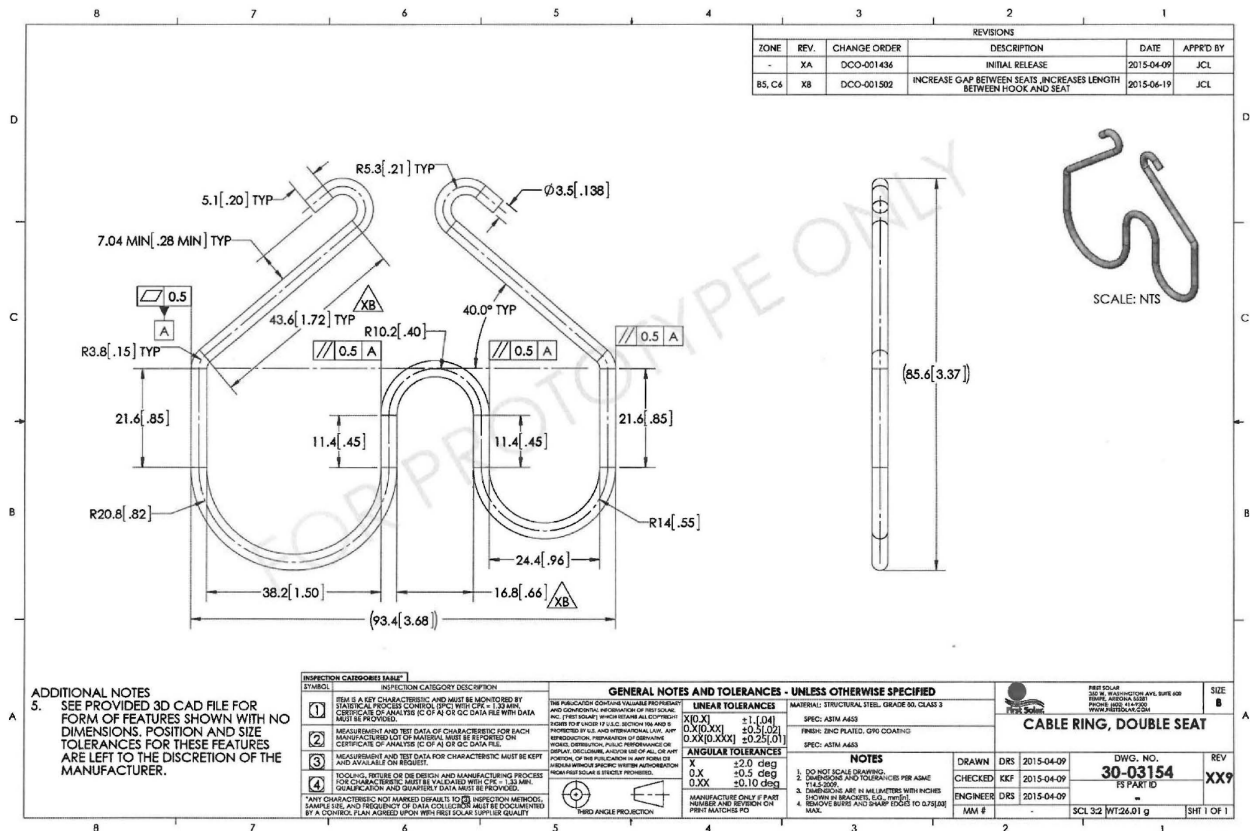
2. A Potential Customer Copied CAB's Product After Being Given Confidential Access To A Prototype

“[W]here there is evidence of actual copying efforts, that evidence is always relevant.” *Liqwd, Inc.*, 941 F.3d at 1138. “A party may prove copying by showing that an accused copier had access to the patented product combined with substantial similarity to the patented product.” *Intri-Plex Techs., Inc. v. Saint-Gobain Performance Plastics Rencol Ltd.*, IPR2014-00309, Paper 83 at 40, 2014 Pat. App. LEXIS 9069 (P.T.A.B. Mar. 23, 2014) (citing *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010); *see also Liqwd*, 941 F.3d at 1137 (“Evidence of copying may include internal documents, direct evidence such as photos of patented features or disassembly of products, or access and similarity to a patented product.”)). Here, there is irrefutable documentary evidence that a potential CAB customer copied CAB's product following a meeting at which CAB confidentially shared its proprietary designs.

As detailed in the Declaration of Allen Smith, in 2015, First Solar, a leading American solar technology company that manufactures PV modules, copied CAB's hanger design after being given access to dozens of CAB hanger products, including a two-carrier solar hanger. EX2006, ¶49. At that meeting, CAB shared its designs and features of its new solar cable hangers, including engineering

drawings. Months later, in September 2015, CAB received a request for a quote from a supplier in the solar industry, for approximately 2 million solar cable hangers for a First Solar project. *Id.*, ¶51; EX2013. The request for a quote attached an engineering drawing of the specified hanger, shown below. The drawing was dated April 9, 2015, only three weeks after the meeting at which CAB shared its sample hanger products and shared its hanger design information. *Id.* As can be seen by the excerpted call-out shown below, the drawing also identified its author by the initials DRS. *Id.* The hanger depicted in the drawing was essentially identical, with the exception of a few minor adjustments in dimension, to the CAB two-carrier hanger that CAB had shared with First Solar in March 2015. *Id.* When CAB became aware that First Solar was quoting a hanger that was virtually identical to CAB's two-carrier hanger, CAB complained to First Solar, but never

received any response. *Id.*, ¶¶52-53; EX2014, EX2015.



EX2013, 2.

SIZE SPECIFIED FEEL GRADE 80, CLASS 3			FIRST SOLAR 350 W. WASHINGTON AVE. SUITE 600 TEMPE, ARIZONA 85281 PHONE: (602) 414-9300 WWW.FIRSTSOLAR.COM		SIZE 8
			CABLE RING, DOUBLE SEAT		
390 COATING					
TES RING, DIMENSIONS PER ASME DIMENSIONS WITH INCHES (E.G., mm[in]) SHARP EDGES TO 0.75[.03]	DRAWN	DRS	2015-04-09	DWG. NO. 30-03154 FS PART ID -	REV XX9
	CHECKED	KKF	2015-04-09		
	ENGINEER	DRS	2015-04-09		
	MM #	-	SCL 3:2	WT:26.01 g	SHT 1 OF 1

EX2013, 2 (excerpted).

On analogous facts, the Federal Circuit affirmed the Board's finding that a petitioner copied a patent owner's confidential method. In *Liqwd, Inc. v. L'Oreal USA, Inc.*, 941 F.3d 1133 (Fed. Cir. 2019), the patent owner cited evidence of a meeting between it and petitioner during which patent owner shared, subject to the terms of an NDA, information from its unpublished patent application. *Id.* The result here should be the same.

3. The Nonobviousness of the '291 Patent Is Evidenced by the Commercial Success of CAB's Standard System

Commercial success is typically shown with evidence of "significant sales in a relevant market." *Ormco Corp.*, 463 F.3d at 1312 (citation omitted). *See also, J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997).

As Mr. Smith describes in his declaration, CAB [REDACTED] when CAB first began to commercialize its Standard System. EX2006, ¶35. CAB continued its marketing efforts throughout 2014 and into 2015, including multiple prototypes and mock-up demonstrations. *Id.*, ¶¶34-37, 41. Following a mock-up demonstration with SunEdison [REDACTED], SunEdison continued for over a year to evaluate CAB's Standard System, [REDACTED] [REDACTED]. *Id.*, ¶¶41-44; EX2028, ¶¶41-47. At that time, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. EX2006, ¶¶ 43-44, 55.

Many other solar industry companies quickly followed suit and likewise specified CAB's system in their engineering drawings. In fact, by the end of 2016, CAB's system was rapidly becoming the industry-standard for cable management. EX2006, ¶62; EX2028, ¶48. In Dr. Kern's opinion, "the commercial success achieved by CAB's Standard System for solar cable management was a direct result of the breakthrough benefits provided by CAB's patented system, including increased efficiencies and cost-savings" EX2038, ¶230.

The commercial success of CAB's Standard System is analyzed in the declaration of CAB's economics expert, Jonathan D. Putnam, Ph.D. EX2044. Dr. Putnam has submitted a declaration filed herewith, in which he has examined the commercial success of CAB's Standard System and the bases for that success. *See* EX2044. Dr. Putnam analyzed underlying documentation, including CAB's sales data and solar industry data as well as witness declarations and Dr. Kern's expert declaration submitted herewith. Dr. Putnam has concluded that the growth of CAB's sales [REDACTED] is directly attributable to the introduction of its Standard System for above-ground cable management and customer demand for that system and its innovative features. *Id.*, ¶54.

Relying on declarations from persons with significant knowledge and experience in the solar industry, Dr. Putnam noted that CAB's Standard System, which is coextensive with the claimed inventions of the '291 patent, offered its customers substantially improved performance at substantially lower cost over prior-art alternatives. *Id.*, ¶8. CAB's Standard System also substantially reduced the cost of materials and labor in connection with the installation, management, and maintenance of the various kinds of electrical cables in so-called "Balance of Systems" (BOS) within a utility-scale photovoltaic (PV) installation relative to prior-art technology, including trenching and cable trays. *Id.*, ¶¶8, 28-29. Dr. Putnam concludes that the improvements provided by CAB's Standard System, which incorporated the features of the inventions claimed in the '291 patent, have driven the substantial growth in CAB's sales. *Id.*, ¶9.

Reviewing underlying data and documentation, Dr. Putnam observed that, from the outset of its commercial introduction [REDACTED], CAB's Standard System was shown to cut installation costs by [REDACTED], and overall labor costs were demonstrated to be reduced by over [REDACTED]. *Id.*, ¶33-34. Indeed, the reduced costs and other advantages of the '291 inventions, such as project standardization, superior installation times, and improved maintenance, form an essential part of CAB's pitch to prospective customers. *Id.*, ¶31.

In addition, Dr. Putnam reviewed invoices and bills of material showing that CAB's major customers specify CAB components in their solar installation project bid requests that, when assembled, constitute the systems of the claimed invention in the '291 patent. *Id.*, ¶¶11, 37-38.³ Dr. Putnam also concluded that there is "no reason to believe that any unclaimed 'hidden factor' drove demand for CAB's systems." *Id.*, ¶54. Thus, Dr. Putnam was also able to show that there is a strong nexus between CAB's rapid sales growth and the benefits conferred by features of the inventions claimed in the '291 patent, namely a code-compliant, safe, efficient, and cost-effective solar cable management. *Id.*, ¶11.

Further, Dr. Putnam analyzed CAB's sales data, calculating that its sales grew by [REDACTED] per year [REDACTED] to 2023. In contrast, over the same period, solar industry utility-capacity growth increased at 24.2% per year. *Id.*, ¶¶45-47. Mr. Putnam further calculated that while solar industry capacity grew by a factor of 6 over this time period, CAB's sales increased by a factor of [REDACTED]. *Id.*, ¶47. Applying this analysis to CAB's sales data, Mr. Putnam calculated that, by 2023, when CAB's sales were [REDACTED], its sales would have only been [REDACTED]

³ Dr. Putnam also observed that the term "CAB" has, to an extent, become "standardized" in the industry, and that prominent players in the solar industry use "CAB" as a shorthand for above-ground cable management systems. *Id.*, ¶¶39-44.

██████ had its sales grown only at the industry benchmark rate – *roughly* ██████ *more than would have been predicted. Id.*, ¶50. In total dollars, CAB's "excess sales" (*i.e.*, total *actual sales* in excess of total *expected sales* at the industry benchmark rate) are predicted to be more than ██████ over the period ██████ 2023. *Id.*, ¶ 50. Thus, CAB's sales growth is not due merely to the growth of the solar industry as a whole. *Id.*, ¶9.

Cognizant that in 2018 CAB introduced an above-ground cable hanger messenger supported cable management system that further incorporated an Integrated Grounding system, covered by U.S. Patent No. 10,177,551 ("the '551 patent"),⁴ Dr. Putnam concluded that "excess" CAB sales cannot be decomposed into separate causes attributed to each of the '291 and '551 patents. *Id.*, ¶56. As Dr. Putnam explains, the '291 and '551 patents are "economic complements," meaning that "[a]n increase in demand for one complement increases demand for the other." *Id.*, ¶¶57-58.

⁴ CAB's Integrated Grounding System covered by the '551 patent further incorporates into its above-ground messenger wire supported cable management system a system that includes a messenger wire that both supports cable hangers and current wires and acts as an equipment grounding conductor. The '551 patent is the subject of a related IPR proceeding: IPR2024-00139.

Thus, when CAB introduced its Integrated System in 2018, its sales growth encompassed two effects: (1) the substitution of the '291+'551 (Integrated Grounding System) for the '291-only (Standard System), and (2) the expansion of CAB's market, as the '291+ '551 combination offered even better value, relative to the alternatives (such as trenching and cable trays), than did the '291-only Standard System. *Id.*, ¶59.

Dr. Putnam acknowledges that, because “the '291+'551 combination is a nearly perfect substitute for the '291-only system,” it is not possible to know how much CAB's sales expanded as the result of adding the technology claimed in the '551 patent or to allocate the gains from CAB's expanded sales between the '291 patent and the '551 patent. *Id.*, ¶¶60-61. Nevertheless, given the significant increase of CAB's sales and increased divergence from the industry's benchmark growth rate, Dr. Putnam observes that, “both the '291 patent and the '551 augmentation of it each contribute substantially to the financial gain a CAB customer receives, and thus to CAB's total sales.” *Id.*, ¶62.

Accordingly, Dr. Putnam opines that CAB's *total* excess sales are so large that the conclusion that [REDACTED] of dollars in excess CAB sales are attributable to each of the '291 and '551 patents remains “unaltered . . . and that “there exists a strong nexus between each of the patents and CAB's excess sales.” *Id.*; See also *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1571

(Fed. Cir. 1997) (“When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention.”)

4. CAB's Above-Ground Wire Management System Has Received Industry Praise and Numerous Industry Awards

Industry praise for an invention may provide evidence of nonobviousness where the industry praise is linked to the claimed invention. *See Geo. M. Martin Co. v. Alliance Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010). Here, the praise and awards for CAB's above-ground cable management system are identified and described in the Declaration of Allen Smith (EX2006), and include:

- 2014 selection as a “Finalist for the Intersolar Award” in the photovoltaics category. This award is considered the flagship award for the solar industry.
- PV Magazine's top 50 “Array-changing Technologies.”
- Featured in the July/August 2016 edition of SolarPro Magazine.

EX2006, ¶¶40, 55, 60. These awards are particularly notable because CAB received them shortly after introducing and commercializing its cable management technology, signifying that the industry quickly recognized the innovative nature

and import of CAB's system and its positive impact on the design and installation of utility-scale PV solar plants. EX2038, ¶242.

Additionally, praise for CAB's above-ground cable management system is evidenced by other companies' recommendations of CAB's Standard System to others, and to design their products to be compatible with CAB's system. EX2006, ¶¶62-64. Mitchel Bowman's declaration describes his decision to "specifically design" his Voyager tracker product to be compatible with CAB's above-ground cable management system. EX2028, ¶¶48-49. William Novak, who has worked in the solar industry in various capacities for nearly 15 years, described his recommendation of CAB's system to Array Technologies Inc. ("ATI"), the leading solar tracking solutions and service provider for utility-scale projects. EX2059, ¶55. Subsequently, as explained by Mr. Smith, ATI developed hardware that was designed to be compatible with CAB's Standard System with ATI's tracker system. EX2006, ¶64. Mr. Novak routinely recommended CAB and its Standard System on other solar projects for which he was consulting. Id., ¶¶53-55. CAB submits that these companies' decisions to tie the success of their products with that of CAB's system was a recognition of the innovation embodied in CAB's system.

5. CAB's System Met a Long Felt But Unsolved Need In The Solar Industry

“Evidence of a long felt but unresolved need tends to show non-obviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1332 (Fed. Cir. 2016) (citation omitted).

That the PV industry “face[d] numerous challenges,” over an extended period, in implementing a “safe, reliable, and Code-compliant wire management system for exposed PV conductors” is recognized both in evidence submitted by Petitioner (EX1011), and in the declarations submitted by CAB. Petitioner’s Exhibit 1011 (the “SolarPro Article”) reported on the “PV industry experts[’]” views (as of 2013) on the industry’s “current challenges, considerations, Code requirements and needs when it comes to managing and protecting exposed conductors within the PV array.” EX1011 at 2; *see also* EX2059, ¶¶43-47. It states that “Implementing a safe, reliable and Code-compliant wire management system for exposed PV conductors is not an easy task” and that “[w]hile securing array wiring seems like it should be a straightforward exercise, the reality is that integrators continue to face numerous challenges.” EX1011 at 2. The SolarPro Article summarizes the then-current state of PV wire management by saying “wire management continues to be the Achilles heel of the majority of PV installations.”

EX1011 at 2; *see also* EX2059, ¶49. The Article's observation that wire management issues plaguing PV installations "continue[] to be" a major problem is a recognition that the issue had existed for an extended period of time, a fact attested to by Mr. Novak. EX2056, ¶¶48-49.

During his deposition, Dr. Beik conceded that there was a "need" in solar installations for an improved cable management solution, and that implementing the solution was "a challenge," but disputed that the SolarPro article evidenced a *long-felt* need. EX2004, 176:13-177:18. His only explanation as to why the need was not long-felt was that a similar need existed in other industries. *Id.* He offered no evidence for that assertion and, even if he had, he did not explain why the existence of a need in one industry means that the same need in another industry could not be "long-felt."

CAB's declarants also testify that CAB's solar cable management system solved a long-felt but unmet need. Mr. Bowman, who has worked in the solar industry since 2008, states that, before CAB introduced its novel solution, PV cable management solutions consisted of trenching and cable trays, both of which posed significant challenges. EX2028, ¶¶27-30; *see also* EX2038, ¶¶62-69; EX2059, ¶41. "Dissatisfied" by those solutions and their deficiencies, Mr. Bowman searched for alternatives and learned of CAB's unique system and its

improvements over those solutions, and adopted it for SunEdison's solar power plant projects. EX2038, ¶¶30, 40-41; *see also* EX2006, ¶36.

6. CAB's Above-Ground Cable Management System Overcame Industry Skepticism

“Doubt or disbelief by skilled artisans regarding the likely success of a combination or solution weighs against the notion that one would combine elements in references to achieve the claimed invention.” *WBIP, LLC*, 829 F.3d at 1335 (citation omitted). As Dr. Kern testifies, in the solar industry, it is the norm for new solar technologies to be faced with significant skepticism, which can only be overcome after significant analysis, testing and confirmation. EX2038, ¶219.

When CAB introduced its above-ground cable management system, it faced significant industry skepticism among industry experts, who were accustomed to trenching and cable trays (despite their deficiencies). EX2059, ¶¶42-43. Mr. Novak explained that industry experts were skeptical whether CAB's system could address the environmental issues identified in the SolarPro article and whether it would comply with the NEC. *Id.*, ¶¶46-48. Mr. Novak advised Mr. Smith that if he wanted to gain any traction with its new idea for an above ground cable management system, CAB would need to be supported by well-respected literature in the field, and specifically recommended that CAB obtain a white paper from Bill Brooks, a pioneer and guru in the solar industry. EX2059, ¶50.

Mr. Smith retained Brooks Engineering to prepare a white paper addressing whether CAB's system complied with NEC requirements and standards. EX2033, ¶¶8, 44-49; EX2038, ¶¶220-221; EX2006, ¶¶22-23, 38-39. As explained by Allen Smith, that paper was necessary to overcome industry skepticism to any new system, including CAB's novel but unfamiliar system. EX2006, ¶39; EX2038, ¶¶226-227, 230.

Mr. Bowman also testified to the skepticism expressed by the PV industry when it learned of CAB's system. He and his team of engineers were "skeptical about the installability, practicality, reliability, and cost" of CAB's system, and also expressed "concerns about ultraviolet ray and radiation resistance, how to structure the hanger support system, wind causing the hangers to sway and fray the jacket of power cables, compliance with various code requirements (such as rules against grouping AC and DC cables together), and the long-term reliability of the system." EX2028, ¶34; *see also* EX2038, ¶¶219-220; EX2006, ¶¶25-28, 32, 34.

After significant, prolonged testing and evaluation of CAB's system, however, SunEdison concluded that it "was not only a practical application for cable management in a utility-scale solar power plant, but [also] addressed the problems presented by" trenching and cable trays. EX2028, ¶36; *see also* EX2028, ¶¶42, 44-45; EX2006, ¶¶37, 41-45 (discussing SunEdison's testing and adoption of

CAB's system). In Mr. Bowman's words, "the CAB system was cheaper to install in terms of labor costs, cheaper to maintain over time, required fewer component parts (reducing cost of components and long-term maintenance of those components), [] provided easy access to the power cables for installation and maintenance" and "complied with all safety requirements, including the NEC." EX2028, ¶36. Based on the results of its evaluation, SunEdison began to incorporate the CAB system into its templates and incorporate it into future projects, and even changed the manufacturing process for its own product to facilitate installation of the CAB system. EX2028, ¶¶40-41. Further testing of CAB's system allayed other of SunEdison's concerns and, [REDACTED], SunEdison began to specify or recommend CAB's system in any utility-scale solar power plant for which it submitted bids, or that it designed, evaluated, or installed. EX2028, ¶46.

CAB overcame all the industry skepticism, and its Standard System ultimately became "the industry standard for cable management designs and specifications for utility-scale solar energy plants." EX2028, ¶47.

This substantial amount of objective evidence of secondary considerations overwhelmingly compels the conclusion that the claims of the '291 patent would not have been obvious at the time of the '291 invention.

IX. CONCLUSION

For the foregoing reasons, Petitioner has not met its burden of proving by clear and convincing evidence that the challenged claims of the '291 Patent are obvious over Petitioner's asserted prior art.

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT LIMITATION

Patent Owner certifies that its Response complies with the word count limitations of 37 C.F.R. §42.24(a)(1)(i). Based on Microsoft Word's "Word Count" feature, Patent Owner's Response contains 13,425 words, excluding the cover page, signature block, and the parts of the Patent Owner's Response exempted by 37 C.F.R. § 42.24(b)(1).

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 25th day of July, 2024, a true and correct copy of the foregoing **PATENT OWNER'S RESPONSE** was served by electronic mail on Petitioner's lead and backup counsel at the following email addresses:

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