

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

**DECLARATION OF JOSEPH WILLIAM NOVAK, P.E., MSE, MBA, S.P.
IN SUPPORT OF PATENT OWNER'S RESPONSE**

I, Joseph William Novak, declare as follows:

I. INTRODUCTION

1. I am currently the Owner of Tropenas Company, a registered engineering firm in Tennessee, Massachusetts and Texas, which focuses on engineering resilient utility-scale solar and energy storage systems, and on continuous improvement of those systems. In addition to these states, I am a licensed professional engineer in nineteen (19) other states: Alabama, Arkansas, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Maine, Michigan, Minnesota, Mississippi, New Mexico, New York, North Carolina, Ohio, South Carolina, Utah and Virginia. In these additional states, I operate as a Sole Proprietor, offering utility-scale solar energy and energy storage consulting and engineering drawings.

2. I am providing this declaration in support of Cambria County Association for the Blind and Handicapped, Inc. (“CAB”) in connection with IPR2024-00178, concerning U.S. Patent No. 11,349,291 (the “291 Patent”), and IPR2024-00139, concerning U.S. Patent No. 10,177,551 (the “551 Patent”), both pending before the U.S. Patent and Trademark Office, Patent Trial and Appeal Board (the “Board”).

3. I understand that Petitioner Affordable Wire Management, LLC (“AWM”) filed a petition for *inter partes* review (the “Petition”) challenging the claims of the ‘291 Patent and ‘551 Patent.

4. I am personally knowledgeable about the matters stated herein and am competent to make this declaration. The information presented herein is based on my knowledge, background, education, training, and experience in the solar industry field, including, specifically, the design, development, and engineering of solar power systems and the development and improvements of technology in the solar industry.

5. The following is my written declaration concerning my knowledge of CAB’s above-ground cable management system in utility-scale solar installations that it introduced in the 2013 timeframe. Specifically, CAB introduced a cable management system that for the first time used above-ground messenger wire supported cable hangers to support and separate the various kinds of electrical cables within a solar installation array. As I will explain further below, at the time CAB introduced its system, cable management in solar arrays had presented significant challenges in the industry.

6. I will also discuss in this declaration my knowledge of CAB’s integrated grounding system, introduced in the 2017 to 2018 timeframe. Specifically, CAB introduced a system that for the first time used a messenger wire

as not only a support structure for the cable hangers, but also as the equipment grounding conductor for the system. Before CAB's integrated grounding system, additional grounding conductors and grounding splices, separate from the messenger wire, were required for grounding the system.

7. I have no financial interest in CAB or in the outcome of these IPR proceedings or any other legal proceeding involving CAB, the '291 Patent, or the '551 Patent. I am being compensated solely for my time in preparing this declaration and providing any follow-up information as necessary in these proceedings. I am being compensated at the rate of \$200/hour for these services.

II. BACKGROUND AND EXPERIENCE

8. In total, my career in the solar industry has spanned over thirty years. Below is a summary of my relevant education and experience.

9. In 1991, I graduated from Purdue University with a Bachelor of Science degree in Mechanical Engineering. In 1993, I graduated from Purdue University with a Master's Degree in Mechanical Engineering.

10. Both my undergraduate and graduate courses at Purdue University focused on mechanical engineering with a specialty in "lean manufacturing," i.e., manufacturing in a more cost-efficient and reliable manner, focusing on minimizing waste while maximizing productivity. By the spring of 1991, as an undergraduate, I had developed a passionate interest in renewable solar energy, in

part stemming from taking Mechanical Engineering 527 “Solar Energy Systems,” a graduate level mechanical engineering course at Purdue University.

11. In 1999, I graduated from the University of Michigan, Stephen M. Ross School of Business, with a Master of Business Administration degree, with highest distinction.

12. As mentioned above, I am currently a licensed Professional Engineer in twenty-two (22) states: Alabama, Arkansas, Florida, Georgia, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, Mississippi, New Mexico, New York, North Carolina, Ohio, South Carolina, Tennessee, Texas, Utah and Virginia.

13. In November of 2010, I earned a NABCEB Photovoltaic Entry Level certificate with the North American Board of Certified Energy Practitioners (NABCEP). This certification demonstrates my knowledge of fundamental principles of the application, design, installation and operation of grid-tied and stand-alone photovoltaic systems, as well as my completion of 54 hours of training in PV system design and installation in conjunction with the Pellissippi State Community College of Knoxville, Tennessee.

14. In December of 2013, I became a NABCEB Certified PV (photovoltaic) Installation Professional with the North American Board of Certified Energy Practitioners (NABCEP), Certification #PV-101913-003052.

15. In December of 2019, I also earned a certificate in Construction Quality Management for Contractors from the United States Army Corps of Engineers in conjunction with the United States Naval Facility Engineering Command Training.

16. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).

17. After earning my Master's Degree from Purdue University in 1993, I began working at Ford Motor Company, where I remained for approximately 15 years.

18. My first position at Ford Motor Company was within the power electronic division, focusing on engineering electric motors, such as wiper and starter motors for Ford vehicles. I worked in this capacity from 1993 to 1997.

19. Following my time in the power electronics division, I transitioned into business management and corporate finance roles with Ford Motor Company, where I worked from 1997 to 2008.

20. I maintained my passion for the solar industry and continued to remain up to date on developments and innovations in solar technologies. This included devoting part of my time in the finance department at Ford to identifying cost-saving manufacturing measures, one of which included an emphasis on the use of solar energy to promote lean manufacturing and operations.

21. Given my focus in identifying and developing cost-efficient manufacturing methods, combined with my interest in solar energy, I performed a preliminary analysis of the cost-savings of using solar energy, coupled with electrolysis of water into hydrogen and oxygen, and combined with captured carbon dioxide to create synthesized natural gas offsetting the costs associated with the burning of \$1 million per month of natural gas at the Nashville, Tennessee Ford Glass Plant. I prepared and submitted a proposal to Ford outlining these cost-savings; however, the plant was sold in 2008.

22. In 2008, as part of the plant sale, I left Ford and focused my efforts on building a career in the renewable solar energy industry that I was passionate about.

23. It was around this time that the State of Tennessee created the Tennessee Solar Institute. The Tennessee Solar Institute developed from a federal government initiative to promote renewable energy in all states. The State of Tennessee utilized federal grants from this initiative to fund the Tennessee Solar Institute, devoting half of the grant funds to solar training, and the remaining half to support incentives for solar installations.

24. In 2010, I enrolled in training funded by the Tennessee Solar Institute. In November 2010, I earned my entry level solar certification through the NABCEP. By April 2011, I earned my professional engineering license in

Tennessee to better focus my career on offering engineered solutions to the solar and renewable industry. Since then, my professional engineering licensure has expanded to now encompass licensure in twenty-two (22) states, as described above.

25. In the meantime, in the 2009 timeframe, I established the Utility-Scale Renewable Energy Division of Tropenas Company. Now a fourth-generation family-run engineering business, Tropenas Company was originally founded in 1920 by my great-grandfather to focus on engineering, consulting, and advisory services within the steel manufacturing industry. My father then continued the family business, expanding into energy engineering of fossil fuel facilities.

26. My purpose in establishing the Utility-Scale Renewable Energy Division of Tropenas was to shift the focus of the company to renewable energy, in particular, solar energy. After I earned my professional engineering license in 2011, I began providing consulting services to various solar-related companies via Tropenas Company in my home state of Tennessee.

27. In 2014, I expanded my solar consulting beyond Tennessee as a Sole Proprietor in Georgia, Mississippi and Kentucky to support more project-specific solar engineering drawings which tended toward less frequent business year-by-year. Based on providing high quality robust engineering services to my various

solar clients, largely by word-of-mouth referrals, and as mentioned above, my sole proprietorship has now expanded to include nineteen (19) states.

28. In this consulting capacity, I began working as a technical advisor for Soltility, a company focused on the use of solar energy with a particular emphasis on the development of pre-fabricated solar module racking systems to promote more efficient manufacturing and installation.

29. In 2010 and 2011, in my role as technical advisor, I wrote and was awarded an Innovation Grant (offered by the Tennessee Solar Institute) for Soltility to build its solar PV manufacturing facility. At this facility, I designed, engineered, and built the first Soltility prototypes of a pre-fabricated solar module “panelized” racking system. This pre-fabricated “panelized” racking system enabled easy transportation and installation at the solar project installation site for more rapid and robust solar PV implementation. There, the “panelized” solar modules could be easily and robustly mounted onto the pre-fabricated foundations.

30. Cable management of the solar module DC wires and DC “homerun” wires at that time was accomplished through laying these wires in a “Z-shaped” purlin steel structure running the length of the “panelized” system, and securing the wires with zip ties. The solar “panelization” assemblies were then installed on the ground mounted foundation with a crane or forklift lifting the full assembly onto already existing metal piles to complete the solar installation.

31. While implementing this project in February 2012, the Soltility team and I were investigating methods to improve the collection of solar PV cables between our “panelized” racking sections. The normal method at that time was to implement “trenching” with wires run within underground conduit to connect the panels of one section to those to the north or south. We also researched above-ground alternatives and found the “SnakeTray” cable tray (a hand bendable cable tray used to route solar cables) – however, the cost feasibility and NEC Code approvals of cables trays were uncertain at that time.

32. At the end of 2012, my consulting contract with Soltility expired after its manufacturing facility was completed and fully operational.

33. As my consulting services for Soltility were winding down in mid-2012, I began providing consulting services to a few of the local solar developers in Tennessee, including Lightwave Solar, the largest residential and commercial installer with a small but growing EPC (Engineering Procurement and Construction) in Nashville, Tennessee at that time. My consulting work included training engineers on issues related to solar and designing various ground-mounted and rooftop solar projects. One of these projects included bidding, receipt of the competitive award, and implementing the design of the well-known guitar-shaped solar array installation atop the Nashville Music City Center.

34. After providing consulting services to Lightwave Solar for one year, I was asked to accept a full-time position with Lightwave Solar as its Chief Engineer. I accepted the position and served as the Chief Engineer for Lightwave Solar for an additional year. At that time, in mid-2014, I resumed rendering consulting services for Tropenas, where I have remained ever since. Under my direction, Tropenas has grown its footprint in the solar industry and expanded the scope of expertise and services to include engineering, development and improvement of robust and resilient utility-scale renewable energy storage systems and substations.

35. As Tropenas Company and through several projects as a sole proprietor, I have developed a strong reputation for thoroughness and clarity in implementing robust and reliable solar PV engineered systems. In particular, Tropenas is known for implementing solar PV projects for the United States Navy and Air Force, incorporating the required technical and robust standards required by the military. Against these standards, Tropenas successfully completed projects at the US Marine Corps Recruiting Depot in South Carolina, the US Naval Base at Guantanamo Bay, Cuba and the Cannon Air Force Base in New Mexico. As a result of Tropenas' experience with military projects, the company strives to implement these robust project management and quality control standards across the board for other non-military commercial and industrial.

36. Typical Tropenas renewable energy projects include interconnection applications, drawings and support, electrical code compliance, mechanical and civil permit drawings, component and system value engineering, and advising on project feasibility, procurement, and implementation.

37. Between my time at Tropenas Company and as a sole proprietor offering renewable energy and solar PV engineering services, I have designed (including feasibility studies, interconnection applications, and/or Issued for Construction drawings) over 2.3 GWdc of solar PV distributed generation, 5.7 GWac of renewable generation capacity, and 11.7 GWh of battery energy storage systems.

38. As part of Tropenas Company and as a sole proprietor, example solar PV and energy storage projects that I have designed for construction or feasibility include:

- 10 GWh AC coupled battery storage feasibility and 345kV interconnection designs in NY
- 567 MW (90 projects) including solar and DC coupled storage in NY
- 27 MW (25kV interconnection) in Hazlehurst, GA
- 18 MW (25kV interconnection) in Hebron, MD
- 12 MW (35kV& 13.8 kV interconnections) for US Navy Guantanamo Bay, Cuba
- 7 MW (interconnection by others) for the US Navy, Parris Island, SC
- 4 MW (12kV interconnections) in Lonoke, and England, AR
- 2.7 MW (12kV interconnection) in Sommerville, TN
- 2.0 MW (12kV interconnection) at Cannon US Air Force Base in NM
- 1.4 MW (12kV interconnection) Community Solar Project in Chattanooga, TN

III. INTRODUCTION TO CAB

39. I was first introduced to CAB in 2013. In October 2013, I attended the Solar Power International (SPI) trade show in Chicago, Illinois. SPI is the solar industry's most well-renowned trade show, hosted annually in different cities in the United States. The SPI trade show provides an opportunity for solar companies to showcase their products and systems. The SPI trade show further provides an opportunity for solar professionals to learn from industry experts about the latest innovations and developments in solar.

40. CAB had a booth at this SPI trade show where it included a rudimentary display of single carrier hangers suspended from a strand of wire that appeared to be intended to depict a messenger wire. When I saw CAB's display, I was not even sure what CAB was trying to show. I then met Allen Smith, CAB's General Manager. I asked Mr. Smith what this display was intending to show. Mr. Smith explained that the display was intended to illustrate CAB's idea for an above-ground cable management system that included cable hangers suspended from a messenger wire in a solar installation.

41. Prior to seeing CAB's display at this trade show, I had never seen anyone use, or even propose using, such an above-ground cable management system in solar installations. Instead, solar plant owners and installers would typically bury these cables, with or without conduit, in underground trenches.

42. Mr. Smith expressed frustration with the difficulty CAB was experiencing promoting and gaining acceptance of its new style of above-ground cable management system.

43. There are various issues and challenges that come with managing cables in a solar installation under any circumstances, even without the additional complications of above-ground cable management, as CAB was proposing. These challenges were well-known among industry experts, and were well-documented in the solar industry publications.

44. One such publication was Solar Pro Magazine, which, at that time, was the leading industry publication and subscribed to by many of the experts in the field, who were also frequent contributors to the various articles and content of the magazine. It is often referred to as the “Bible” of solar energy. It was a routine practice by me and others in the industry to quickly consult new editions of the magazine to learn about the latest innovations and developments in the solar industry.

45. In fact, not long before I spoke with Allen Smith at the 2013 SPI trade show, Solar Pro Magazine published its February/March 2013 edition, which featured a cover story about the challenges associated with wire management in solar installations. The story focused on the difficulties in implementing a successful and code compliant cable management system given the number of

variables that must be considered when managing cables in utility-scale solar installations. **EX2060** is a true and accurate copy of the February/March 2013 edition of Solar Pro Magazine that I maintained in my possession.

46. The challenges discussed in this article include the harsh outdoor environments in which PV arrays are installed. The system is subjected to extreme temperatures, both hot and cold, extreme wind gusts, and damaging weather conditions including snow, sleet, hail, or sand. In addition, an outdoor environment presents the risk of damage from animal activity, such as rodents chewing through cables or birds nesting within the system. These conditions make it very difficult for an electrical system to survive in these kinds of outdoor environments. The failure to address these issues, and the damage they cause, results in not only a non-operational system, but also potentially an unsafe system. **EX2060**, at 33.

47. Concerns related to these kinds of harsh environmental conditions are only going to be exacerbated by the kind of above-ground messenger wire supported cable hanger system that CAB was attempting to implement.

48. Of equal concern were the challenges that CAB's above-ground messenger wire supported cable hanger system would face in complying with the National Electric Code (NEC). As the Solar Pro Magazine article further discusses, because of their high voltage levels, exposed conductors, particularly

those in harsh conditions, if not managed properly, can present significant shock hazards, necessitating that system components be properly grounded. In addition, improper management of exposed conductors can result in ground faults that present safety hazards, such as system fires. **EX2060**, at 34, 36.

49. In light of all of these concerns, the Solar Pro Magazine article aptly described wire management as the “Achilles heel” of PV installations. **EX2060**, at 33. As one industry expert noted at the time, “new approaches” to wire management were necessary to address these various problems. **EX2060**, at 37.

50. I told Allen Smith at the 2013 SPI trade show that if CAB was to gain any traction in the solar industry with its new above-ground cable management system design, CAB would need its design to be backed up and supported by well-respected literature in the field. I specifically recommended that CAB attempt to obtain a white paper from Bill Brooks, who was and continues to be recognized as a pioneer and guru in the solar industry, with his intimate knowledge and expertise of electrical code and compliance issues impacting the solar industry.

51. In 2014, I returned to the SPI trade show in Las Vegas, Nevada and again spoke with Allen Smith and others from CAB. They relayed to me that CAB had been successful in obtaining a white paper from Bill Brooks, providing industry reassurance that CAB’s above-ground messenger wire supported cable management system was compliant with the NEC.

52. Allen Smith further relayed that once CAB started to gain traction with its new above-ground cable management system, it began to experience significant growth in its sales.

53. Following these updates from CAB on the success of its above-ground cable management system, I began advocating for the use of CAB's system on solar projects for which Tropenas was consulting.

54. In 2015, at my recommendation, CAB's above-ground cable management system was successfully installed at Oak Ridge National Laboratories in Oak Ridge, Tennessee. The Oak Ridge site was unique in that the property was originally used back in the 1940s for the development of the atomic bomb. As a result of that work, the property was contaminated with various nuclear waste and related hazards. As part of the remediation measures for the property since that time, these hazards were permanently entombed in concrete beneath the ground surface. As a result, the property was not amenable to trenching. This made readily apparent the significant advantage of installing CAB's above-ground cable management system at the site, which was a more robust, as well as cost-efficient solution to the customer.

55. In February of 2015, I introduced Tim Wedding to Russell Pacific, a reseller of Array Technologies, who was previously unfamiliar with CAB's products and technologies. As part of this introduction, and given its successful

installation at the Oak Ridge project, I also recommended the use of CAB's above-ground cable management system on a project in Columbus, Mississippi with Russell Pacific. Specifically, I recommended CAB as its above-ground cable management system would be an improvement over the use of cable trays at the project. Russell Pacific ultimately decided to use CAB for the project, and CAB's above-ground cable management system was successfully installed. The site of this project was owned by Silicon Ranch, one of the largest independent power producers in the United States.

56. Around 2017, I learned CAB developed a new technology – an integrated grounding system for installation in solar arrays that utilized a messenger wire as both a support for cable management hangers, and simultaneously, as a grounding conductor.

57. Prior to 2017, I am not familiar with any installations, whether in the solar industry or otherwise, that utilized a messenger wire as both a support and grounding conductor.

58. Prior to CAB's integrated grounding system, any solar array would require the use of a separate grounding conductor, normally an extra cable, to be run through the entire system. The use of extra cables to facilitate grounding, coupled with the labor associated with running and attaching these extra cables

through the system, results in significantly increased labor and material costs on a solar project.

59. CAB's integrated grounding system eliminates the need for any separate grounding conductor. Instead, CAB's integrated grounding system simultaneously provides both the Equipment Grounding Conductor (EGC) and Grounding Electrode Conductor (GEC). Together, the system not only provides sufficient ampacity for fault current duty, but also provides adequate structural support for the cable system.

60. The CAB integrated grounding system is particularly impressive given it addresses the specific needs for adequate grounding of electricity within a solar array, with an emphasis on addressing safety concerns with any type of grounding, such as reducing risks associated with faults.

61. The cost savings with CAB's integrated grounding system span those incurred from not only materials and labor, but also those from purchasing, shipping, staging and handling.

62. In 2020, Tropenas Company recommended both CAB's above-ground cable management system and integrated grounding system for installation on a project at the United States Naval Base at Guantanamo Bay, Cuba.

63. The Guantanamo Bay project is particularly illustrative of the revolutionary nature of CAB's systems, as it negated the time-consuming and costly need to drill or trench the jobsite.

64. Prior to the decision to use CAB's system for the project, the Guantanamo Bay project originally necessitated significant blasting of bedrock on the jobsite to permit the eventual installation of solar cables through a series of trenches to be dug on the site.

65. Within the solar field, trenching is a notoriously time-consuming and extremely expensive process, which is also accompanied by the significant occurrence of many issues that compromise the system, mainly the result of the environment (i.e. weather, flooding) or animals (i.e. rodents chewing through buried cable lines).

66. I was successful in convincing leadership on the Guantanamo Bay project to utilize CAB's system, which was successful and provided significant cost and time savings having eliminated the need for any trenching.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

DocuSigned by:

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Joseph William Novak, P.E., MSE, MBA, SP

Dated: 07/25/2024 | 11:53 AM EDT