

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.

IPR2024-00139
U.S. Patent No. 10,177,551 B1

**DECLARATION OF JOSHUA PHINNEY, Ph.D.
IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE**

Table of Contents

	<u>Page</u>
I. Assignment	4
II. Qualifications.....	5
III. Level of Ordinary Skill in the Art	10
IV. Relevant Legal Standards	12
V. Brief Tutorial on Grounding Systems	14
A. GROUNDING.....	15
B. BONDING.....	17
C. GROUNDED CONDUCTOR/NEUTRAL CONDUCTOR.....	19
D. GROUNDING CONDUCTORS	21
E. MESSENGER WIRE.....	25
VI. Overview of the '551 Patent.....	29
VII. Claim Interpretation – “Multi-Function Line”	37
VIII. Discussion of Proposed Grounds of Unpatentability	42
A. DESCRIPTION OF PRIOR ART REFERENCES.....	43
1. U.S. Patent No. 10,003,298 (“Grushkowitz”)	43
2. CAB Website	46
3. CAB Whitepaper	48
4. U.S. Patent No. 3,001,749 (“Petersen”)	51
5. MacLean	53
B. RESPONSE TO ASSERTED INVALIDITY GROUNDS 1-5 UNDER 35 U.S.C. §103	53

1.	GROUND 1 – Grushkowitz in View of the Knowledge of a POSITA Does Not Render Claims 1-12, 18-19 Obvious.....	55
a.	Independent Claim 1 and Dependent Claims 2-12, 18.....	55
b.	Independent Claim 19	66
2.	GROUND 2 – CAB WEBSITE and CAB WHITEPAPER in View of the Knowledge of a POSITA Do Not Render Claims 1-19 Obvious.....	68
a.	Independent Claim 1 and Dependent Claims 2-18	68
b.	Independent Claim 19	82
3.	GROUND 3 – PETERSEN in View of the Knowledge of a POSITA Does Not Render Claims 1-19 Obvious	85
a.	Independent Claim 1 and Dependent Claims 2-18	85
b.	Independent Claim 19	93
4.	GROUND 4 – Petersen and MacLean in View of the Knowledge of a POSITA Do Not Render Claims 13-17 Obvious	96
5.	GROUND 5 – CAB WEBSITE, CAB WHITEPAPER, and MacLEAN in View of the Knowledge of a POSITA Do Not Render Claims 13-17 Obvious	98
IX.	Conclusion	101

I, Joshua Phinney, Ph.D., of Garden City, NY declare that:

I. ASSIGNMENT

1. I have been retained on behalf of Cambria County Association for the Blind and Handicapped, Inc. (“CAB” or “Patent Owner”). I understand that Affordable Wire Management, LLC (“AWM” or “Petitioner”) has filed a petition with the Patent Trial and Appeal Board (“PTAB” or “Board”) to institute an *inter partes* review (“IPR”) of U.S. Patent No. 10,177,551 (“the ’551 patent”) (EX1001), issued to CAB on January 8, 2019. I understand that CAB is submitting my declaration in support of its Patent Owner Preliminary Response to AWM’s petition. Because CAB’s response to the petition at this juncture is preliminary in nature, in the event the Board issues a decision granting institution, I reserve the right to amend and supplement my opinions rendered herein in any subsequent declaration I submit in support of CAB’s Patent Owner Response.

2. I have been asked to analyze the assertions of invalidity of claims 1-19 of the ’551 patent made by Petitioner in its petition and by Dr. Omid Beik in his declaration submitted in support of the petition (EX1002), and to render my opinions in response to those assertions. Paragraph numbers below, where not otherwise indicated, refer to paragraphs of Dr. Beik’s declaration, EX1002.

3. I am being compensated for my work as an expert with respect to this *inter partes* review at the rate of \$695 per hour, but my compensation is not

contingent in any way on the content of my opinions or the outcome of this proceeding.

4. My findings, as explained below, are based on my study, experience, and background in the field of power systems, informed by my education in electrical engineering, and my experience in the design and analysis of mechanical and electrical systems. In preparing this declaration, I have considered the claims, specification, and prosecution history of the '551 patent. I have also relied on my review and analysis of the prior art as well as other materials submitted to the Board in support of AWM's petition.

5. I have also considered the various documents referenced in my declaration and other information provided to me in connection with this case.

6. My opinions are also based on the knowledge I have accumulated over my years of experience as outlined below.

II. QUALIFICATIONS

7. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in Exhibit A attached hereto. The following is a brief summary of my relevant qualifications and professional experience.

8. I am a Principal Engineer in the Electrical Engineering and Computer Science practice at Exponent, an engineering and scientific consulting firm

headquartered at 149 Commonwealth Drive, Menlo Park, California 94025. I received a Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology (“MIT”) in 2005. I also earned S.M. and B.S. degrees in Electrical Engineering from MIT and the University of Illinois, Chicago (“UIC”), respectively.

9. While at MIT, I worked at the interface of power electronics and electromechanics. I designed inverters and rectifiers for rotating machines, including automotive alternators and induction generators in the MIT Microengine Project. As part of my graduate work for the MIT/Industry Consortium on Advanced Electrical/Electronic Components and Systems, I measured and modeled the chassis-ground impedance in automobiles equipped with 42 V electrical systems. In my Master’s Thesis I designed, built, and tested filters to suppress electromagnetic interference (“EMI filters”) that are used when powering circuitry from an AC utility source.

10. At MIT I also worked on the Laser Interferometric Gravitational Wave Observatory (LIGO) experiment, where I designed and tested low-turbulence hydraulic systems for seismic isolation of the experimental apparatus. My job responsibilities included the design and testing of a hydraulic manifold and pressure control system, as well as the selection and testing of the sensors and actuators that were parts of the position control system.

11. My doctoral work at MIT centered on power electronics and magnetics. As part of my doctoral work, I constructed and modeled filters, including filters with magnetically coupled coils. While at MIT, I taught magnetics design and magnetic-circuit analysis to both undergraduate and graduate students. I have authored papers in the areas of power electronics and magnetics, and am a co-inventor on patents for improving the performance of capacitors, EMI filters, and common-mode chokes.

12. For my publications related to both my Master's and Ph.D. thesis, I received the William M. Portnoy Prize Paper Award (2003) and the IEEE Power Electronics Society Transactions Prize Paper Award (2004).

13. After earning my Ph.D., I joined Exponent where I lead technical investigations pertaining to electronics, microcomputers, and electromechanical systems. My job functions include analyzing hardware and software of these devices to understand their modes of failure and testifying regarding these devices in legal matters involving patents and trade secrets. I have led Exponent's technical investigation of large generation failures, including grid-scale photovoltaic facilities and the Ravenswood U30 generator loss. In addition at Exponent, I have worked on commissioning and failure analysis of HVDC converter stations as well as emergency power systems (including uninterruptible power supplies) in hospitals, data centers, emergency-response centers, and military installations.

These investigations encompassed distribution and substation automation of the serving utility.

14. Throughout the last 18 years at Exponent, I have performed electromagnetic assessments of utility and communication infrastructure. These issues include permitting, interference, and environmental impact of radar, AC and HVDC transmission lines, substations, photovoltaic installations, generators, broadcast antennas, and electrified mass transit systems. As part of this work, I calculate electric- and magnetic-field profiles – as well as profiles of audible noise and radio noise – along transects perpendicular to the path of transmission and distribution lines. For overhead lines, calculation of profiles is preceded by sag calculations, i.e., predicting the ground clearance of conductors at their lowest point, for a given temperature and attachment height at the structure. I have formalized this prediction of conductor position as part of a tool suite at Exponent to predict the likelihood of flashover. These tools used assist transmission-line operators manage the risk associated with wilderness fires.

15. In addition to the foregoing, I have advised clients on RF safety and grounding practices in the vicinity of commercial radio transmitters and high-voltage transmission lines. This work includes advising manufacturers and operators of hoists, cranes, pipelines, and hydrogen-handling facilities regarding mitigation of touch potentials, nuisance shocks, and electromagnetic interference

around high electric fields. I have also performed stray-current measurements and grounding-system assessments in high-voltage DC converter stations, substations, marinas, and dairies. Here, stray currents were from conducted sources, rather than induced by radiated sources.

16. I have also testified regarding the faults that occur in electrical systems, e.g., detection and ride-through of ground faults in grid-connected wind turbines, as well as mitigation of electrical hazards to installers of commercial lighting. In the context of mediation, I have opined regarding specification compliance and National Electric Code (NEC) compliance in the emergency-power and power-distribution systems of data centers. In addition, I have taught electricians and engineers-in-training and as part of the Professional Engineering Review Course at Hofstra University, to prepare students for NEC questions on the Professional Engineering exam.

17. Regarding solar projects, I have assisted with permitting of grid-scale solar facilities (30-300 MW) in Kern County, CA, Arizona, and Texas, and led failure root-cause analysis (RCA) efforts in solar power plants. Some of the RCA projects involve failure of particular components, e.g., panels and combiner boxes. More complicated RCA projects included inverter fires and generator-step-up transformer failures. As part of these failure studies, I have modeled the dynamics of grid-scale solar power plants, including the collector system,

inverters, generator step-up transformers, and main step-up transformers. I also testified before the Kern County Board of Supervisors on behalf of Sempra Generation regarding their solar generation projects in Antelope Valley.

III. LEVEL OF ORDINARY SKILL IN THE ART

18. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field).

19. I understand that '551 patent was filed as U.S. Patent Application No. 15/725,668 (the "'668 application") on October 5, 2017, and does not claim priority to any earlier-filed applications.

20. As discussed further below, the '551 patent relates to a "grounding system, structured to ground a number of cables supported by a support assembly," and that "includes a multi-function line assembly and a number of conductive mounting assemblies," each of which is "structured to be coupled to the multi-function line and to a conductive pile." EX1001, Abstract. The specification further explains that the claimed invention "relates to a grounding system for a suspended cable assembly and, more particularly, to a grounding system that includes conductive elements whereby grounding cables do not need to be spliced

into a conductor wire disposed adjacent a messenger wire, and, to a system wherein a multi-function line provides support and a current path.” EX1001, 1:7-13. The multi-function line “supports the cable hangers, as a messenger wire, and provides a current path, as a grounding conductor.” EX1001, 2:35-37.

21. Based on my understanding of the technology, education, and experience level of those working in this field, it is my opinion that a person of ordinary skill in the art (“POSITA”) working in the field of the ’551 Patent *circa* 2017 would have an associate’s degree in an engineering discipline, and 1-2 years experience in electrical power systems. Lack of work experience can be remedied by additional education, and vice versa.

22. At ¶32, Dr. Beik opines “that a POSITA working in the field of the ’551 Patent at the relevant time would have had a bachelor’s degree in a pertinent discipline, such as electrical engineering, civil engineering, mechanical engineering or equivalent with 2-3 years of experience in electrical power systems, planning, and design, with the understanding that the number of years of experience could be higher or lower given the level of education and vice versa.”¹

¹ While Dr. Beik refers to the 2-3 years’ experience level being in “electrical power systems,” Petitioner in its Petition refers to 2-3 years experience in

23. I have considered the level of ordinary skill offered by Dr. Beik and it is my opinion that he (and Petitioner) propose a level of skill that is too high. In my opinion, a POSITA working in the field of the '551 patent could have the work experience Dr. Beik and Petitioner proposes, but with far less education. I base this opinion on my experience and interactions with electricians and engineers-in-training, many of whom did not have a bachelor's degree in an engineering discipline, but nevertheless would be considered to be skilled artisans in the field of the '551 invention. However, my opinions would be the same applying the level of ordinary skill proposed by Dr. Beik and Petitioner.

24. For purposes of this Declaration, and unless otherwise noted, my opinions are based upon the perspective of a POSITA on the priority date of the '551 patent (i.e., October 5, 2017) as set forth in ¶22 above.

IV. RELEVANT LEGAL STANDARDS

25. In preparing and expressing my opinions and considering the subject matter of the '551 patent, I am relying on certain basic legal principles that counsel have explained to me. These principles are discussed below.

“electrical utility systems.” Petition, 23. In my declaration, I refer to “electrical power systems,” as does Dr. Beik.

26. I understand that prior art to the '551 patent includes patents and printed publications in the relevant art that predate the priority date of the inventions recited in the '551 patent.

27. I have been informed that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis takes into account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

28. I have also been informed that when asserting obviousness under § 103 based on a single prior art reference, a petitioner must articulate a reason, with rational underpinnings, why a POSITA would have been motivated to modify that single prior art reference to arrive at the claimed invention.

29. I have been informed that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain

predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

V. BRIEF TUTORIAL ON GROUNDING SYSTEMS

30. Before the time of the invention, safety benchmarks such as NFPA 70, the National Electrical Code (NEC), included a requirement that non-current-carrying metal components of an electrical distribution system be bonded to one another, and separately be grounded through the use of the grounding conductor. *Grounding and bonding* in this manner have been NEC requirements in the vast majority of circumstances since before the time of the invention. As explained below, a grounding system (a) limits the voltage on exposed metal parts; and (b) assists with the clearing of faults by establishing an “effective ground-fault current path.”

A. GROUNDING

31. Grounding is generally understood to mean connecting to the earth, and includes joining non-current-carrying metal parts that support and surround the electrical system to make a low-resistance connection between these metal parts and the earth.² One purpose of grounding is to stabilize voltage in relation to the earth – or to another body that serves as a voltage reference – so that the voltage measured between an ungrounded conductor (also referred to as a “hot” or phase conductor) and a grounded object is at a defined potential. EX1028, 14, 15. For practical power distribution systems, the earth or ground is usually taken to have zero potential and everything is referenced to the earth. Electrical potential is measured between two points in a circuit and it is expressed in volts. By keeping the potential near zero volts on exposed metal parts such as raceways, enclosures, supports, and piping, the possibility for shock or electrocution from contact with such structures is greatly reduced. *Id.*, 15, 85. For instance, grounding decreases the voltage on exposed metal parts in the event of a lightning strike, since the grounding system diverts the strike current to one or more grounding electrodes embedded in the earth.

² The term “grounding” can also be used when joining to a conducting body that serves in place of the earth, as in a vehicle.

32. NEC Art. 250.4(A)(1)-(2), which Dr. Beik also references at ¶38, describes these fundamental concepts:

(A) Grounded Systems.

(1) Electrical System Grounding. Electrical systems that are grounded shall be connected to earth in a manner that will limit the voltage imposed by lightning, line surges, or unintentional contact with higher-voltage lines and that will stabilize the voltage to earth during normal operation.

...

(2) Grounding of Electrical Equipment. Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected to earth so as to limit the voltage to ground on these materials.

EX1007, 99.

33. What Dr. Beik omits from his discussion (*see* ¶38), however, is that electrical systems (and especially the non-current carrying parts such as supports and enclosures) and electrical equipment are grounded through grounding conductors (not grounded conductors) and other components. I will discuss further below the difference between grounded conductors and grounding conductors, and also explain the different types of grounding conductors. But first I will discuss the process of bonding, which is also critical to any grounding system.

B. BONDING

34. Bonding means connecting metallic parts in order to establish electrical continuity and conductivity. EX1028, 85; EX1032, 100. By permanently joining metallic parts to form an electrically continuous path, bonding ensures that currents likely to be imposed on metallic parts are conducted safely. Properly bonded systems are at the same potential as the grounding portion of the electrical system. Bonded systems are not intended to carry current as part of the electrical system but they must be able to safely do so in the event that current is imposed on them. In general, an abnormal current on any one part (e.g., from a phase-to-case fault) will flow on different parts of the bonded system because they are connected. Bonding, however, minimizes the voltage difference between the different conductive components in the system under such atypical operating conditions. EX1028, 93. Bonding also ensures that current from a ground fault, no matter where it occurs in a raceway, support, enclosure, or similar bonded system, returns to the supply source via an “effective ground-fault current path.” The effective ground-fault current path must have sufficiently low impedance to the supply source so fault current will quickly rise to a level that will open the circuit overcurrent protection device. EX1007, 99.

35. NEC Art. 250.4(A)(3)-(4), which Dr. Beik also references at ¶38, describes these fundamental concepts:

(3) Bonding of Electrical Equipment. Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

(4) Bonding of Electrically Conductive Materials and Other Equipment. Normally non-current-carrying electrically conductive materials that are likely to become energized shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

EX1007, 99 (emphases added).

36. NEC Article 250.2 provides the definition of “effective ground-fault current path:”

Effective ground-fault current path. An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground fault detectors on high impedance grounded systems.

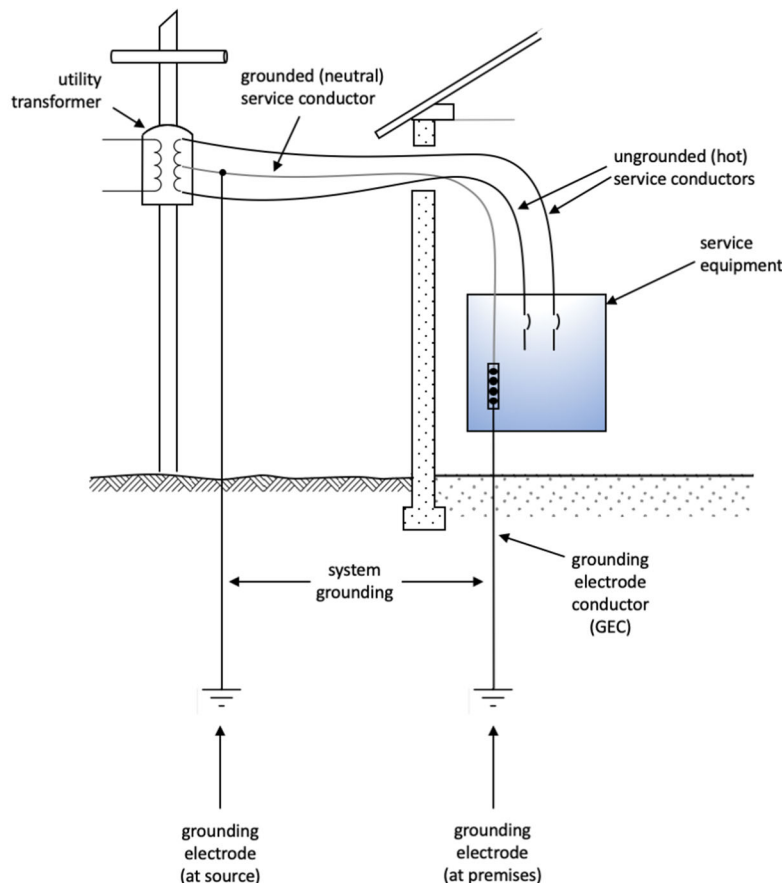
EX1007, 99.

37. As with grounding of electrical systems and equipment, providing this intentionally constructed low-impedance electrically conductive path is accomplished through a grounding conductor, as opposed to a grounded conductor

or neutral conductor.

C. GROUNDED CONDUCTOR/NEUTRAL CONDUCTOR

38. As defined in the NEC Article 100, a “grounded conductor” is a system or circuit conductor that is intentionally grounded. EX1007, 31. For instance, among the conductors from a supply source (e.g., conductors to the secondary winding of a transformer serving a customer’s premises) one of the conductors is often intentionally grounded. As illustrated below in a figure I created, this conductor, called the “neutral,” is grounded at the utility transformer and at the service equipment at the customer premises:



39. The “neutral conductor” is defined as a conductor “intended to carry current under normal conditions.” *See* EX1007, 32 (NEC Article 100). It can be thought of as the “return leg” of a circuit, i.e., the conductor that completes the circuit of each phase. In this way, the neutral conductor carries the unbalanced current of the phases.

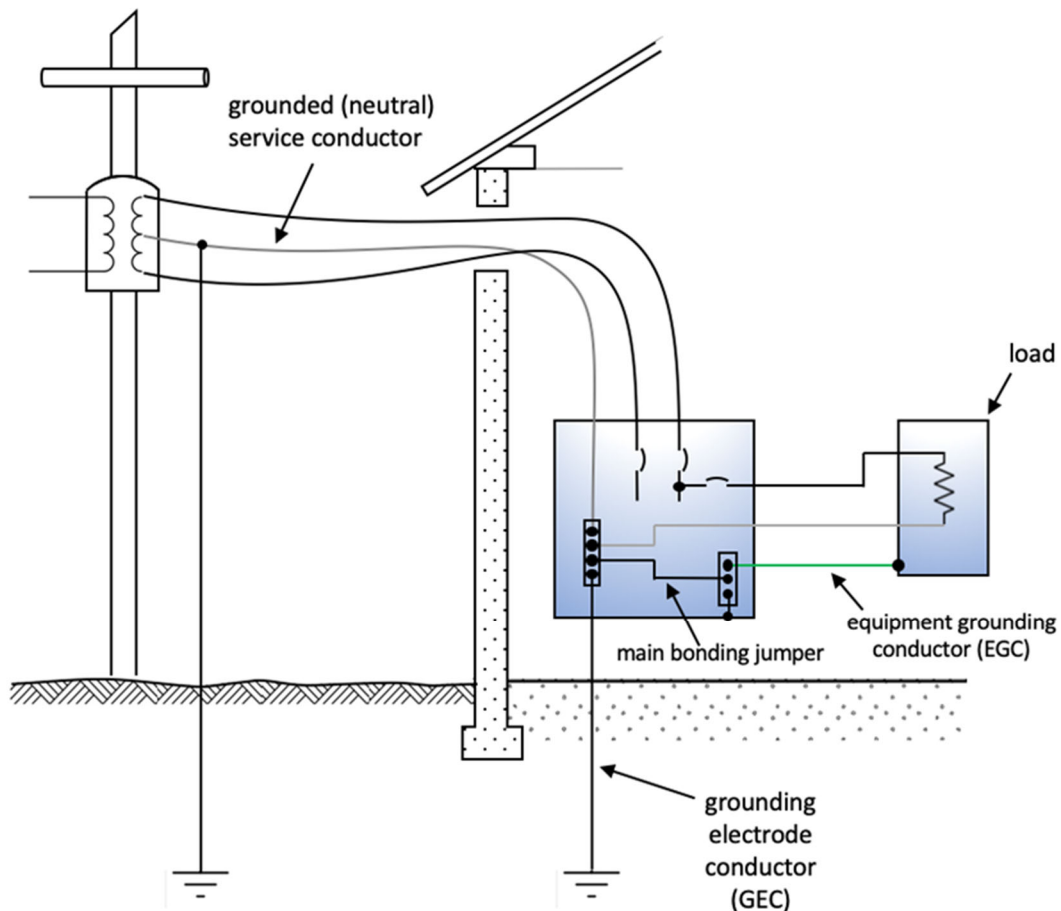
40. As shown above, the “neutral conductor” is the groundeded conductor of the split-phase 120/240V circuit, since it is intentionally grounded. In this figure, the neutral conductor is connected to grounding electrodes via a “grounding electrode conductor,” which, as discussed below, is a type of grounding conductor. A grounded neutral conductor highlights an important distinction between the terms groundeded and grounding, which is known to electricians, electrical engineers, and other users of the NEC. The neutral conductor is said to be groundeded, and this is accomplished via grounding members including grounding conductors.

41. An ungrounded conductor (also referred to as a “hot” or “phase” conductor) is a wire which supplies power or which carries current from a source of power to a device which uses power (a load). For instance, in the figure above, the split-phase 120/240V circuit includes two phases, each of which is an ungrounded conductor.

D. GROUNDING CONDUCTORS

42. The NEC discusses two types of grounding conductor, the “grounding electrode conductor” (GEC) and the “equipment grounding conductor” (EGC).

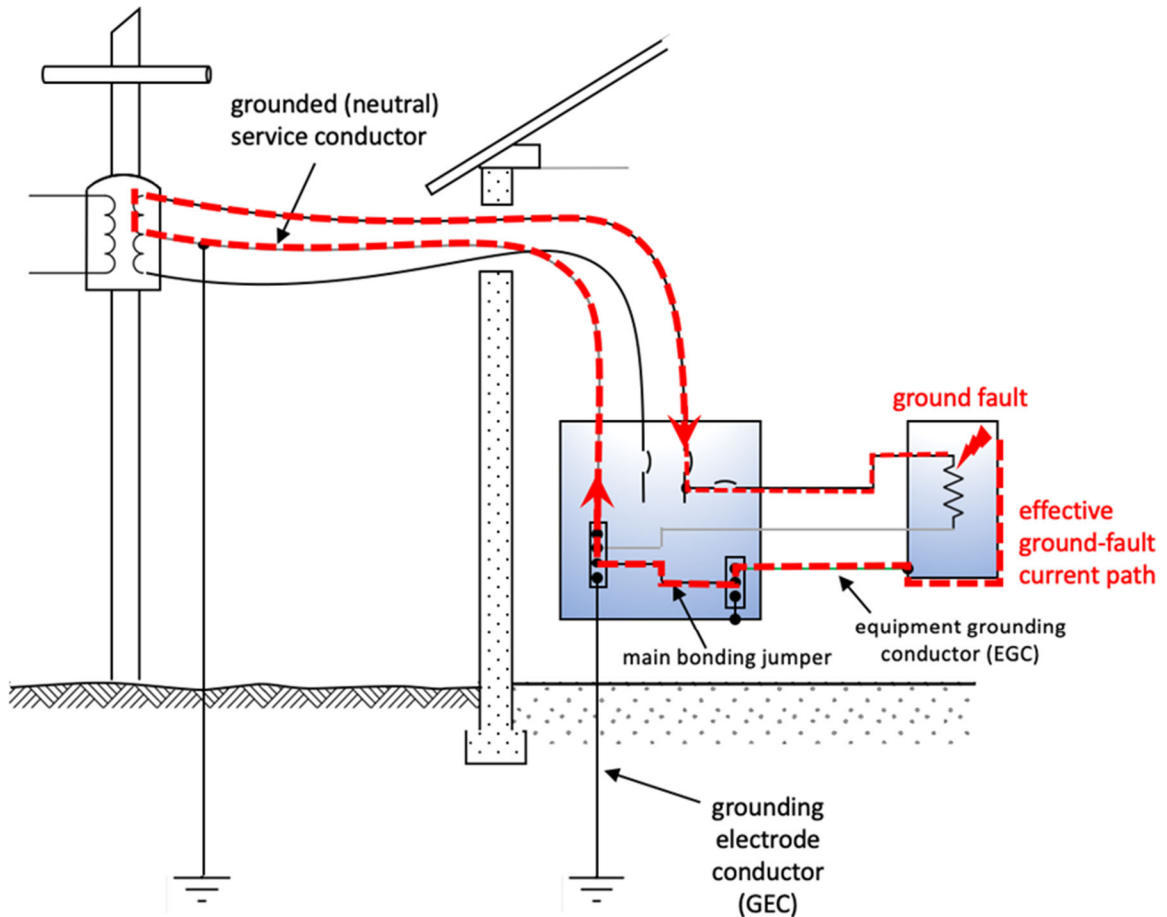
Below, in a figure I created, both conductors are shown diagrammatically at a utility-served premises:



43. *Grounding Electrode Conductor.* A grounding electrode is an electrically conductive solid rod or other structure whose size and surface area are sufficient to permit adequate contact with the earth in which it is buried or driven. A wire called a “grounding electrode conductor” (“GEC”) connects to the

grounding electrode. In the figure of the previous section, the GEC is the conductor through which and by which the neutral conductor is grounded. The GEC in this case connects the grounding electrode to the grounded/neutral conductor at the service equipment.

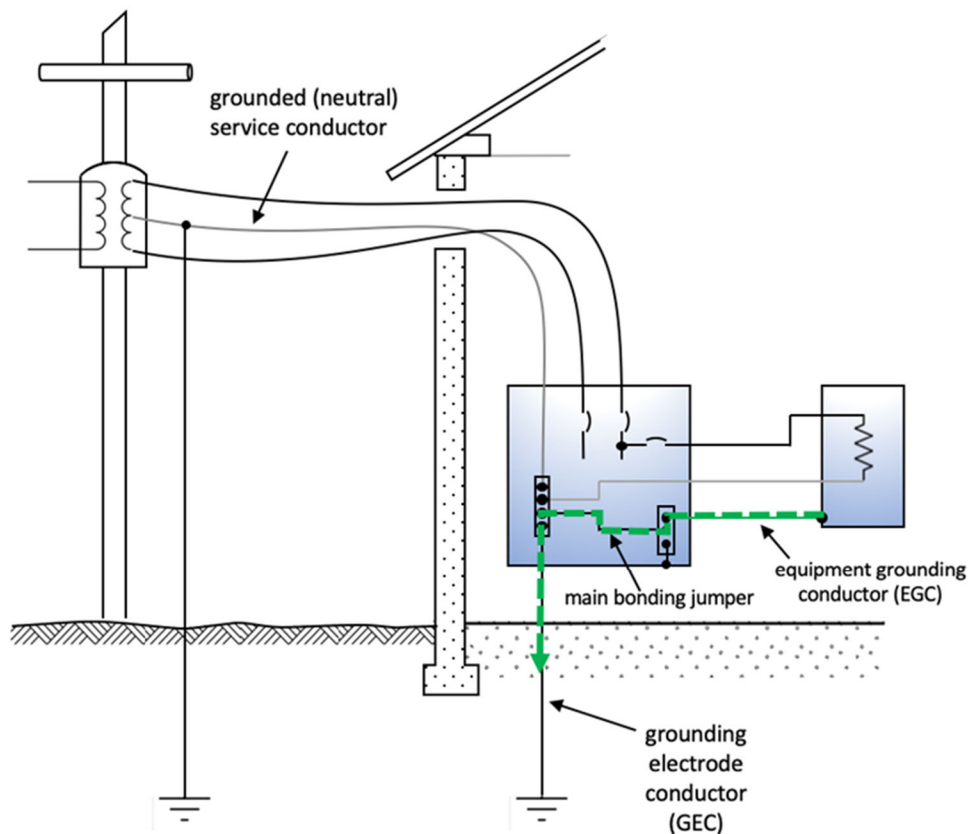
44. *Equipment Grounding Conductor.* An “equipment grounding conductor” (“EGC”) is the conductive path installed to connect normally non-current-carrying metal parts of equipment together and to ground. *See* EX1007, 31. The EGC does not normally carry current, and is not intended to carry current, when the electrical system is properly functioning. In the event of a ground-fault, however, the equipment grounding conductor is designed to provide an effective, low-impedance ground-fault current path from the point of a ground-fault on the wiring system to the electrical supply source in order to cause the overcurrent protection device to open the circuit and to clear the fault. The EGC is what provides the “effective ground fault current path” as shown in the figure below, which I created, where the current from a line-to-case fault returns to the neutral point of the transformer:



45. The EGC electrically connects exposed metal parts, including parts that are likely to become energized. Such parts (e.g., cases and support structures) are electrically conductive materials that normally do not carry current, and are bonded together (in part) through the EGC. *See* EX1007, 31, where the NEC states in fine-print note 1: “FPN No. 1 It is recognized that the equipment grounding conductor also performs bonding.” In the event that exposed metal parts are energized – e.g., due to accidental contact with energized conductors – the equipment grounding conductor provides an effective ground-fault current path

that facilitates the operation of overcurrent protection devices.

46. An EGC also provides a path to ground (i.e., the earth) since it is a conductive path installed to the system grounded conductor, the GEC, or both. *See* NEC Article 100, definition of “Grounding Conductor, Equipment,” EX1007, 31. As illustrated below, the EGC grounds normally non-current-carrying metal parts of equipment through the main bonding jumper and ground-electrode system. In this way, the EGC, as a grounding conductor, provides a conductive path to ground.



47. The EGC installation depicted above shows an ac utility service, but the NEC also requires EGCs in generation facilities, such as solar photovoltaic electrical energy systems. NEC Article 690.43, for instance, requires that exposed non-current-carrying metal parts in a PV array be grounded regardless of voltage, and regardless of whether any of the current-carrying conductors from the PV array are grounded. *See* EX1007, 587. To achieve this equipment grounding, an EGC must be installed between a PV array and other equipment, and must run with PV array conductors when those circuit conductors leave the vicinity of the PV array. *Id.*, 587-588; *see also* EX1001, 1:65-2:16 (discussing equipment grounding conductors).

E. MESSENGER WIRE

48. Prior to 2020, “messenger wire” was not a defined term in the NEC. A POSITA at the time of the invention, however, would have understood that messenger wires were used to provide a support function. In the 2020 NEC, messenger wire was defined for the first time as “a wire that is run along with or integral with a cable or conductor to provide mechanical support for the cable or conductor.” *See* “Article 100 Messenger or Messenger Wire” retrieved from <https://www.electricallicenser renewal.com/Electrical-Continuing-Education-Courses/NEC-Content.php?sectionID=791.0> Both as understood by a POSITA at the time of the invention, and as defined even subsequently in the 2020 NEC, a

messenger wire is not structured to carry a signal or power.

49. A POSITA would understand that a messenger wire is an exposed metal part that is likely to be energized, particularly when it supports power cables. As such, a messenger wire needs to be grounded. NEC Article 396.30 includes this specific provision. EX1007, 241. As part of a larger support system, a POSITA would understand that a messenger wire also needs to be bonded to other metal parts of the support system.

50. At times, a messenger wire *can* be used as a neutral conductor intended to carry current, such as in a service-drop cable. For instance, triplex service-drop cable is typically used to supply split-phase power (two hot phases, with neutral) from a pole-mounted transformer to the customer's service head where connection to the service entrance cable is made. *See, e.g.*, NEC Article 396.2, EX1007, 241. When a "neutral messenger" is used in this way, the phase conductors are wrapped around or affixed to the messenger wire and the messenger wire acts as a neutral conductor and is required to be grounded near the service entrance. Neither the messenger wire itself, however, nor any of the conductors wrapped around or affixed to it, serve as "grounding conductors." In fact, the neutral conductor is part of the circuit – it is intended to carry current to complete the circuit – and it is the conductor that is groundeded, not the conductor that is grounding the system.

51. Dr. Beik, in his review of the state of the art in his declaration, cites to the 2003 Southwire triplex service drop cable constructed to include “neutral messengers.” ¶50, citing to EX1025, 1. Dr. Beik then states his understanding that a “‘neutral messenger’ refers to a messenger cable that doubles as a grounding conductor.” ¶50. Dr. Beik’s understanding of the use of the term “neutral messenger” is incorrect. As I explained above, a “neutral messenger” in this context that supports conductor wires that are wrapped around or affixed to it acts as a **neutral conductor**, and a neutral conductor cannot “double” as an equipment grounding conductor, i.e., act simultaneously as a neutral conductor and an EGC. In fact, a messenger wire intended to carry current as a neutral conductor would be inherently inconsistent with the function of an EGC, since an EGC can only provide an effective ground fault current path if it does not carry current under normal operating conditions.³

³ Dr. Beik also refers in ¶50 to the “well-known benefit of using the messenger cables as a grounding conductor.” Not only does Dr. Beik fail to offer any support for his statement that this benefit was well-known, in my experience in this industry, I am not aware that anyone was using a messenger wire as a grounding conductor.

52. In the previous paragraph of his declaration at ¶49, Dr. Beik cites to NEC Article 396.30, EX1007, 241, which identifies potential uses of a messenger wire, in addition to a support structure, to include neutral conductor (Article 396.30(B)) or equipment grounding conductor (Article 396.30(C)). But, contrary to Dr. Beik's assertion in ¶50, NEC Article 396.30(B) and (C) are mutually exclusive, and do not authorize a neutral conductor to "double" simultaneously as an equipment grounding conductor.

53. The Hendrix messenger wire, EX1024, which Dr. Beik cites and acknowledges at ¶51, also discloses messenger wire that supports three phase conductors and is also used as a "system neutral." EX1024, 13. For the same reasons stated above, it would have been known to a POSITA that a "system neutral," i.e., a neutral conductor, cannot also be acting simultaneously as a grounding conductor.

54. EX1024 also refers to the Hendrix messenger wire as a "lightning shield." EX1024, 13. In the overall context of the Hendrix messenger wire, a POSITA would not understand this to be referring to using the messenger wire as an equipment grounding conductor that would provide an effective ground fault current path. The Akasaka reference, EX1025, which Dr. Beik cites in ¶52, is even further removed from the use of a messenger wire as a grounding conductor. Akasaka only discloses a static wire, which acts like a lightning rod, to "provide

protection to the conductor from disturbances such as lightning and other atmospheric conditions.” *Id.*, [0002]. Indeed, Akasaka does not even disclose a messenger wire that provides any support function for any other structure – the wire is simply described as “self-supporting.” *Id.*, [0003].

VI. OVERVIEW OF THE ’551 PATENT

55. The ’551 patent relates to a grounding system having a “multi-function line” that serves a dual purpose of (1) physically supporting cable hangers that in turn support electric cables; and (2) serving as an equipment grounding conductor (a type of grounding conductor) for the system. “That is, a single multi-function line supports the cable hangers, as a messenger wire, and provides a current path, as a grounding conductor.” EX1001, 2:33-37 (emphasis added). The multi-function line shown in Fig. 7 below includes conductive copper and copper-clad steel strands. *Id.* 8:67-9:6. Thus, the multi-function line shown in Fig. 7 is sufficiently strong to support cable hangers and electrical wires, and is also sufficiently conductive to act as an equipment grounding conductor.

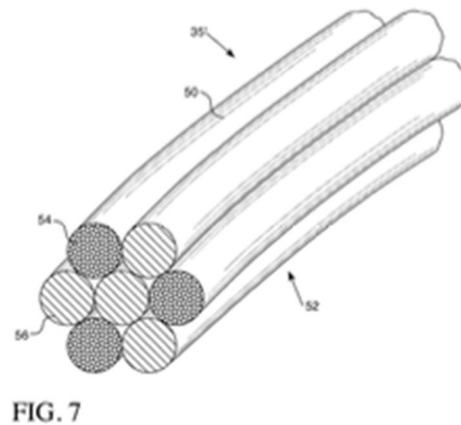


FIG. 7

'551 patent, Fig. 7

56. The '551 patent specifies that the multi-function line is a “tension member.” As shown in Fig. 1 of the '551 patent, conductive terminal supports (item 44) are used to couple the multi-function line to a support (e.g., a pile) and “draw the multi-function line 35 taut.” *Id.* 7:17-23.

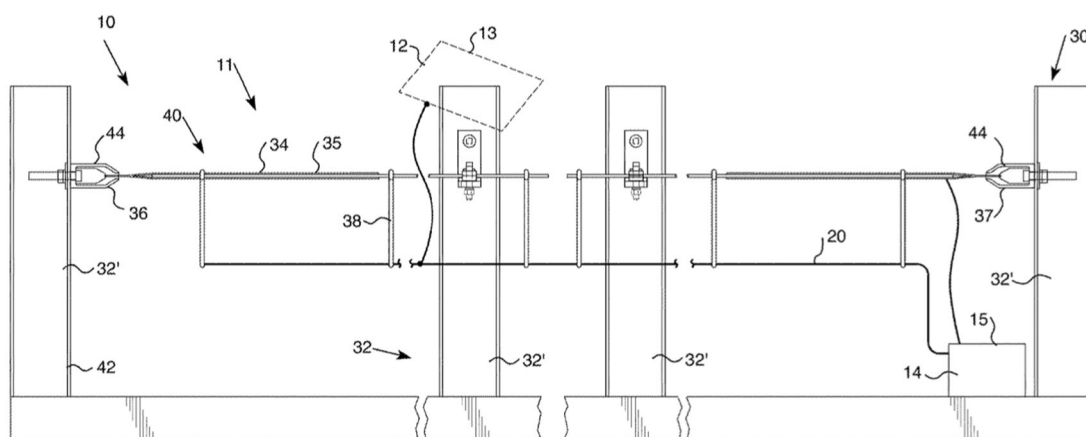


FIG. 1

'551 patent, Fig. 1.

57. The disclosed and claimed grounding system is structured to ground a number of cables supported by a support assembly. EX1001, 2:24-27; 12:12-23; 13:16-31. The grounding system includes a multi-function line assembly and a number of conductive mounting assemblies. *Id.*, 2:27-29; 12:15-20. Each conductive mounting assembly is coupled to the multi-function line and to a conductive pile. *Id.*, 2:29-31; 12:17-20.

58. The multi-function line acts as the grounding conductor, as discussed above in my tutorial section. It is an intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions. In the event of a ground fault, the multi-function line provides a path to ground for a current in the multi-function line assembly. *Id.*, 2:31-33. One such conductive path to ground is from the multi-function line, through the multi-function line couplings, mounting body and conductive piles. *See id.*, 10:8-15, 31-42; 12:11-29; 13:15-31. In this way, the multi-function line couplings define the conductive path as recited in the claims of the '551 patent. *See* EX1001, 12:24-29; 13:16-31. As discussed above in my tutorial section, the multi-function line also provides an effective ground fault current path. Further, the multi-function line supports the cable hangers (which support the current wires, data wires and other wires). *Id.*, 2:33-35. That is, a single multi-function line supports the cable hangers, as a messenger wire, and provides a current path, as a grounding

conductor. *Id.*, 2:35-37.

59. The ‘551 Patent provides technological solutions to various deficiencies in the prior art. As stated in the Field of the Invention section of the ‘551 Patent specification:

The disclosed and claimed concept relates to a grounding system for a suspended cable assembly and, more particularly, to a grounding system that includes conductive elements whereby grounding cables do not need to be spliced into a conductor wire disposed adjacent a messenger wire, and, to a system wherein a multi-function line provides support and a current path.

EX1001, 1:7-14.

60. As further discussed in the Background Information section of the ‘551 Patent specification:

While the messenger wire is not structured to carry a current, there are instances wherein the messenger wire does carry a current. For example, lightning is known to strike the messenger wires, the current wire(s), the solar electrical equipment, the support piles, or any other construct coupled to these elements. Further, a current wire, or any other wire carrying a current can fail creating a short or other undesirable current in the supported bundle of wires. This is why a conductor or grounding wire is disposed adjacent the messenger wires; hereinafter, such a wire is identified as a “grounding conductor.” The grounding conductor must be coupled to a current path to the ground. Further, many regulations require that the

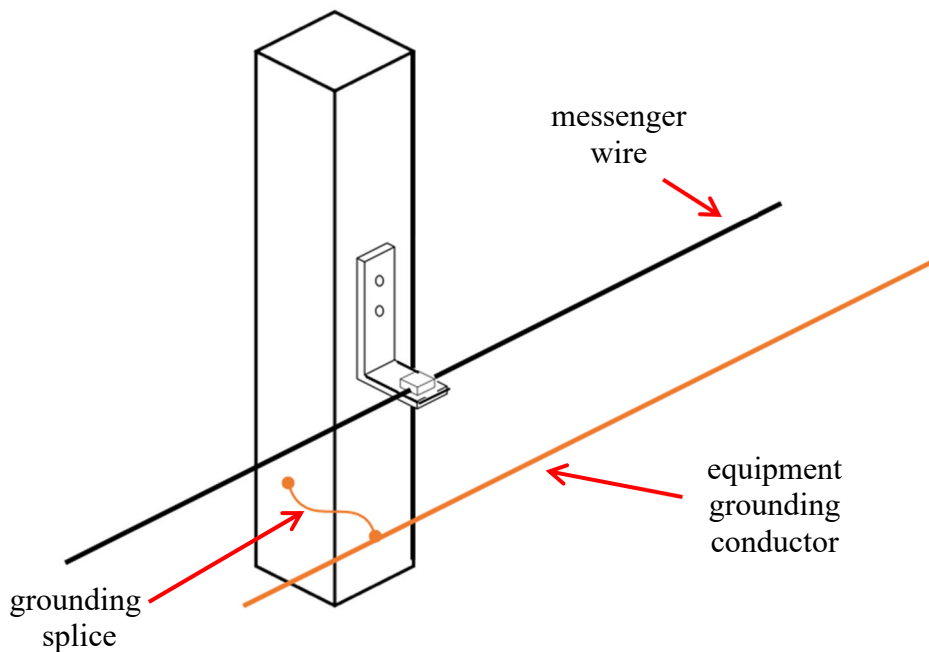
grounding conductor be grounded at each pile. Presently, the grounding conductor is grounded by splicing a conductor, such as, but not limited to, a copper wire into the grounding conductor and coupling the copper wire to a grounding cable or, if the piles are conductive, to each pile. That is, the copper wire must be spliced into the grounding conductor, i.e., a “grounding splice,” and, then electrically coupled to the pile or a ground cable. The process of installing the conductors, i.e., splicing the copper wire into the grounding conductor and making an electrical coupling with the pile is difficult, time consuming and expensive. These are problems of the known art.

Id., 1:60-2:16 (emphasis added).

61. In the context of a solar array as discussed in the specification, a POSITA would understand that the regulations referenced in the specification above would have included NEC Article 690.43, which requires that exposed non-current-carrying metal parts in a PV array must be grounded regardless of voltage, and regardless of whether any of the current-carrying conductors from the PV array are grounded. *See* EX1007, 587. In other words, as the specification explains, the grounding conductor, which a POSITA would understand in this context to be more specifically an equipment grounding conductor, was bonded to the conductive pile in the prior art by splicing, for example, a copper wire to the equipment grounding conductor and coupling the copper wire to each conductive

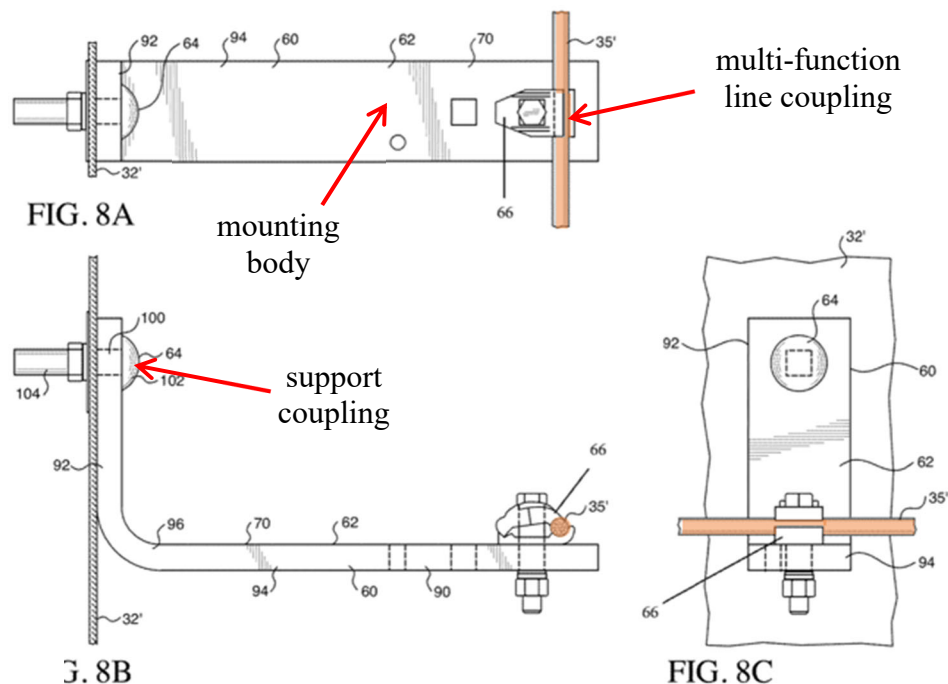
pile. Grounding in this manner provided a conductive path to ground from the equipment grounding conductor through the copper wire splice and conductive pile. As understood by a POSITA, this method of grounding would have also established an effective ground fault current path.

62. I have created the figure below to illustrate a grounding splice as described in the '551 patent specification, along with an equipment grounding conductor (EGC) adjacent to the messenger wire. The grounding splice is formed by splicing a copper wire into the EGC and coupling the copper wire to the conductive pile:



Grounding conductor disposed adjacent to the messenger wire

63. Unlike the arrangement shown above, the grounding system disclosed in the '551 patent provides a current path to ground without grounding splices between an equipment grounding conductor and each conductive pile. Here, the multi-function line coupling defines a current path to ground from the multi-function line, through the mounting body, support coupling, and a conductive pile. This defined current path replaces the current path provided by the grounding splices of the prior art.



EX1001, Figs. 8A-8C (annotated).

64. Since it is structured to provide a current path, the multi-function line and conductive mounting assembly, including the multi-function line couplings,

replace the separate grounding conductor and medial grounding splices used in the prior art. That is, a POSITA would appreciate after reading the disclosure of the '551 patent that the patent dispenses with the need for a dedicated equipment grounding conductor adjacent to the prior-art messenger wire. A POSITA would further appreciate that in order to effectively replace the prior art's usage of a separate equipment grounding conductor and copper splice, the multi-function line and conductive mounting assembly cannot simply be any metal cable. Rather, as the NEC requires, equipment grounding conductors must be certain structures and materials to provide for an effective ground fault current path. *See* EX1007, Article 250.118, 118. These structures and materials are sufficiently conductive to allow the multi-function line to serve as an equipment grounding conductor. Further, a POSITA would appreciate that the multi-function line couplings must be sufficiently conductive to allow them to define the current path to ground from the multi-function line through the multi-function line couplings and conductive pile. The multi-function line of the '551 patent thus performs the dual function of supporting the cable hangers, as a messenger wire, and providing a current path, as a grounding conductor. *See id.*, 2:35-37.

65. Contrary to Petitioner's assertion (Petition at 4, and unsupported by Dr. Beik), the novelty of the '551 invention is not limited to the claimed multi-function line. Rather, the novelty of the '551 patent is the claimed grounding

system as a whole, including the claimed multi-function line and multi-function line couplings that define the conductive path to ground.

VII. CLAIM INTERPRETATION – “MULTI-FUNCTION LINE”

66. It is my understanding that in order to properly evaluate the ’551 patent, the terms of any disputed claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term.

67. Citing EX1001, 2:37-40, Dr. Beik states at ¶69 that “[t]he ’551 Patent defines ‘multi-function line’ as a ‘tension member that supports current wires and/or cable hangers, and, which is conductive.’” Petitioner sets forth this same construction in the Petition. Petition, 23-24. Petitioner understands from this definition that “the multi-function line is something that is under tension, made of a material capable of conducting electricity (e.g. steel), and supports power lines or power line hangers.” *Id.*, 2-3. I disagree both with Petitioner’s proposed construction, and with what Petitioner understand its construction to mean.

68. Petitioner’s proposed construction, based on selective quotation of the specification language, cannot be the meaning of “multi-function line,” as it would

include messenger wires in the prior art that do not serve as grounding conductors. The '551 patent defines “messenger wire” as a “robust cable structured to support a number of other wires...and which is not structured to carry a signal or power.” EX1001, 1:24-28. The specification explicitly notes that a messenger wire as defined is not a “multi-function line.” *Id.*, 2:40-41, i.e., a messenger wire that only provides a support function, but is not sufficiently conductive to act as a grounding conductor for the system, is not a “multi-function line.” Furthermore, “a conductor that does not support other constructs is not a ‘multi-function line.’” *Id.*, 41-42.

69. A POSITA would recognize that an important feature of the claimed “multi-function line” is not merely that it is conductive, but that it is sufficiently conductive to serve as a grounding conductor for the claimed grounding system. In this way, the multi-function line not only “supports the cable hangers, as a messenger wire,” but also “provides a current path, as a grounding conductor.” EX1001, 2:35-37 (emphasis added). While a messenger wire that only supports cable hangers and other wires may carry a current in the event of a lightning strike, for example, that does not mean it can serve as a grounding conductor. *Id.*, 1:60-65. A separate grounding conductor, disposed adjacent to the messenger wire, would be required to ground the system. *Id.*, 1:67-2:3.

70. Dr. Beik’s and Petitioner’s proposed construction of “multi-function line” includes only the last sentence of the definitional language in the

specification, and ignores the additional definitional language that immediately precedes that last sentence. The relevant language of the specification is as follows:

The grounding system includes a multi-function line assembly and a number of conductive mounting assemblies. Each conductive mounting assembly is structured to be, and is, coupled to the multi-function line and to a conductive pile. This configuration provides a path to ground for a current in the multi-function line assembly. Further, the multi-function line supports the cable hangers (which support the current wires, data wires and other wires). That is, a single multi-function line supports the cable hangers, as a messenger wire, and provides a current path, as a grounding conductor. Accordingly, as used herein, a “multi-function line” means a tension member that supports current wires and/or cable hangers, and, which is conductive.

EX1001, 2:27-40 (emphases added).

71. Petitioner and Dr. Beik ignore in their proposed construction the language “Accordingly, as used herein” that begins the last sentence on which they base their proposed construction. “Accordingly, as used herein,” however, clearly incorporates the structure and two functions described in the immediately previous sentence, i.e., (i) supports cable hangers, as a messenger wire; and (ii) provides a current path, as a grounding conductor. *Id.*, 2:35-37. This is precisely how a POSITA would understand “multi-function line” in light of the specification.

72. Further, the '551 patent makes clear that the multi-function line is a “tension member.” The plain and ordinary meaning of “tension member,” as understood by a POSITA in light of the specification, would be a flexible, cable-like structure that can be stretched taut.

73. The '551 patent universally describes the claimed multi-function line in this way. The Background Information of the '551 patent begins by defining a “messenger wire” as “a robust cable.” *Id.*, 1:24-25. The Summary of Invention further states that “a single multi-function line supports the cable hangers, as a messenger wire, and provides a current path, as a grounding conductor.” *Id.*, 2:35-37 (emphasis added).

74. Further, the multi-function line is described throughout the '551 patent as “copper wire or a copper cable, i.e., copper wires twisted together or about a copper core” *Id.*, 8:60-62; “a cable that includes conductive strands and non-conductive strands” *Id.*, 9:6-8; and “strands...selected from the group consisting of: copper strands, copper-clad steel strands, galvanized steel strands, a conductive alloy strands, partially conductive, alloy strands, or are a composite of strands.” *Id.*, 9:12-16. And, as described above, the specification describes the multi-function line as being “drawn taut.” *Id.*, 7:17-23 (emphasis added). From reading the specification in its entirety, therefore, a POSITA would understand that a multi-function line consisting of a “tension member” is a flexible, cable-like

structure, i.e., a messenger wire, that can be drawn or stretched taut.

75. My review of the prosecution history further supports this understanding of a “tension member” by a POSITA. My understanding from reviewing the file history is that during prosecution, the Examiner issued a Final Office Action rejection of the grounding-system claims of the Application, determining that certain claims were anticipated under 35 U.S.C. §102(a)(2) over Korman (U.S. Patent Publication No. 2012/0024563), and that the remaining claims were obvious under 35 U.S.C. §103 over Korman in combination with other references. EX1037, 124-133. Applicant appealed to the Patent Trial and Appeal Board. As Applicant explained in its appeal brief, Korman discloses “a conductive frame assembly and solar panels that are coupled by, and in electrical communication via, male/female couplings.” *Id.*, 175. As Applicant further explained, Figs. 5-7 of Korman show solar panels being installed on Korman’s rigid frames. *Id.*, 175-176. In rejecting the claims, the Examiner identified pin 60 and the male/female plug-and-play connectors 42 and 43 as the “multi-function line assembly,” and pin 60 as the “multi-function line.” *Id.*, 178. Applicant argued, in relevant part, that the pin 60 is a rigid construct, and that the male/female plug-and-play connectors 42 and 43 are rigid elements, as well as the metallic rail 48 that forms the ground path. None of those rigid elements are a “cable or rope-like construct” that can be drawn taut. *Id.*, 178-180. Following the

submission of Applicant's appeal brief, the Examiner then allowed all claims, determining that the claim limitations were not taught or disclosed in the prior art. *Id.* 207-210. As such, a POSITA, reading the claims in light of the specification and prosecution history, would understand a "tension member" to be a flexible, cable-like structure, not a rigid structure.

76. Accordingly, in light of the claim language, together with the entirety of the specification and the prosecution history, a POSITA would understand the term "multi-function line" to mean "a tension member that supports current wires and/or cable hangers, as a messenger wire, and which provides a current path, as a grounding conductor."

VIII. DISCUSSION OF PROPOSED GROUNDS OF UNPATENTABILITY

77. I understand Petitioner has proposed five grounds of unpatentability, arguing that certain references, alone or in combination, render the claims of the '551 patent obvious. Citing the opinions of Dr. Beik (EX1002), Petitioner argues that:

- 1) Grushkowitz in view of the knowledge of a POSITA renders Claims 1-12, 18-19 obvious;
- 2) The CAB Website and CAB Whitepaper in view of the knowledge of a POSITA renders Claims 1-19 obvious;

- 3) Petersen in view of the knowledge of a POSITA renders Claims 1-19 obvious;
- 4) Petersen and MacLean in view of the knowledge of a POSITA renders Claims 13-17 obvious; and
- 5) The *CAB Website*, *CAB Whitepaper*, and *MacLean* in view of the knowledge of a POSITA renders Claims 13-17 obvious.

Petition, 24.

78. As described in detail below, I disagree with Dr. Beik that the inventions of the challenged claims would have been obvious in view of the identified prior art references, alone or in combination with the knowledge of a POSITA.

A. DESCRIPTION OF PRIOR ART REFERENCES

1. U.S. Patent No. 10,003,298 (“Grushkowitz”)

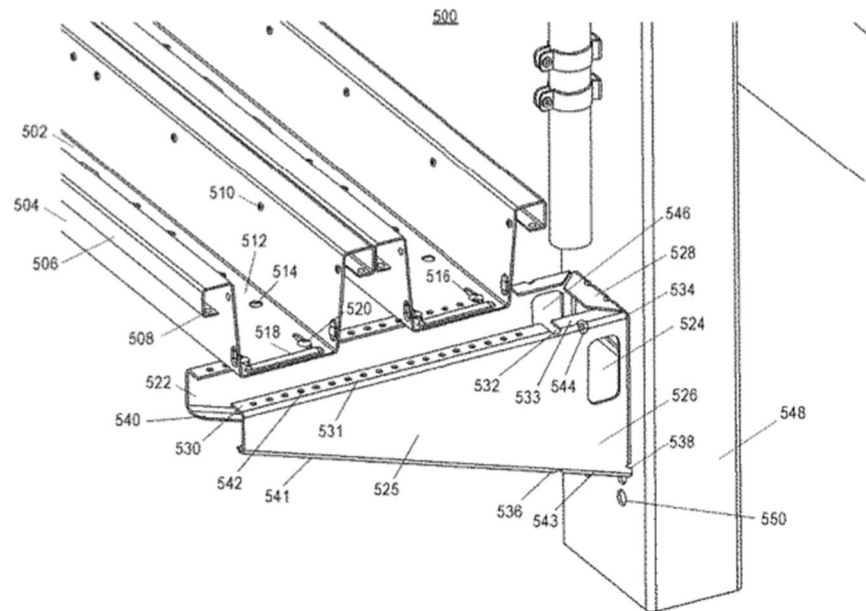
79. U.S. Patent No. 10,003,298 (“Grushkowitz”) issued on June 19, 2018, and is titled “Solar Collector Cable Support Tray and Support System.”

80. Grushkowitz is directed to a cable-tray and support system that “facilitates cable management in a solar energy collector system at reduced cost.” EX1003, Abstract. The cable tray and support system comprises cable trays, mounting brackets, and vertically-oriented piles. *Id.*

81. Grushkowitz discusses in the Background how “[l]arger solar

collector installations usually include an array of solar collector devices,” and that “[s]uch systems also include numerous cables for transferring electrical energy from the solar collectors to the utility grid and to transfer signaling instructions across the sun-tracking solar energy system.” *Id.*, 1:6-7, 28-31. Grushkowitz relies on the cable tray and other components of its system to facilitate cable management in a solar energy collector system. The cable tray and support system also provide a ground path “to dissipate transient voltages in the solar energy collection system.” *Id.*, Abstract.

82. A POSITA would recognize that, unlike the “tension member” of the ‘551 patent, the cable trays and other components of the Grushkowitz system are rigid structures. This system is depicted in Figure 5 of Grushkowitz as shown below:



EX1003, Fig. 5, showing two cable trays (one tray is labeled 502), a mounting bracket (522), and a vertically-oriented pile (548)

83. Grushkowitz's support system accommodates expansion and contraction of the cable trays without using flexible jumpers between cable trays and between cable trays and the vertically-oriented piles, as had been employed in the prior art. *Id.*, 7:3-27.

84. Such jumpers between cable trays would otherwise be required to electrically bond two cable trays, which are components having a sliding connection (e.g., at an expansion joint):

Under many regulations, the equipment ground connections between the various components of the cable tray 60 and its support system must be fixed connections (i.e., jumpers, immobile clamps, rivets, bolts, etc. and not sliding ground connections).

EX1003, 6:65-7:2.

85. Further, Grushkowitz’s mounting bracket can flex, and “provides for cantilevered deflection in response to thermal expansion or contraction in the cable trays 502.” EX1003 7:64-67. In this manner, Grushkowitz provides a cable tray and support system with fixed connections that “provides a continuous (i.e., not sliding) electrical grounding path from the cable trays 502 to the vertically-oriented pile 548 the mounting bracket 522 without using jumpers.” EX1003 7:67-8:38.

2. CAB Website

86. The CAB Website, EX1005, is the printout of a webpage titled “CAB Cable Rings and Saddles for Solar Cable Management,” which Petitioner states was accessible at <http://www.cabproducts.com/cable-rings-solar/> at least as early as February 4, 2015.

87. The CAB Website showcases the benefits of “CAB Cable Rings and Saddles” including: “strong and durable cable support,” “Quick and Easy Installation,” “strength and corrosion resistance,” as well as a flame-retardant PVC coating for high dielectric strength, abrasion resistance, and grip. The CAB Website includes links to download product data, sales information, and whitepapers related to CAB Cable Rings and Saddles.

88. The CAB Website shows Rings and Saddles suspended from a

messenger wire that, as acknowledged by Dr. Beik at ¶¶113, 115, appears to be made of galvanized steel:



EX1005, 3, 4.

89. The CAB Website shows metal piles. EX1005, 5, 18. Bolted to the piles are clamps, which in turn clamp what appears to be a bare steel messenger wire. *Id.*



90. The CAB Website describes the messenger-supported system as “effectively operat[ing] as a mini cable tray system for a fraction of the cost of cable tray.” *Id.*, 5.

91. The CAB Website focuses on fittings (Rings and Saddles) suspended from a messenger wire in order to support electric cables in a solar array. It makes no reference to a grounding conductor or a grounding system. In fact, the CAB Website does not use the words “ground” or “grounding.” The CAB Website only discusses and depicts the messenger wire as supporting the Rings and Saddles.

92. The CAB Website emphasizes (1) the properties of CAB Rings and Saddles themselves – their strength, safety, and coatings; (2) the value proposition of a messenger-wire supported system from the standpoint of material, installation, and maintenance costs; and (3) the acceptability of CAB Rings and Saddles for exposed cable management in view of NEC and industry installation standards.

93. These topics reflect the marketing challenge for CAB Rings and Saddles *circa* 2015, namely whether an exposed cable-management solution using an above-ground messenger suspended cable management system would be competitive with buried cables or cables placed in cable trays in solar power plants, or would be accepted by the solar power industry at large in light of NEC requirements. EX1005, 3-4. These marketing challenges are addressed in the CAB Whitepaper.

3. CAB Whitepaper

94. The “CAB Whitepaper,” titled “Cable Management in Solar PV Arrays: A Review of Requirements in the National Electrical Code and how CAB

Cable Rings and Saddles Meet These Requirements,” was expressly prepared for CAB by Brooks Engineering and bears the date September 18, 2014 (Version 1.3). EX1006. Petitioner alleges it is the same document linked in the CAB Website, EX1005, 4-5. Petition, 26. Additionally, Petitioner states that the CAB Website was accessible at <http://www.cabproducts.com/cable-rings-solar/> at least as early as February 4, 2015. *Id.*

95. The CAB Whitepaper picks up on the marketing challenges of using CAB’s above-ground messenger suspended cable management system in a PV system. It specifically addresses concerns in the industry with such a system being able to comply with any applicable NEC requirements. While it refers to components of the cable management system being grounded, it is not directed to, nor discloses, any kind of grounding system, including the use of grounding conductors.

96. The CAB Whitepaper “lay[s] out the basic requirements found in the 2014 NEC and relate[s] those requirements to Cable Rings and Saddles manufactured by the company CAB that are relevant to the NEC requirements and industry standard installation practices.” EX1006, 7. The CAB Whitepaper addresses developments in NEC regulations regarding cable management in PV arrays, including the spacing between cable supports (*Id.*, 11), bundling of current-carrying cables in different partitions of a support (*Id.*, 12-13), and ampacity of

exposed cables. *Id.*, 16.

97. Specific to the requirements that system components be grounded and bonded, the CAB Whitepaper addresses whether the CAB rings and saddles need to be individually bonded (e.g., to the “grounded steel messenger wire” that supports them). The conclusion of the CAB Whitepaper is that CAB Rings and Saddles are properly classified as “fittings,” and as such may be installed without a listing for bonding and grounding:

Some AHJs [Authority Having Jurisdiction] may request that exposed metal rings and saddles be evaluated for bonding, but this is not well substantiated in the NEC, nor is there a UL standard for evaluating such equipment. As an example, metallic cable staples for NM cable are not required to be bonded. The NEC simply states in Article 334.30 that, “Nonmetallic-sheathed cable shall be supported and secured by staples, cable ties, straps, hangers, or similar fittings designed and installed so as not to damage the cable...” Clearly, damage to the cable is the issue. Given this line of reasoning, a cable hanger or similar fitting such as CAB Cable Rings and Saddles could be installed without a listing for bonding and grounding. In Figure 5, the hangers are actually in full contact with a grounded steel messenger wire. It could be argued that even if the conductor insulation were ever to be damaged, the cable rings and saddles would stay at or near ground potential.

EX1006, 14 (emphasis added).

98. While concluding that CAB’s Rings and Saddles comply with NEC requirements, the CAB Whitepaper notes that “[u]ltimately, the AHJ must approve any equipment used in a PV installation under their purview,” and may require additional measures so that Rings and Saddles are not likely to become energized:

If an AHJ will not accept cable rings and saddles as being designed to prevent damage to the cable, a simple way to resolve the need for bonding this product is to coat the product with a durable non-conductive coating so that the metal of the rings and saddles never comes in contact with the cable.

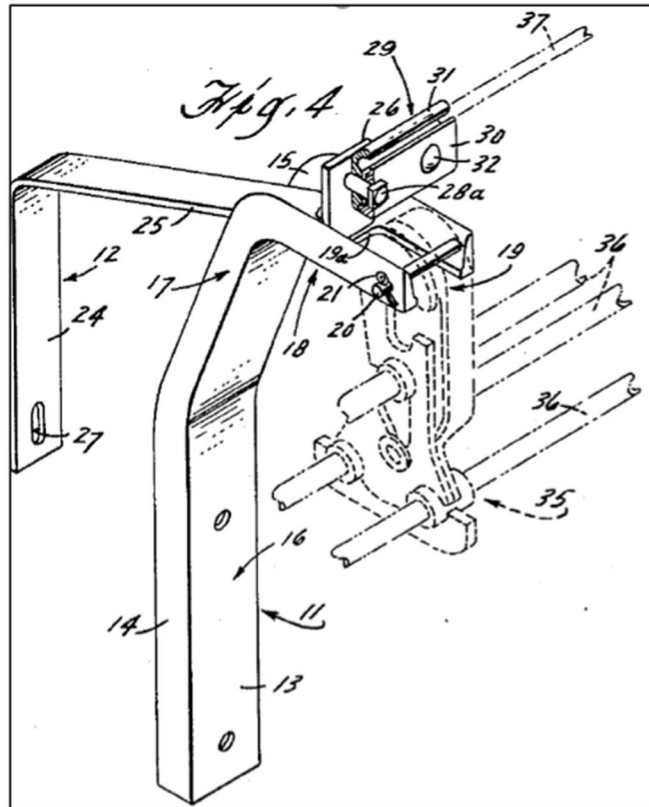
Id. at 14-15.

4. U.S. Patent No. 3,001,749 (“Petersen”)

99. U.S. Patent No. 3,001,749 (“Petersen”) issued on September 26, 1961 and is titled “Pole Top Extension for Aerial Cable.”

100. Petersen generally relates to pole top extensions for aerial cables (conductors), and specifically to a horizontally offset extension specially adapted to be attached to the top of a wooden utility pole. EX1004, 1:9-21. This type of pole-top extension addresses a need *circa* 1961 to obviate the use of crossarms in aerial cable suspension systems. *Id.*, 1:13-15.

101. Petersen’s pole top extension bracket includes two pieces: a channel support means (item 11, below), and a brace member (item 12) below.



EX1006, Fig. 4; 1:50-55. In use, Petersen's pole-top extension bracket supports an insulating aerial cable holder, shown holding three conductors in Petersen's Fig. 4, above. *Id.*, 2:41-47.

102. Petersen discloses that brace means 12 is formed of a strap material and is surmounted by a vertical extending end portion 26 “for supportingly engaging [a] neutral messenger cable.” *Id.*, 2:1-8. Attached to the vertical extending portion are “two clamping jaw members” that keep the neutral messenger wire in place:

Attached in aperture 28 in portion 26 of the brace member 12 is a ground clamp means 29 which is fixedly mounted by a bolt 28a. The

ground wire clamp means comprises two clamping jaw members 30 and 31 which upon tightening of suitable bolts 32 confine and keep a neutral messenger cable 37 in tight supported engagement therewith.

Id., 2:34-40.

103. In addition, Petersen’s claims recite a “neutral messenger wire clamp means” (*Id.*, 3:33-34) and a “neutral messenger wire support” (*Id.*, 4:6-7).

5. MacLean

104. MacLean Power Systems’ “Pole Line Hardware Catalog” (“MacLean”) states that “[t]his catalog section includes our standard line of Pole Line Hardware – those items commonly used by electric and telephone utilities and CATV systems.” EX1027 at 1. MacLean bears the “issue date” May 2010 on most of its pages. *Id.*, 2-139.

105. In its “bolts” section, MacLean discloses a thimble-eye bolt, made of galvanized steel, that “provides an excellent attachment point to deadened or guy messenger wire, guy strand or formed wire grips” EX1027, 14.

B. RESPONSE TO ASSERTED INVALIDITY GROUNDS 1-5 UNDER 35 U.S.C. §103

106. Below I provide the language of independent Claims 1 and 19 of the ‘551 Patent:

1. A grounding system structured to ground a number of cables supported by a support assembly, said support assembly including a plurality of spaced, conductive piles, said grounding system

comprising:

a multi-function line assembly including a multi-function line;
a number of conductive mounting assemblies, each said
conductive mounting assembly structured to be coupled to said multi-
function line and to a conductive pile; and

wherein said multi-function line assembly is coupled to, and in
electrical communication with, said number of conductive mounting
assemblies.

* * * *

19. A mounting assembly for a grounding system structured to
ground a number of cables supported by a support assembly, said
support assembly including a plurality of spaced, conductive piles,
said grounding system including a multi-function line assembly with a
multi-function line, said mounting assembly comprising:

a mounting body, a support coupling, and a number of multi-
function line couplings;

each said multi-function line couplings structured to be coupled
to said multi-function line;

each said support coupling structured to be coupled to a
conductive pile; and

wherein, when said multi-function line assembly is coupled to,
and in electrical communication with said multi-function line
couplings, each said multi-function line coupling defines a conductive
path.

EX1001, 12:11-23; 13:16-31.

1. GROUND 1 – Grushkowitz in View of the Knowledge of a POSITA Does Not Render Claims 1-12, 18-19 Obvious

107. In my opinion, Grushkowitz in view of the knowledge of a POSITA does not render obvious Claims 1-12, 18-19.

a. Independent Claim 1 and Dependent Claims 2-12, 18

108. According to Dr. Beik, who cites EX1001, 2:37-40, “[t]he ’551 patent defines ‘multi-function line’ as a ‘tension member that supports current wires and/or cable hangers, and, which is conductive.’” See ¶69. Dr. Beik states that this definition includes cable trays like those used in Grushkowitz’s system, since Grushkowitz’s trays are (1) metal, hence “conductive;” and (2) are “subjected to tensile forces as a result of gravity and the weight of current wires supported thereon.” EX1002, ¶69.

109. Dr. Beik also says at ¶70 that he understands that wire clip 602 (which is “coupled to the rim 508 on cable tray 502” and which “may be used to support cables 604”) “would subject cable tray 502 to tensile forces.”

110. As I explain in more detail in Section VII, “Claim Interpretation – Multi-Function Line” above, Dr. Beik relies on an incomplete definition of “multi-function line” provided in the specification. When taking into account the additional definitional language in the specification that Dr. Beik ignores, it is clear the claimed multi-function line must be a tension member that supports the cable hangers, as a messenger wire, i.e., a robust cable, “as messenger wire” is defined

in the specification. *See* EX1001, 1:24-25, 2:35-40.

111. In addition to the fact that Grushkowitz does not disclose a “robust cable,” I disagree with Dr. Beik that, under any circumstances, a POSITA would understand Grushkowitz’s rigid cable tray structure to be a “multi-function line” that is a tension member as described in the ‘551 patent.

112. First, both parties agree that the term “tension member” should be part of the construction of “multi-function line.” Throughout the ‘551 patent specification, the “multi-function line,” *i.e.*, the “tension member,” is consistently described as a “cable” made from “strands.” *See* Section VII, “Claim Interpretation – Multi-Function Line” above. In addition, the Figures show the multi-function line/tension member as a cable.

113. Further, the ‘551 patent specification describes how the multi-function line is “draw[n]...taut” from its ends:

[A] “conductive terminal support” 44 is structured to couple a multi-function line 35 to a support, *draw the multi-function line 35 taut*, and provide a current path between the multi-function line 35 and the support.

EX1001, 7:19-23 (emphasis added). In other words, tensile forces are intentionally applied at both ends of the multi-function line in order to draw it taut and maximize its length.

114. Grushkowitz discloses a rigid frame structure that consists of interconnected metal components, including cable trays, brackets, and conductive piles, and Grushkowitz's support system is assembled with fasteners. Setting aside my disagreement with Dr. Beik's explanation and depiction of tensile forces on Grushkowitz's cable trays due to gravity,⁴ Grushkowitz nowhere describes its cable trays as being intentionally "tensioned," "drawn into tension," "strung," "pulled taut" or the like, in order to maximize its length and support functionality, as the '551 patent describes. *Compare, e.g.,* EX1001, 7:19-22 *with* EX1003, 7:56-59 ("The mounting bracket 522 . . . supports the weight of the cable trays 502 plus additional vertical loads."). Grushkowitz also nowhere discloses that its cable tray supports cable hangers as a messenger wire. EX1001, 2:35-36.

115. Further, symptomatic of Dr. Beik's mis-identification of a multi-function line, are deficiencies in his analysis of dependent claims of the '551 patent that include cable fittings and support hardware.

⁴ A POSITA would understand that when sagging under its own weight, the top portion of the cable tray (where Dr. Beik has labeled a "tensile force" in his annotated Figure 8A at ¶69) is compressed, not stretched.

116. Claim 7 of the '551 patent, for instance, recites:

The grounding system of claim 6 wherein each said multi-function line coupling includes one of a clam-shell assembly, a split bolt, a U-bolt, or a lay-in lug assembly.

EX1001, 12:41-43.

117. A “split bolt” is a bolt having a longitudinal channel cut in the shaft.

For example, a search of Amazon.com discloses many split bolts including the Morris Products 90324 Split Bolt Connector, shown below, and which is found at <https://www.amazon.com/Morris-Products-90324-Connector-Conductors/dp/B005GDFR54/>



118. A split bolt is structured to affix one or more cables. The '551 patent specification explains:

As used herein, a ‘split bolt’ includes a threaded rod including a passage and a threaded passage, passage, and/or a nut. As is known, and as shown in Figure 6B, a *cable*, such as multi-function line 35 is

passed through the rod passage and the threaded rod is drawn against the passage by tightening the nut.

EX1001, 10:56-61 (emphasis added).

119. Dr. Beik effectively vitiates the claim language, and defeats the Grushkowitz cable tray system, by maintaining that a split bolt, intended to secure cables, is just one of many fasteners capable of coupling Grushkowitz's tray and bracket, which has no cables. Dr. Beik states at ¶90:

Grushkowitz discloses that that fasteners 520 (multi-function line couplings) are not limited to nut and bolt assemblies (i.e. "fasteners 520 may be any of a rivet, nut and bolt, screw, etc." EX1003, 8:53-54), and can therefore be any assembly capable of coupling cable tray 502 to mounting bracket 522.

120. I disagree. In my opinion, a POSITA would not find it obvious to affix a tray and bracket together with a fastener, not mentioned in Grushkowitz, adapted to affix cables, also not mentioned in Grushkowitz, rather than with the nuts, bolts, or rivets that are mentioned in Grushkowitz and suitable for cable trays. Dr. Beik's tortured treatment of dependent Claim 7 of the '551 patent provides further support for my opinion that he has mis-identified the multi-function line at the outset in Claim 1, and is simply an effort to use hindsight reconstruction to invalidate the claim.

121. I also note that the issue of whether a rigid structure, such as a cable tray, is a “multi-function line” was already considered and ultimately resolved by the Examiner during prosecution.

122. It is my understanding from reviewing the prosecution history that, in the then-pending application, Claims 1-5, 8-11, 13 and 15 had been rejected under 35 U.S.C. § 102(a)(2) as anticipated by Korman. *See* EX1037, 144. Korman discloses a photovoltaic (PV) ac-module grounding system that includes a plurality of PV dc-voltage modules. Each PV dc-voltage module is integrated with a corresponding dc-ac micro-inverter to provide a corresponding PV ac-voltage module. Each PV ac-voltage module includes an ac-voltage plug and play connector that includes a dc ground conductor. *Id.*, 175.

123. Korman details how rigid metal frames, enclosures, and connector bodies in each module (like the inverter case 36, the plug and play connectors 42, 43, and the metallic grounding rail 48) form a grounding path since they are in electrical communication via plugs. *Id.*, 179, 180. The solar panels are shown being installed on Korman’s rigid frames below, where I have annotated a plug and play connector:

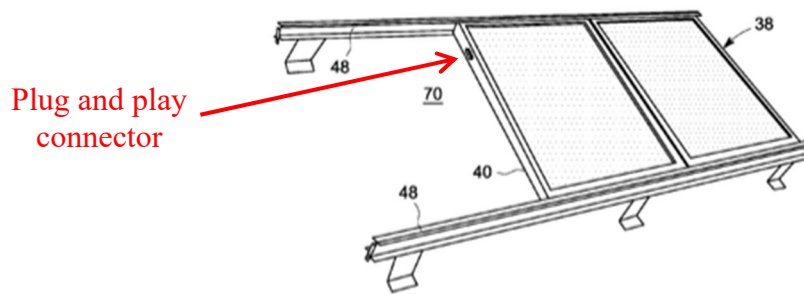


FIG. 5

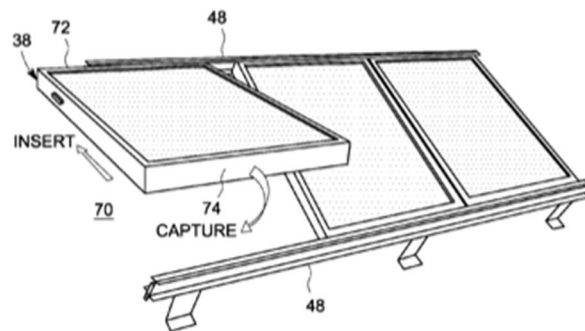


FIG. 6

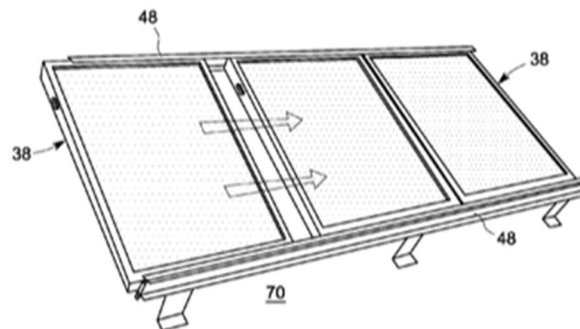


FIG. 7

Figs. 5-7 of Korman

See also EX1037, 175-176 (discussing Korman's disclosures).

124. In a final office action rejection, the Examiner rejected the pending claims as anticipated under §102(a)(2) over Korman, as well as obvious under §103 over Korman in view of other references. *Id.*, 125-133.

125. Patent Owner appealed to the USPTO Patent Trial and Appeal Board.

In its Brief on Appeal, Patent Owner argued that:

As Korman does not disclose a tension member, Korman cannot disclose a “multi-function line” as defined in the present application. Further, for the Examiner to assert that the rigid elements disclosed in Korman anticipate a “multi-function line” means that the Examiner is either ignoring the special definition or is interpreting the term in an overly broad manner.

Id., 181.

126. It is further my understanding that after Patent Owner submitted its appeal brief, the Examiner reversed course, and issued a Notice of Allowance of the claims. Accordingly, Patent Owner overcame the §102(a)(2) rejection over Korman, as well as §103 rejections over Korman in view of other references. *Id.*, 207-211.

127. In my opinion, the fact that Patent Owner prevailed in its Brief on Appeal is directly pertinent to Ground 1 of the present Petition. In fact, the Examiner ultimately rejected the very kind of arguments that Dr. Beik and Petitioner assert here – that a rigid structure, such as Grushkowitz’s rigid cable tray assembly, can be a tension member that satisfies the “multi-function line” limitation of the claims. Specifically, neither the cable tray, brackets, or any other support structure are a cable or rope-like construct. Rather, each of these elements is described in Grushkowitz as rigid constructs. Dr. Beik identifies no other

element in Grushkowitz that he opines is a tension member or multi-function line as described and claimed in the ‘551 patent.

128. Finally, Petitioner attempts to skirt the issues I have outlined above by applying labels to Grushkowitz that are arbitrary and incorrect. The Petition states that “Grushkowitz discloses a support and grounding system that comprises a *cable tray multi-function line*.” See Petition, 12 (emphasis added). Nowhere does Grushkowitz characterize its cable tray as a “multi-function line.” And a POSITA would not recognize Petitioner’s phrase (“cable tray multi-function line,”) much less describe a cable tray as a “line” or “tension member” for the reasons I have described above.

129. For all of these reasons, it is my opinion that Grushkowitz does not disclose or teach a “multi-function line,” and a POSITA would not recognize Grushkowitz’s metal cable tray support system as a “multi-function line” as that term is defined in the ‘551 Patent.

130. Finally, only at the end of his obviousness analysis of the “multi-function line assembly including a multi-function line” limitation does Dr. Beik make a conclusory statement that “[a]ccordingly, Grushkowitz alone, or in view of the knowledge of a POSITA at the time of the alleged invention discloses or renders obvious ‘a multi-function line assembly including a multi-function line.’” EX1002, ¶70. Dr. Beik proposes no modification of Grushkowitz, including

modifying its support system to replace its cable trays with a tension member that supports cable hangers as a messenger wire, let alone any explanation of any kind of why a POSITA would be motivated to modify Grushkowitz in any manner, or with any reasonable expectation of success in achieving the invention of the '551 patent. It is my understanding that such non-specific, unsupported and conclusory statements are insufficient to demonstrate obviousness.

131. Accordingly, in my opinion, Grushkowitz does not disclose or render obvious the claim limitation “a multi-function line assembly including a multi-function line,” as claimed in independent claim 1 and dependent claims 2-12 and 18 of the '551 patent.

132. Claim 1 further recites “a number of conductive mounting assemblies, each said conductive mounting assembly *structured to* be coupled to said multi-function line. . . .”

133. The specification of the '551 patent specially defines what “structured to” followed by a verb means:

As used herein, “structured to [verb]” means that the identified element or assembly has a structure that is shaped, sized, disposed, coupled and/or configured to perform the identified verb. . . . Further, as used herein, “structured to [verb]” means that the identified element or assembly *is intended to, and is designed to, perform the identified verb*. Thus, an element that is merely capable of performing the identified verb but which is not intended to, and is not designed to,

perform the identified verb is not “structured to [verb].”

EX1001, 3:36-50 (emphasis added).

134. Each of the conductive mounting assemblies, therefore, is “structured to be coupled to said multi-function line,” i.e., is intended to and designed to be coupled to the multi-function line.

135. Dr. Beik, at ¶71, appears to point to Grushkowitz’s disclosure of “fixing a cable tray to a mounting bracket made of conductive materials” as satisfying the claim limitation “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line.”

136. Because Grushkowitz does not disclose or suggest a multi-function line, however, it follows that these structures that Dr. Beik identifies in Grushkowitz cannot satisfy this claim limitation, since those structures are not intended to or designed to be coupled to a multi-function line.

137. Accordingly, it is my opinion that Grushkowitz does not disclose the claim limitation “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line.”

138. Further, because Grushkowitz fails to disclose or render obvious “a multi-function line assembly including a multi-function line,” or “a number of

conductive mounting assemblies, each said conductive mounting assembly coupled to be coupled to said multi-function line,” it further fails to disclose or render obvious the last limitation of claim 1 that recites “said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies.”

139. Because each of dependent claims 2-12 and 18 depend from claim 1 (and each requires the “multi-function line assembly including a multi-function line” and “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line,” and “said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies” limitations), it is equally my opinion that, for at least these reasons, Grushkowitz does not disclose or render obvious these dependent claims.

b. Independent Claim 19

140. Independent Claim 19 recites, in addition to other limitations, “A mounting assembly for a grounding system . . . , said grounding system including a multi-function line assembly with a multi-function line,” “a number of multi-function line couplings,” and “each said multi-function line couplings structured to be coupled to said multi-function line,” and “wherein, when said multi-function line assembly is coupled to, and in electrical communication with said multi-

function line couplings, each said multi-function line coupling defines a conductive path.” EX1001, 13:22-25.

141. For the reasons stated above, Grushkowitz fails to disclose or render obvious the “multi-function line assembly with a multi-function line” limitation. Accordingly, Petersen fails to disclose or render obvious a mounting assembly for a grounding system that includes a multi-function line assembly with a multi-function line.

142. Dr. Beik, at ¶104, identifies Grushkowitz’s cable tray fasteners “designed to couple the cable tray to the mounting bracket” as satisfying the “a number of multi-function line couplings,” “each said multi-function line couplings structured to be coupled to said multi-function line,” claim limitations. For the reasons stated above, however, Grushkowitz’s cable trays do not disclose a “multi-function line assembly including a multi-function line.” Accordingly, it follows that Grushkowitz’s cable tray fasteners fail to disclose or render obvious multi-function line couplings structured to (i.e., designed to or intended to) be coupled to a multi-function line.

143. For the reasons stated above, Grushkowitz fails to disclose or render obvious a multi-function line assembly or multi-function line couplings. Accordingly, it follows that Grushkowitz fails to disclose or render obvious the limitation “wherein, when said multi-function line assembly is coupled to, and in

electrical communication with said multi-function line couplings, each said multi-function line coupling defines a conductive path.”

144. Further, Dr. Beik once again provides no support for his assertion in ¶¶102, 104 and 106 that Grushkowitz alone, or in view of the knowledge of a POSITA, renders these limitations of claim 19 obvious. Dr. Beik again proposes no modification of Grushkowitz or any explanation why a POSITA would be motivated to modify Grushkowitz. Nor does he offer any support that any modification of Grushkowitz could be made with any reasonable expectation of success in achieving the invention of the ’551 patent.

145. Accordingly, it is also my opinion that, for at least these reasons, Grushkowitz neither discloses nor renders obvious these limitations of claim 19.

2. GROUND 2 – CAB WEBSITE and CAB WHITEPAPER in View of the Knowledge of a POSITA Do Not Render Claims 1-19 Obvious

146. In my opinion, the CAB Website and CAB Whitepaper in view of the knowledge of a POSITA do not render obvious Claims 1-19.

a. Independent Claim 1 and Dependent Claims 2-18

147. At the outset, Dr. Beik argues in ¶168 that a POSITA at the time of the invention would have been motivated to combine the teachings of the CAB Website and CAB Whitepaper, “because both references are concerned with the same subject matter (cable management stems for solar arrays), discuss the same

company's products, and because the CAB Website expressly references by name and date, excerpts from, and encourages CAB Website visitors to download the CAB Whitepaper. . . ." *See also* Petition, 47.

148. I understand Dr. Beik to be saying that a POSITA would have been motivated to combine these references because they relate to the same subject matter, and that the CAB Website would have encouraged visitors to the website to read the CAB Whitepaper.

149. It is my understanding that a motivation to combine does not arise simply because the references are in the same field of art. Rather, it is necessary to show with specificity why the POSITA would have been motivated to combine the references in a way that would achieve the claimed invention. Dr. Beik offers no such opinion.

150. Similarly, Dr. Beik opines at ¶169 that a POSITA "would have a reasonable expectation of success in combining the teachings of the two references because both references are discussing the same cable management systems and corresponding components." Dr. Beik goes on to state that the CAB Website depicts and describes the parts of the CAB system, and that a POSITA "would be encouraged to check the details of the parts and to ensure that CAB products satisfy NEC codes." *See also* Petition, 47-48.

151. My understanding of the reasonable expectation of success requirement is that it is not satisfied by simply showing that the POSITA would have had a reasonable expectation of success in combining the references because they are discussing the same system and components. Rather, it must be shown that the POSITA would have had a reasonable expectation of success in combining the references in a manner that would achieve the claimed invention. Again, Dr. Beik offers no such opinion. In addition, Dr. Beik's conclusory statements do not identify what CAB parts and details of parts would need to be checked to see if they complied with NEC requirements, nor does he even identify any applicable specific NEC requirements.

152. My understanding from reviewing the Petition and Dr. Beik's declaration is that, more than arguing a motivation to combine with a reasonable expectation of success, they are really arguing that each of the CAB Website and CAB Whitepaper discloses the claimed invention. Whenever Dr. Beik relies on the CAB Website in view of the CAB Whitepaper to disclose a particular limitation, he only relies on the CAB Whitepaper to elaborate with respect to a claim element that he had already stated that a POSITA would have understood was disclosed in the CAB Website. *See, e.g.*, ¶¶112, 116, 119, 120, 121. At no time does Dr. Beik purport to combine elements of the claim only disclosed in the CAB Whitepaper with elements only disclosed in the CAB Website.

CAB Website

153. Dr. Beik’s opinion that the CAB Website discloses the claimed grounding system of the ‘551 patent can be reduced to this: a metal messenger wire that supports current carrying cables and that is coupled to spaced metal piles with metal brackets achieves a grounding system “because all of the components are in contact with each other and are made of metal which is conductive.” ¶108.

154. Dr. Beik states at ¶59 that “the CAB Website discloses images depicting grounding systems structured to ground a number of cables supported by a support assembly comprising a multi-function line and mounting assemblies comprising multi-function line couplings.”

155. Throughout his element-by-element analysis, Dr. Beik relies on images included in the CAB Website that simply depict metal-to-metal connections. *See, e.g.,* ¶¶117, 120. Based on this identification of a conductive path resulting from metal parts connected to one another, Dr. Beik concludes at ¶108 that “[a] grounding system is achieved...because all of the components are in contact with each other and are made of metal which is conductive. Accordingly, the CAB Website discloses a grounding system structured to ground a number of cables supported by a support assembly.”

156. I disagree with Dr. Beik’s characterization of the CAB Website, which he says “includes information regarding various *grounding* and support

assemblies offered by CAB” (§58) and “discloses images depicting **grounding systems** structured to ground a number of cables . . . comprising a **multi-function line** and mounting assemblies comprising **multi-function line couplings**. . . .” §59 (emphases added).

157. Dr. Beik fails to offer any evidence to support his assertion that the CAB Website provides any information whatsoever about grounding assemblies or a multi-function line or multi-function line couplings. The page of the website on which Dr. Beik relies only offers information relating to a method of supporting electric cables using Rings and Saddles suspended from a messenger wire. It makes no reference whatsoever to the messenger wire also “provid[ing] a current path, **as a grounding conductor**” (EX1001, 2:37 (emphasis added)), in addition to supporting the Rings and Saddles.

158. Dr. Beik reads too much into the depiction of clamped and bolted connections to a bare messenger wire too conclude that a bare messenger wire constitutes the “multi-function line” and “multi-function line couplings” recited by the ‘551 patent. “Multi-function line” is a term coined by the inventors of the ‘551 patent. Contrary to Dr. Beik’s assertions (*see, e.g.*, §§59, 117), a messenger wire clamped to a metal pile, without more, does not inform a POSITA that the messenger wire provides support for electric cables **and** serves as a grounding conductor for the system so as to constitute a “multi-function line” as defined by

the patent.

159. In fact, as confirmed by the Background Information section of the ‘551 patent, a POSITA at the time of the invention would have understood that the messenger wire was not a grounding conductor. The Background explains that prior to the invention, a separate grounding conductor was disposed adjacent the messenger wire, and that the separate grounding conductor itself was grounded by splicing a conductor, such as a copper wire, into the grounding conductor and coupling the copper wire to a conductive pile. EX1001, 1:60-2:12. An objective of the ‘551 invention is to eliminate the need for the separate grounding conductor and grounding splices. As stated in the Field of the Invention section of the ‘551 Patent specification:

The disclosed and claimed concept relates to a grounding system for a suspended cable assembly and, more particularly, to a grounding system that includes conductive elements whereby grounding cables do not need to be spliced into a conductor wire disposed adjacent a messenger wire, and, to a system wherein a multi-function line provides support and a current path.

EX1001, 1:7-14.

160. Moreover, the ‘551 patent explicitly makes clear that a messenger wire as would have been understood by a POSITA at the time of the invention is not a “multi-function line” as defined by the patent. EX1001, 2:40-41.

161. While a POSITA would understand that a messenger wire would not act as a grounding conductor simply because it is clamped to other metal components, a POSITA would also understand that the messenger wire must be grounded^{ed}. NEC Article 396 mandates that a messenger be grounded as required for enclosures:

396.60 Grounding The messenger shall be grounded as required by 250.80 and 250.86 for enclosure grounding.

EX1007, 241.

162. A POSITA would understand that normally non-current carrying metal equipment such as a messenger wire cannot be left unbonded, with an undefined potential. Rather, the messenger wire must be connected together with other conductive metal equipment of the supporting structure. *See* EX1007, NEC Article 250.4(A)(2)-(4), at 99, which Dr. Beik references at ¶38:

(2) **Grounding of Electrical Equipment.** Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected to earth so as to limit the voltage to ground on these materials.

(3) **Bonding of Electrical Equipment.** Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

(4) **Bonding of Electrically Conductive Materials and Other Equipment.** Normally non-current-carrying electrically conductive materials that are likely to become energized shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

163. A POSITA would thus understand, that in accordance with NEC requirements, the messenger wire of a system as depicted in the CAB Website would be grounded^{ed}. Dr. Beik's further suggestion, however, that a POSITA at the time of the invention would also conclude that the messenger wire depicted in the CAB Website would also serve as the grounding^{ing} conductor (thus dispensing with a separate grounding^{ing} conductor adjacent the messenger wire), is both anachronistic and motivated by hindsight. Dr. Beik offers no evidence, and does not even inquire as to whether the messenger wire depicted in the CAB Website is made of the materials required by the NEC that would allow it to serve as an equipment grounding conductor. *See* EX1007, 118 (Article 250.118).

164. Stated another way, the most that a POSITA could glean from the CAB Website is that the messenger wire depicted on the website would be

grounded. The fact that a messenger must be grounded as part of the system, however, does not mean that it is itself a grounding conductor that provides a conductive path to ground as claimed in the ‘551 patent.

165. For all the above reasons, the fact that the CAB Website merely depicts a steel messenger wire mounted to a pile would not inform a POSITA at the time of the invention that the messenger wire served as an equipment grounding conductor in addition to its support function. Thus, it is my opinion that the CAB Website does not disclose or suggest the claimed grounding system, comprising “a multi-function line assembly including a multi-function line,” as claimed in the ‘551 patent.

CAB Whitepaper

166. As with the CAB Website, Dr. Beik states that the CAB Whitepaper discloses a multi-function line because it is a conductive steel tension member that supports current wires.

The messenger wire depicted in the CAB Website and CAB Whitepaper is metal. Specifically, it appears to be made from galvanized steel which is a material that conducts electrical current. The conductive messenger wire depicted in both the CAB Whitepaper and CAB Website is subject to tensile forces of gravity and the weight of the wires and/or cable hangers supported thereon. The ‘551 Patent defines a “multi-function line” as “a tension member that supports current wires and/or cable hangers” and “is conductive.” EX1001,

2:37-40.

EX1002, ¶115.

167. Relying on Dr. Beik’s opinion, the Petition asserts that the “grounded steel messenger – i.e., ‘multi-function line’” serves as a grounding conductor because it keeps cable rings and saddles “at or near ground potential.”

The CAB Whitepaper discloses that even if the insulation covering the current-carrying cable “were ever to be damaged, the cable rings and saddles [supporting the current-carrying cable] would stay at or near ground potential” due to the use of a **grounded** steel messenger wire—i.e., a “multi- function line.”

Petition, 20 (citing EX1006, 14) (emphasis added).

168. I disagree with Dr. Beik’s identification of a messenger wire in the CAB Whitepaper as a multi-function line, since he relies only on its properties as a conductive tension member.⁵

⁵ While I do not dispute that the messenger wire depicted in the CAB Whitepaper is a “tension member,” I disagree that it is a tension member for the reasons stated by Dr. Beik, i.e., that it “is subject to tensile forces of gravity and the weight of the wires and/or cable hangers supported thereon.” *See* Section VIII.B.1, ¶114, n. 4, above. Rather, the messenger wire is a tension member as used in the ‘551 patent because it can be drawn or stretched taut.

169. As I explain in more detail in the Section VII, “Claim Interpretation – Multi-Function Line” above, Dr. Beik relies on a definition of “multi-function line” that is incomplete and incorrect. Petitioner’s construction covers messenger wires that, while conductive because they are metal, do not “provide[] a current path, as a grounding conductor,” and thus cannot be the meaning of “multi-function line” as defined by the ’551 patent and understood by a POSITA at the time of the invention.

170. To the contrary, the specification explicitly states that a messenger wire, which is separately defined as “a robust cable structured to support a number of other wires . . . and which is not structured to carry a signal or power,” is not a “multi-function line.” EX1001, 1:24-28, 2:40-41 (emphasis added).

171. As with the CAB Website, I incorporate here my comments regarding other deficiencies in Dr. Beik’s analysis, particularly his lack of inquiry into the electrical properties of the messenger wire depicted on the CAB Website, or its serviceability as an equipment grounding conductor.

172. As stated above in my description of the CAB Whitepaper at ¶95 of this declaration, the CAB Whitepaper was directed to concerns in the industry of whether a cable management system in a PV array utilizing Rings and Saddles suspended from a messenger wire could comply with applicable NEC requirements. In no way does it purport to describe any kind of grounding system.

173. The reference in the CAB Whitepaper to the cable Rings and Saddles being held at or near ground potential in the event of damage to the insulation covering the current-carrying cables because the steel messenger wire is “grounded” in no way means that the steel messenger wire is grounding the system, as Dr. Beik, suggests. A POSITA would understand that messenger wires are included among such metallic support structures that themselves must be grounded. NEC Article 396 in fact requires that messenger wires be grounded as required for enclosures:

396.60 Grounding The messenger shall be grounded as required by 250.80 and 250.86 for enclosure grounding.

EX1007, 241. A POSITA would further understand that a normally non-current carrying metallic support structure such as a messenger wire cannot be left unbonded, with an undefined potential. Rather, the messenger wire must be connected (i.e., bonded) together with other normally non-current carrying materials of the supporting structure.

174. Statements in the CAB Whitepaper about Rings and Saddles being held near “ground potential” go to questions of safety of the Rings and Saddles, and whether they need to be listed for bonding and grounding in light of the fact that they are in full contact with a grounded steel messenger wire, i.e., even if the Rings and Saddles damage the insulation on current-carrying cables and become

energized, they remain at or near ground potential because the steel messenger wire to which they are connected is grounded. EX1006, 14. These are liminal questions related to the adoption of CAB Rings and Saddles in the solar industry at large. In no way does this suggest that a POSITA would have understood from this disclosure that the grounded steel messenger wire takes the place of using equipment grounding conductors and ground splices to ground the PV array system.

175. For all of these reasons, it is my opinion that the CAB Website and CAB Whitepaper, either separately or in combination with each other, fail to disclose or render obvious a “multi-function line” as defined in the ‘551 patent. Accordingly, the CAB Website and CAB Whitepaper, either separately or in combination with each other, fail to disclose a grounding system comprising “a multi-function line assembly including a multi-function line,” as claimed in independent claim 1 and dependent claims 2-18 of the ‘551 patent.

176. Claim 1 further recites “a number of conductive mounting assemblies, each said conductive mounting assembly *structured to* be coupled to said multi-function line. . . .”

177. As I explained above in Section VIII.B.1., given the ‘551 Patent’s definition of “structured to” in the specification (see EX1001, 3:36-50), each of the conductive mounting assemblies is intended to and designed to be coupled to the

multi-function line.

178. Dr. Beik, at ¶¶117-118, points to “metal mounting assemblies” depicted in the CAB Website and to “a nearly identical photo of a conductive mounting assembly” in the CAB Whitepaper, as disclosing the limitation “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line . . .” recited in claim 1.

179. Because the CAB Website and CAB Whitepaper, either separately or in combination with each other, fail to disclose or render obvious a “multi-function line” as recited and claimed in the ‘551 patent, it follows that these structures that Dr. Beik identifies in the CAB Website and CAB Whitepaper as the “conductive mounting assemblies” cannot satisfy this claim limitation, since those structures are not intended to or designed to be coupled to a multi-function line.

180. Accordingly, it is my opinion that the CAB Website and CAB Whitepaper, either separately or in combination with each other, do not disclose the claim limitation “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line.”

181. Further, because the CAB Website and CAB Whitepaper, either separately or in combination with each other, fail to disclose or render obvious “a

multi-function line assembly including a multi-function line,” or “a number of conductive mounting assemblies, each said conductive mounting assembly coupled to be coupled to said multi-function line,” they further fail to disclose or render obvious the last limitation of claim 1 that recites “said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies.”

182. Because each of dependent claims 2-18 depend from claim 1 (and each requires the “multi-function line assembly including a multi-function line” and “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line,” and “said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies” limitations), it is equally my opinion that, for at least these reasons, the CAB Website and CAB Whitepaper, either separately or in combination with each other, do not disclose or render obvious these dependent claims.

b. Independent Claim 19

183. Independent Claim 19 recites, in addition to other limitations, “A mounting assembly for a grounding system . . . , said grounding system including a multi-function line assembly with a multi-function line,” “a number of multi-function line couplings,” and “each said multi-function line couplings structured to

be coupled to said multi-function line,” and “wherein, when said multi-function line assembly is coupled to, and in electrical communication with said multi-function line couplings, each said multi-function line coupling defines a conductive path.” EX1001, 13:22-25.

184. For the reasons stated above, the CAB Website and CAB Whitepaper, separately or in combination with each other, fail to disclose or render obvious the “multi-function line assembly with a multi-function line” limitation. Accordingly, the CAB Website and CAB Whitepaper, separately or in combination with each other, fail to disclose or render obvious a mounting assembly for a grounding system that includes a multi-function line assembly with a multi-function line.

185. Dr. Beik, in ¶¶163-164, points to a coupling that couples the steel messenger wire to a vertical pile, as depicted in the CAB Website and CAB Whitepaper, as satisfying the “a number of multi-function line couplings,” “each said multi-function line couplings structured to be coupled to said multi-function line,” claim limitations. For the reasons stated above, however, the steel messenger cable depicted in the CAB Website and CAB Whitepaper does not disclose a “multi-function line assembly including a multi-function line.” Accordingly, it follows that the steel messenger cable depicted in the CAB Website and CAB Whitepaper fails to disclose or render obvious multi-function line couplings structured to (i.e., designed to or intended to) be coupled to a multi-

function line.

186. For the reasons stated above, the CAB Website and CAB Whitepaper, separately or in combination with each other, fail to disclose or render obvious a multi-function line assembly or multi-function line couplings. Accordingly, it follows that the CAB Website and CAB Whitepaper, separately or in combination with each other, fail to disclose or render obvious the limitation “wherein, when said multi-function line assembly is coupled to, and in electrical communication with said multi-function line couplings, each said multi-function line coupling defines a conductive path.”

187. Further, Dr. Beik once again provides no support for his assertion in ¶¶162, 164, 165 and 167 that the CAB Website and CAB Whitepaper, separately or in combination with each other, render this claim limitation obvious. Dr. Beik again provides no analysis as to why a POSITA would be motivated to combine or modify the CAB Website and CAB Whitepaper in a way that would achieve the claimed invention of the ‘551 patent, let alone how a POSITA would combine or modify these references with a reasonable expectation of success of doing so.

188. Accordingly, it is also my opinion that, for at least these reasons, the CAB Website and CAB Whitepaper, separately or in combination with each other, neither disclose nor render obvious these limitations of claim 19.

3. GROUND 3 – PETERSEN in View of the Knowledge of a POSITA Does Not Render Claims 1-19 Obvious

189. In my opinion, Petersen in view of the knowledge of a POSITA does not render obvious Claims 1-19.

a. Independent Claim 1 and Dependent Claims 2-18

190. At ¶170, Dr. Beik focuses on Petersen’s “ground clamp means” that supports and engages the neutral messenger cable. *See* EX1004, 2:1-8, 2:34-40. Dr. Beik says that “Petersen’s use of the term ‘ground clamp means’ *implies* to me that the neutral messenger and pole top extension are coupled with the clamp means in order to provide a ground-path for any stray electrical current.” ¶170 (emphasis added).

191. Citing EX1004 at 2:34-50, Dr. Beik at ¶57 also characterizes the clamp in Petersen as keeping “the neutral messenger wire in place and in a grounded electrical communication.”

192. Dr. Beik opines at ¶172 that Petersen renders obvious a support system including a plurality of spaced conductive piles, because of the advantages of conductive piles compared to Petersen’s wooden utility poles:

To the extent Petersen does not expressly disclose conductive piles, metallic and/or conductive materials were widely used in the industry for piles in electrical distribution systems around the time of Petersen’s invention because of their enhanced durability, and because metal piles weigh approximately 60% less than wood structures,

galvanized steel poles are easier and less expensive to handle and install. *See* EX1030.

193. At ¶173, Dr. Beik states that Petersen’s neutral messenger cable 37 is a tension/support member since it “subjected to tensile forces as a result of gravity and the weight current wires and/or cable hangers supported thereon.” He then identifies Petersen’s neutral messenger cable 37 at ¶174.

194. I disagree with Dr. Beik’s opinions.

195. Petersen neither discloses nor renders obvious any grounding system, let alone the claimed “grounding system” of the ‘551 patent that comprises the recited “multi-function line assembly including a multi-function line” limitation in independent Claim 1 and required by dependent Claims 2-18.

196. Petersen is directed to a two-piece pole-top mounting bracket, rather than a “grounding system.” Many of the features that Dr. Beik relies on to show a purported grounding system are not shown in Petersen. For instance, Petersen never shows a connection to ground of any cable or clamp. Petersen likewise shows no ground wire, or a conductor down the side of the wooden utility pole, to provide a conductive path to earth. Similarly, Petersen depicts aerial cables held by a spacer, and in turn supported by Petersen’s pole-top bracket, but does not show conductors supported by a messenger cable. *Id.*, Fig. 4, 2:41-47. There is insufficient disclosure in Petersen, therefore, to enable a POSITA to conclude that

it discloses a grounding system.

197. Dr. Beik’s entire opinion that Petersen discloses a grounding system in the first instance revolves around Petersen’s use of the term “ground clamp means” and what it “implies” to him. *See* ¶170. In my opinion, Dr. Beik’s reliance on that phrase ignores that the “ground clamp means” is used to “confine and keep a neutral messenger cable 37 in tight supported engagement therewith.” EX1004, 2:36-40 (emphasis added). I would note that in ¶57, Dr. Beik, citing this very same disclosure in Petersen, misstates that the “ground clamp means” is used to “keep the neutral messenger wire in place and in a grounded electrical communication.” Petersen says nothing about the neutral messenger being “in a grounded electrical communication,” and nowhere even uses that term.

198. Likewise, Petersen’s claims refer to this same clamp as a “neutral messenger wire clamp means” (*Id.*, 3:33-34) and a “neutral messenger wire support.” *Id.*, 4:6-7.

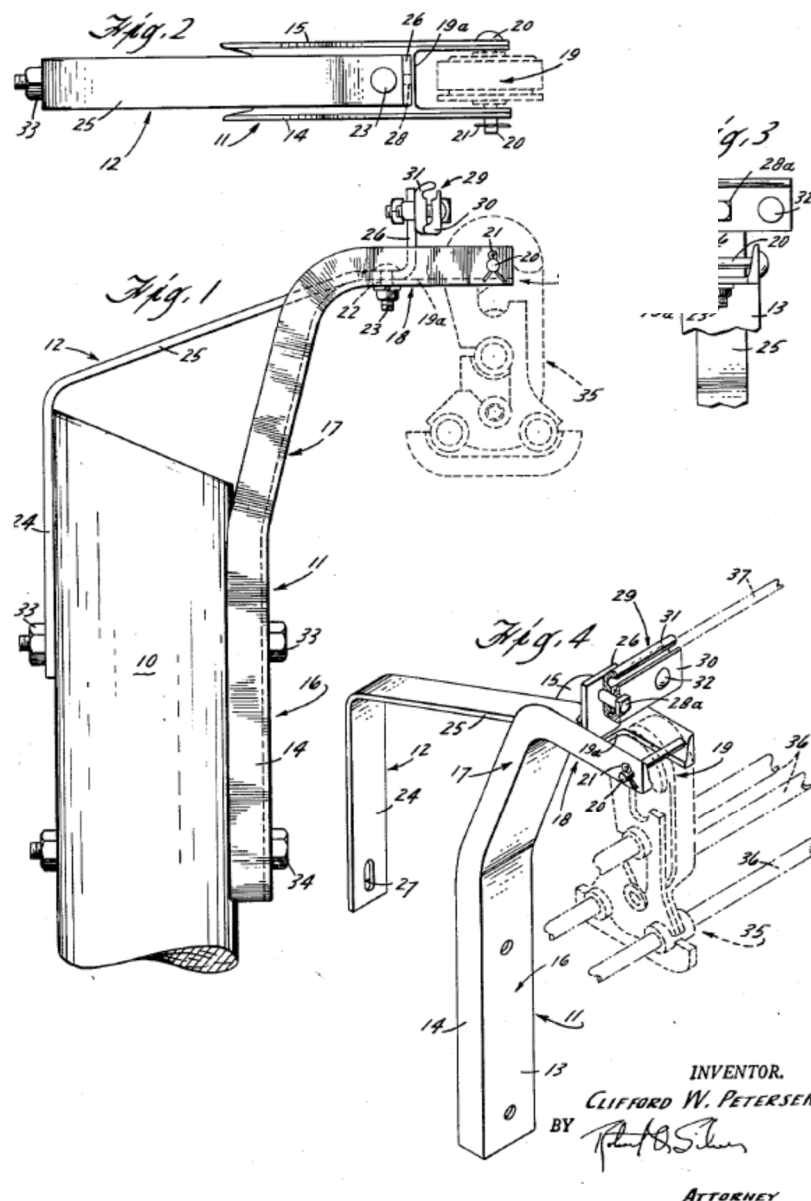
199. Petersen’s references to “neutral messenger cable” and “neutral messenger wire” are significant since a POSITA would understand that these terms refer to a neutral conductor (hence the name), not a grounding conductor. As I explain in my tutorial above, the neutral conductor carries the unbalanced current of the ungrounded conductors (the “hot” conductors or phases). As defined in the NEC, a “neutral conductor” is intended to carry current under normal conditions.

EX1007, 32 (Article 100). In addition, as defined in the NEC, an “equipment grounding conductor” connects “normally non-current carrying metal parts of equipment together” in order for those metal parts to be grounded. *Id.*, 31. A neutral conductor, therefore, cannot simultaneously serve as an equipment grounding conductor. In fact, the NEC calls “objectionable” any neutral current that returns on grounding and bonding paths when an improper neutral-to-case bond creates a parallel path for neutral current to return to the power supply. *See* EX1032, at 93; EX1007, Article 250.6(A), 250.6(C), at 101. Stated another way, the neutral carries current under normal conditions because it is part of the circuit that delivers power to loads. The EGC, on the other hand, is not intended to carry current under normal conditions (like the neutral is) since, unlike the neutral, it is *not* part of the circuit that delivers power to loads.

200. Not only does Petersen fail to disclose that its neutral messenger cable 37 acts as a grounding conductor, it also fails to disclose that its neutral messenger cable 37 supports current wires and/or cable hangers so as to satisfy the multi-function line limitation of the claim. Dr. Beik, ¶173, simply states that “neutral messenger cable 37 is subjected to tensile forces as a result of gravity and the weight [*sic*] current wires and/or cable hangers supported thereon, and accordingly that Petersen’s neutral messenger cable 37 is a tension/support member.” From this, Dr. Beik concludes in ¶174 that “Petersen’s neutral messenger cable 37 is a

multi-function line.”

201. Petersen makes no disclosure that neutral messenger cable 37 supports anything, let alone current wires and/or cable hangers. Specifically, Petersen’s disclosure of aerial cable holder 35 that is adapted to hold the three conductors 36 in spaced relation (EX1004, 2:41-47) is not supported on the neutral messenger cable 37, but rather attached to clevis 19.



Id., 1:62-64, 2:56-58; *see also* FIGS. 1, 2 and 4.

202. Dr. Beik’s conclusory assertion that current wires and/or cable hangers are supported on Petersen’s neutral messenger cable 37, therefore, and his characterization of neutral messenger cable 37 as a “support member,” is without any support in Petersen’s disclosure.

203. Petersen thus fails to disclose or render obvious the “multi-function line assembly including a multi-function line” limitation of the ‘551 patent claims.

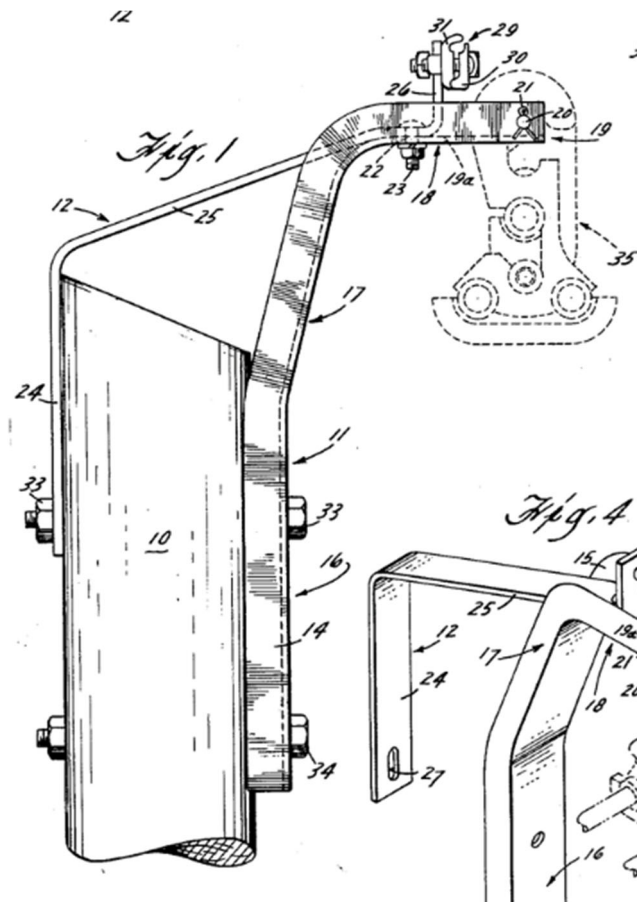
204. Claim 1 further recites “a number of conductive mounting assemblies, each said conductive mounting assembly *structured to* be coupled to said multi-function line and to a conductive pile.”

205. Given the ‘551 Patent’s definition of “structured to” in the specification (*see* EX1001, 3:36-50), as I explained above in Section VIII.B.1., each of the conductive mounting assemblies must be “structured to be coupled to said multi-function line,” i.e., is intended to and designed to be coupled to the multi-function line.

206. Dr. Beik, at ¶175, appears to point to Petersen’s pole top extension “comprised of ‘metallic parts’” as satisfying the claim limitation “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line. . . .”

207. Because Petersen does not disclose or suggest a multi-function line, however, it follows that Petersen's pole top extension cannot satisfy this claim limitation, since the pole top extension is not intended to or designed to be coupled to a multi-function line.

208. I also disagree with Dr. Beik's suggestion at ¶172 that "Petersen discloses or renders obvious a support system including a plurality of spaced conductive piles. Petersen consistently refers to the invention as an extension, or bracket, mounted on a "pole top" or "utility pole." EX1004, 1:2-10. Figure 1 of Petersen depicts the pole as wooden:



Id., Fig. 1; *see also id.*, 2:28-33. Wooden poles are not conductive. Petersen, therefore, clearly does not disclose a conductive pile.

209. Moreover, to support his suggestion that Petersen renders conductive piles obvious, Dr. Beik simply asserts in ¶172 that metal poles are cheaper and easier to install.” But Dr. Beik ignores that Petersen’s pole top extension is specially adapted to be affixed to the top of Petersen’s wooden pole. *See* EX1004, 1:50-55; *see also*, 2:28-33 (“Suitable through bolts 33 and 34 extend through the pole and fixedly attach the brace member and the channel support member to the pole”). Dr. Beik offers no explanation how a metal pole would work with Petersen’s pole top extension made specifically for a wooden pole, or what modifications would have been obvious to a POSITA to make to either the metal pole or pole top extension to make Petersen’s pole top extension compatible with a metal pole.

210. Accordingly, because Petersen does not disclose or suggest a conductive pile, it follows that Petersen’s pole top extension cannot satisfy the claim limitation that recites “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to . . . a conductive pile,” i.e., it is not intended to or designed to be coupled to a conductive pile.

211. Further, because Petersen fails to disclose or render obvious “a multi-function line assembly including a multi-function line,” or “a number of

conductive mounting assemblies, each said conductive mounting assembly coupled to be coupled to said multi-function line,” it further fails to disclose or render obvious the last limitation of claim 1 that recites “said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies.”

212. Because each of dependent claims 2-18 depend from Claim 1 (and each requires the “multi-function line assembly including a multi-function line,” “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line,” and “wherein said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies” limitations), it is equally my opinion that, for at least these reasons, Petersen does not disclose or render obvious these dependent claims.

b. Independent Claim 19

213. Independent Claim 19 recites, in addition to other limitations, “A mounting assembly for a grounding system . . . , said grounding system including a multi-function line assembly with a multi-function line,” “a support coupling,” “a number of multi-function line couplings,” “each said multi-function line couplings structured to be coupled to said multi-function line,” “each said support coupling structured to be coupled to a conductive pile,” and “wherein, when said multi-

function line assembly is coupled to, and in electrical communication with said multi-function line couplings, each said multi-function line coupling defines a conductive path.” EX1001, 13:22-25.

214. For the reasons stated above, Petersen fails to disclose or render obvious the “multi-function line assembly with a multi-function line” limitation. Accordingly, Petersen fails to disclose or render obvious a mounting assembly for a grounding system that includes a multi-function line assembly with a multi-function line.

215. Dr. Beik, in ¶211, identifies Petersen’s “clam-shell clamping assembly structured to couple the neutral messenger wire to the pole top extension” as satisfying the “a number of multi-function line couplings,” “each said multi-function line couplings structured to be coupled to said multi-function line,” claim limitations. For the reasons stated above, however, Petersen fails to disclose or render obvious a multi-function line assembly with a multi-function line. Accordingly, it follows that Petersen’s clam-shell clamping assembly fails to disclose or render obvious multi-function line couplings structured to (i.e., designed to or intended to) be coupled to a multi-function line.

216. Dr. Beik, in ¶212, identifies Petersen’s “[s]uitable through bolts 33 and 34 [which] extend through the pole and fixedly attach the brace member to the channel support member to the pole” as satisfying the “said support coupling

structured to be coupled to a conductive pile” limitation. For the reasons stated above, however, Petersen fails to disclose or render obvious a conductive pile. Accordingly, it follows that Petersen’s through bolts 33 and 34 fail to disclose or render obvious support couplings structured to (i.e., designed to or intended to) be coupled to a conductive pile.

217. For the reasons stated above, Petersen fails to disclose or render obvious a multi-function line assembly or multi-function line couplings. Accordingly, it follows that Petersen fails to disclose or render obvious the limitation “wherein, when said multi-function line assembly is coupled to, and in electrical communication with said multi-function line couplings, each said multi-function line coupling defies a conductive path.”

218. Further, Dr. Beik once again provides no support for his assertion in ¶211, 212 and 213 that Petersen alone, or in view of the knowledge of a POSITA, renders the limitations of claim 19 obvious. Dr. Beik again proposes no modification of Petersen or any explanation why a POSITA would be motivated to modify Petersen to achieve the invention of claim 19. Nor does he offer any support that any modification to Petersen could be made with any reasonable expectation of success in achieving the invention of the ’551 patent.

219. Accordingly, it is also my opinion that, for at least these reasons, Petersen neither discloses nor renders obvious these limitations of claim 19.

4. GROUND 4 – Petersen and MacLean in View of the Knowledge of a POSITA Do Not Render Claims 13-17 Obvious

220. In my opinion, Petersen and MacLean in view of the knowledge of a POSITA do not render Claims 13-17 obvious. Claim 13 depends from claim 12, which, in turn, depends from independent claim 1, and recites the additional limitation of a “conductive thimble eye” included in the grounding system claimed in claims 1 and 12.

221. Claim 12 depends from independent claim 1, and thus requires each of the limitations of independent claim 1, specifically, a “multi-function line assembly including a multi-function line,” “a number of conductive mounting assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line,” and “wherein said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies.” limitations),

222. As I have discussed above at Section VIII.B.3.a., Petersen does not render obvious independent claim 1, and for at least these reasons, does not render obvious dependent claim 12. For at least the same reasons, Petersen and MacLean in view of the knowledge of a POSITA do not render obvious claim 13, which depends from claim 12.

223. Claims 14-17, which depend from claim 13, recite additional limitations. Claim 14 recites the additional limitation to the claimed grounding system “wherein said multi-function line is structured to be operational with solar electrical equipment.” Claims 15 and 16 add limitations relating to the absence of grounding splices, and claim 17 adds limitations regarding the composition of the multi-function line.

224. Dr. Beik relies on MacLean solely for the disclosure of the “conductive thimble eye” limitation included in claims 14-17 by virtue of their dependency from claim 13. With respect to claim 13, Dr. Beik states at ¶¶214-215 that Petersen in view of MacLean discloses the “conductive thimble eye” limitation of claim 13, since “[a]ll messenger supports must be supported where the messenger support terminates in order to maintain the messenger in taught suspension so it can adequately support current carrying cable,” and thimble-eye terminal supports were known in the prior art “as a cost effective and simple way to terminate a messenger wire.” Dr. Beik further states his opinion at ¶216 that a POSITA would have been motivated to combine Petersen with MacLean for various reasons, including “because of the inherent need to provide a terminal support for a messenger wire support system.” At ¶¶219-221, Dr. Beik offers his analysis as to why a POSITA would have been motivated to combine Petersen’s system with MacLean’s thimble-eye terminal support to meet the “conductive

thimble-eye” limitation of claims 14-17.

225. Dr. Beik offers no such motivation to combine analysis, however, with respect to the other limitations of claims 14-17, including the limitation in claim 14 of the multi-function line being “structured to be operational with solar electrical equipment.” He simply states in conclusory fashion at ¶218, with no analysis whatsoever beyond the “conductive thimble-eye” limitation, that “claims 14-17 are disclosed by Peterson [*sic*], and therefore Peterson [*sic*] in view of MacLean and further in view of a POSITA’s knowledge renders them obvious.”

226. For these additional reasons, it is my opinion that Petersen and MacLean in view of a POSITA’s knowledge do not render obvious claims 14-17.

5. GROUND 5 – CAB WEBSITE, CAB WHITEPAPER, and MacLEAN in View of the Knowledge of a POSITA Do Not Render Claims 13-17 Obvious

227. In my opinion, CAB Website, CAB Whitepaper, and MacLean in view of the knowledge of a POSITA do not render Claims 13-17 obvious. Claim 13 depends from claim 12, which, in turn, depends from independent claim 1, and recites the additional limitation of a “conductive thimble eye” included in the grounding system claimed in claims 1 and 12.

228. Claim 12 depends from independent claim 1, and thus requires each of the limitations of independent claim 1, specifically, a “multi-function line assembly including a multi-function line,” “a number of conductive mounting

assemblies, each said conductive mounting assembly structured to be coupled to said multi-function line,” and “wherein said multi-function line assembly is coupled to, and in electrical communication with, said number of conductive mounting assemblies.” limitations).

229. As I have discussed above at Section VIII.B.2.a., CAB Website and CAB Whitepaper do not render obvious independent claim 1, and for at least these reasons, does not render obvious dependent claim 12. For at least the same reasons, CAB Website, CAB Whitepaper, and MacLean in view of the knowledge of a POSITA do not render obvious claim 13, which depends from claim 12.

230. Claims 14-17, which depend from claim 13, recite additional limitations. Claim 14 recites the additional limitation to the claimed grounding system “wherein said multi-function line is structured to be operational with solar electrical equipment.” Claims 15 and 16 add limitations relating to the absence of grounding splices, and claim 17 adds limitations regarding the composition of the multi-function line.

231. Dr. Beik relies on MacLean solely for the disclosure of the “conductive thimble eye” limitation included in claims 14-17 by virtue of their dependency from claim 13. With respect to claim 13, Dr. Beik states at ¶¶222-223 that CAB Website and CAB Whitepaper in view of MacLean disclose the “conductive thimble eye” limitation of claim 13, since “[a]ll messenger supports

must be supported where the messenger support terminates in order to maintain the messenger in taught suspension so it can adequately support current carrying cable,” and thimble-eye terminal supports were known in the prior art “as a cost effective and simple way to terminate a messenger wire.” Dr. Beik further states his opinion at ¶224 that a POSITA would have been motivated to combine CAB Website and CAB Whitepaper with MacLean for various reasons, including “because of the inherent need to provide a terminal support for a messenger wire support system.” At ¶¶229-231, Dr. Beik offers his analysis as to why a POSITA would have been motivated to combine CAB Website and CAB Whitepaper with MacLean’s thimble-eye terminal support to meet the “conductive thimble-eye” limitation of claims 14-17.

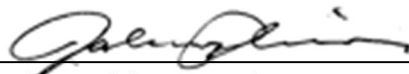
232. Dr. Beik offers no such motivation to combine analysis, however, with respect to the other limitations of claims 14-17, including the limitation in claim 14 of the multi-function line being “structured to be operational with solar electrical equipment.” He simply states in conclusory fashion at ¶228, with no analysis whatsoever beyond the “conductive thimble-eye” limitation, that “claims 14-17 are disclosed by the CAB Website and CAB Whitepaper, and therefore CAB Website and CAB Whitepaper in view of MacLean and further in view of a POSITA’s knowledge renders them obvious.”

233. For these additional reasons, it is my opinion that the CAB Website and CAB Whitepaper in view of MacLean and further in view of a POSITA's knowledge do not render obvious claims 14-17.

IX. CONCLUSION

234. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements made herein on 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 or imprisonment, or both, under Section 1001 or Title 18 of the United States Code.

Date: February 12, 2024



Joshua Phinney, Ph.D.

EXHIBIT A

Joshua W. Phinney, Ph.D., P.E.
Principal Engineer

Professional Profile

Dr. Joshua W. Phinney is a Principal Engineer in Exponent's Electrical Engineering and Computer Science practice. Dr. Phinney's background is in electrical and electronic engineering, particularly related to power electronics, electromagnetics, and electromechanics. His specialties include power supplies, radio-frequency electronics, control systems, printed circuits, integrated-circuit packaging, magnetics design, and power transmission and distribution. He has related experience in embedded software, acoustics, and numerical methods for optimization and simulation.

At Exponent, Dr. Phinney has assisted clients with identifying the root cause of failures in mobile electronic devices, industrial and automotive controllers, capacitors, transformers, amplifiers, and power supplies. He has testified in patent and trade secret litigation regarding computer hardware and software, audio circuitry, mobile telephones, tablets, power supplies, control systems, hard disk drives, and electronic instruments. In addition, Dr. Phinney has assisted clients with electromagnetic assessment issues pertaining to utility and communication infrastructure. These issues include permitting, interference, and environmental impact of radar, AC and HVDC transmission lines, substations, photovoltaic installations, generators, broadcast antennas, and electrified mass transit systems. In addition, Dr. Phinney has written software for data classification and machine learning in radar-return and other image-analysis applications.

Dr. Phinney received his Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology. His doctoral work centered on miniaturization of power converters and electromechanical power conversion. He has related experience in radio-frequency electronics (particularly phase-locked loops and RF amplifiers), network synthesis, system identification, and control. Dr. Phinney is the co-inventor on patents for improving the performance of capacitors, EMI filters, and common-mode chokes.

Academic Credentials and Professional Honors

Ph.D., Electrical Engineering, Massachusetts Institute of Technology, 2005
S.M., Electrical Engineering, Massachusetts Institute of Technology, 2001
B.S., Electrical Engineering, University of Illinois at Chicago (*summa cum laude*), 1999
B.A., Ancient and Classical Languages, Philosophy, Wheaton College, 1995

2004 IEEE Power Electronics Society Transactions Prize Paper Award (for the paper "Filters with Active Tuning for Power Applications"); 2003 William M. Pormoy Prize Paper Award (Awarded by the Power Electronics Devices and Components Committee of the IEEE Industry Applications Society)

Declaration of Joshua Phinney, Ph.D.

IPR2024-00139

Exhibit 2001

103 of 108

1993-1994 Lawrence Livermore National Laboratory, Nuclear Chemistry Division. Associated Western Universities internship: Neural-network classification of gamma-ray detector events.

Work History

2005-*present* Exponent, Inc.

Licenses and Certifications

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Languages

German

Patents

U.S. Patent No. 7,242,269: Filter Having Parasitic Inductance Cancellation, July 2007 (with D.J. Perreault and T.C. Neugebauer).

U.S. Patent No. 6,937,115: Filter Having Parasitic Inductance Cancellation, February 2002 (with D.J. Perreault and T.C. Neugebauer).

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Phinney JP, Perreault DJ, Lang JH. Synthesis of lumped transmission-line analogs. IEEE Transactions on Power Electronics 2007; 22(4):1531–1542.

Phinney JP, Perreault DJ, Lang JH. Radio-frequency inverters with transmission-line input networks. IEEE Transactions on Power Electronics 2007; 22(4):1154–1161.

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Academic Appointments

Declaration of Joshua Phinney, Ph.D.

Page 2
08/20

IPR2024-00139

Exhibit 2001

104 of 108



Adjunct Professor, Hofstra University, 2008-2018

Peer Reviewer

- IEEE Transactions on Power Electronics, 2013-2015
- Health Physics Journal, 2007
- IEEE Power Electronics Letters, 2006
- Power Electronics Specialists Conference, Recife, Brazil, 2005
- Power Electronics Specialists Conference, Jeju, Korea, 2006

Professional Affiliations

- Institute of Electrical and Electronic Engineers (member)
- Tau Beta Pi

Joshua W. Phinney, Ph.D., P.E.
Principal Engineer

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