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*** CONFIDENTIAL PROTECTIVE ORDER MATERIAL ***

Transcript of Edward C. Kern, Jr., Ph.D.

Date: October 1, 2024

Case: Affordable Wire Management, LLC -v- CCABH, Inc. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 AFFORDABLE WIRE MANAGEMENT, LLC,

6 Petitioner,

7 v.

8 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND

9 HANDICAPPED, INC.,

10 Patent Owner.

11
12 Case IPR2024-00178

13 Patent 11,349,291 B2

14
15 * CONFIDENTIAL PROTECTIVE ORDER MATERIAL *

16 Deposition of EDWARD C. KERN, JR., PH.D.

17 Boston, Massachusetts

18 Tuesday, October 1, 2024

19 9:38 a.m.

20 Job No.: 553477

21 Pages: 1 - 198

22 Reported By: Michelle Keegan, RMR, CRR, CSR

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1 Deposition of EDWARD C. KERN, JR., PH.D.,
2 held at the offices of:

3
4 MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND
5 POPEO, P.C.

6 One Financial Center
7 Boston, Massachusetts 02111
8 (617) 542-6000

9
10
11
12
13 Pursuant to notice, before Michelle
14 Keegan, Registered Merit Reporter and Notary
15 Public in and for the Commonwealth of
16 Massachusetts.

17
18
19
20
21
22
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A P P E A R A N C E S

ON BEHALF OF PETITIONER AFFORDABLE WIRE
MANAGEMENT, LLC:

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KEVIN C. AMENDT, ESQ.

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A P P E A R A N C E S (continued):

ON BEHALF OF PATENT OWNER CAMBRIA COUNTY

ASSOCIATION FOR THE BLIND AND HANDICAPPED, INC.:

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C O N T E N T S

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By Mr. Dixon	6

E X H I B I T S

(None marked.)

PREVIOUSLY MARKED EXHIBITS

(Not attached to transcript.)

Paper 17	98
Exhibit 1001	94
Exhibit 1003	120
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Exhibit 1005	136
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** Documents quoted on the record are transcribed
as read **

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P R O C E E D I N G S

EDWARD C. KERN, JR., PH.D.,

having been satisfactorily identified and duly
sworn by the Notary Public, was examined and
testified as follows:

EXAMINATION BY COUNSEL FOR

PETITIONER AFFORDABLE WIRE MANAGEMENT, LLC

BY MR. DIXON:

Q. Good morning, Dr. Kern. Thanks for taking
the time to sit down with me today.

I'll just go over some ground rules --

A. Sure.

Q. -- so that we can make this as efficient
and generate as clear a record as we can. Is that
fair?

A. Generate a clear record?

Q. Yes. Is that fair?

A. Yup.

Q. Do you understand that depositions are
taken in a question-and-answer format?

A. Yes.

Q. Do you understand that you're under oath

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1 today, as if you were testifying before a judge or
2 a jury?

3 A. I do.

4 Q. It is your -- it is important that you
5 testify truthfully and accurately to the best of
6 your ability. Do you understand?

7 A. Yes.

8 Q. Is there any reason, whether it be
9 medication or something else, that would prevent
10 you from testifying truthfully today?

11 A. No.

12 Q. At any time during the deposition, you can
13 take a break. I'd just ask that you let me finish
14 the pending question and provide an answer before
15 we take that break. Is that fair?

16 A. That's fair.

17 Q. If you don't understand or you don't hear
18 one of my questions, please feel free to let me
19 know and I'll either try and rephrase it or repeat
20 my question. So please feel free to just ask for
21 a clarification. Is that fair?

22 A. I certainly will.

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1 Q. Your counsel may object from time to time.
2 Do you understand that unless your counsel
3 instructs you not to answer, you are required to
4 give an answer?

5 A. Yes.

6 Q. Because your testimony is being recorded
7 today by a court reporter, I ask that you let me
8 finish my questions. And sometimes I might pause
9 in the middle of a question, so please just allow
10 sufficient time for me to finish my questions
11 before starting your answer. And that will also
12 allow time for your counsel to object. Is that
13 fair?

14 A. To let you finish and -- yes, certainly.
15 And let me have time to think.

16 Q. And related to that, can you please give
17 verbal answers, so try not to use head nodding and
18 stuff like that just so we have a clear record.

19 A. Yup.

20 Q. Have you been deposed before?

21 A. Yes.

22 Q. About how many times?

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1 A. Once.

2 Q. What type of matter did you get deposited
3 in?

4 A. A patent matter.

5 Q. Was the patent matter before the Patent
6 Trial and Appeal Board?

7 A. I think so, but this stuff is all pretty
8 new to me. I'm pretty sure it was. Yes.
9 But . . .

10 Q. Did you offer opinions regarding the
11 obviousness of a patent?

12 A. I don't recall. Let me finish. I don't
13 recall whether it was obviousness or anticipation.

14 Q. What is your understanding of the
15 difference between obviousness and anticipation?

16 A. Oh, gosh. Again, I am new at this, pretty
17 new at this, but the -- the sense I get is that
18 "anticipation" means that the invention disclosed
19 by the patent is entirely demonstrated -- I'm not
20 sure what the right word is -- by a single piece
21 of I guess what you call prior art, whereas the
22 other one, which is -- what, again, is it?

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1 Q. Obviousness?

2 A. Obviousness.

3 Obviousness involves the knowledge of a
4 POSITA and looking at a patent and/or several
5 patents or several pieces of prior art that may or
6 may not be patented and the POSITA concluding that
7 it would be obvious to create the thing that's
8 being challenged, this patent that's being
9 challenged.

10 Is that about right?

11 Q. It seems like a pretty good description.

12 A. Good.

13 Q. You used the term "POSITA." Does that
14 mean person of ordinary skill in the art?

15 A. That's what I learned in this last few
16 years of doing these kinds of things.

17 Q. Okay. I just wanted to make sure we're
18 referring to the same term.

19 A. Yeah.

20 Q. Did you prepare for your deposition today,
21 Dr. Kern?

22 A. Yes.

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1 Q. For how long did you prepare?

2 A. Well, I believe since I've been involved
3 in this case, it's been leading to this deposition
4 and my declaration. So ten months.

5 Q. Specifically for your testimony today, did
6 you spend time reviewing documents such as your
7 declaration?

8 A. Yes.

9 Q. When did you review your declaration in
10 preparation for your testimony today?

11 A. I reviewed it most recently last night,
12 after dinner.

13 Q. When did you start reviewing your
14 declaration in preparation for your testimony
15 today?

16 A. Last week.

17 Q. Did you meet with your attorneys before
18 your deposition today?

19 A. Yes. And last week.

20 Q. About how long did you spend meeting with
21 with your attorneys in preparation for your
22 deposition today?

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1 A. Two days last week and yesterday.

2 Q. About how much time did you spend
3 preparing your report in this case?

4 A. My report?

5 Q. Let me clarify. About how much time did
6 you spend preparing your declaration in this case?

7 A. There were two declarations. I'm not
8 quite, you know, up on the legalese about the
9 difference between the two.

10 But the one that was submitted sometime in
11 the spring of 2024 and then one that was submitted
12 in July 2024. And I probably spent -- oh, gosh,
13 how many hours? I'd have to go back and check.
14 At least a week on each of the -- in days. It was
15 spread out over a long period, as you
16 might expect, can imagine.

17 Q. That's fair. What are the differences
18 between the report -- strike that.

19 What are the differences between the
20 declaration you submitted in July and the
21 declaration that you submitted in the spring?

22 MR. MELMAN: Objection to form.

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1 A. The difference I believe is that it
2 responded to the -- is it Omar Beik? I'm not sure
3 how to pronounce the name. Is that correct, Beik?

4 Q. I believe it's Beik, but I might be
5 mispronouncing it as well.

6 A. Anyway, I believe that the additional
7 information that went into my July declaration
8 came from reviewing the testimony that Omar Beik
9 provided. There may have been others. I know
10 that was one additional source of information that
11 I was responding to.

12 Q. When you say you were reviewing the
13 testimony that Omar Beik provided, are you
14 referring to the deposition transcript of Omar
15 Beik?

16 A. Yes. Oh -- correct, correct. Thank you.

17 Q. From time to time I might refer to Cambria
18 County Association for the Blind as "CAB." Is
19 that fair?

20 A. That works for me.

21 Q. Were you aware of CAB before being asked
22 to offer an opinion in this matter?

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1 A. Could you restate that? I think I heard
2 you, but I'd like to listen to exactly how you
3 said it.

4 Q. Were you aware of CAB before being asked
5 to offer an opinion in this matter?

6 A. No.

7 Q. Were you aware of CAB's cable management
8 systems before being asked to offer an opinion in
9 this matter?

10 A. No.

11 Q. If I refer to Affordable Wire Management
12 as "AWM," is that fair?

13 A. That works.

14 Q. Were you aware of AWM prior to being asked
15 to offer an opinion in this matter?

16 A. No.

17 Q. Were you aware of AWM's cable management
18 systems before being asked to offer an opinion in
19 this matter?

20 A. No.

21 Q. So I'm handing you a document that's
22 already been marked Exhibit 2038.

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1 (Exhibit 2038, previously marked, is not
2 attached to the transcript.)

3 Q. Do you recognize Exhibit 2038, Dr. Kern?

4 A. It appears to be my declaration. It
5 doesn't have a date on it, but I expect it is the
6 one submitted in July. Is that correct?

7 Q. I believe if you go to page 88 of
8 Exhibit 2038, it's dated July 25th, 2024. Is that
9 accurate?

10 A. Okay. Excellent. Thank you. That, I
11 recognize.

12 Q. So Exhibit 2038 is the declaration that
13 you submitted in this matter in July. Is that
14 right?

15 A. That's a statement, not a question. Okay.

16 Q. Is that an accurate statement?

17 A. Yes.

18 Q. So if we could turn to page 8 of
19 Exhibit 2038, specifically Paragraph 10, it states
20 that you earned a bachelor of arts with a major in
21 engineering sciences from Dartmouth College in
22 June 1967 and a bachelor of engineering from

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1 Dartmouth's Thayer School of Engineering in
2 June 1968. Is that accurate?

3 A. That is correct.

4 Q. Did you take any type of coursework
5 relating to electricity during the course of
6 earning your engineering degree at Dartmouth?

7 MR. MELMAN: Objection to form.

8 A. Yes.

9 Q. Which classes did you take at Dartmouth
10 that related to electricity?

11 A. Well, electricity is first introduced in
12 physics courses in electricity and magnetism.
13 It's then introduced in electrical engineering in
14 the more engineering sense of circuitry.

15 I don't recall specifically the course
16 names, but I can assure you that Dartmouth doesn't
17 let people graduate without understanding
18 electricity and magnetism.

19 Q. I believe that's the entry-level courses,
20 electricity and magnetism, that first discusses
21 electricity.

22 A. I'm sorry. Now you're --

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1 Q. I'm just talking. It wasn't a question.

2 Did you take any courses relating to
3 circuitry while earning your engineering degrees
4 at Dartmouth?

5 MR. MELMAN: Objection, form.

6 A. Relating to circuitry, it certainly is
7 covered. I'm not sure that the name of the course
8 was circuitry or whatever. Electric circuits are
9 certainly something that's -- I'm familiar with.
10 Yes.

11 Q. How are you familiar with electric
12 circuits?

13 A. Electric circuits involve resistors,
14 capacitors, and inductors. In my time, they kind
15 of began to invent transistors. The basics for
16 passive electric circuits are resistors,
17 capacitors, and inductors. And Ohm's law and
18 Kirchhoff's laws and on and on and on relate to
19 voltages and currents in electrical circuits.

20 And perhaps I've learned a lot more about
21 it in the last 50 years in a practical way, but
22 the mathematics for analysis of electrical

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1 circuits is -- that's something I was trained in.

2 Q. While earning your undergraduate degrees,
3 did you learn about cross-induction?

4 A. I probably did not. It would be basically
5 the magnetic coupling of two inductors, and it was
6 probably taught to me in that form rather than
7 with the name "cross-induction."

8 Q. What does "cross-induction" mean to you?

9 A. It means inducing a magnetic field from
10 one circuit inducing a current in another circuit.

11 Q. Is that generally something undesirable,
12 to have one circuit inducing a magnetic field that
13 induces a current in another circuit?

14 MR. MELMAN: Objection, form.

15 A. Could you repeat the question?

16 Q. Is it undesirable to have one circuit
17 induce a magnetic field that then induces a
18 current in another circuit?

19 MR. MELMAN: Objection, form.

20 A. Not necessarily. I could add that
21 electric transformers have inductive coupling. So
22 our whole electric power system would not work

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1 without it, so it's not necessarily bad. It's
2 probably good.

3 Q. Are there any instances where inductive
4 coupling is bad?

5 A. Yes.

6 Q. What are some instances where inductive
7 coupling is bad?

8 A. Inductive coupling can be bad when you are
9 trying to send a signal through a conductor and
10 something interferes with that signal by inducing
11 a current in the signal circuit that adds what is
12 called noise or cross-talk or static in that
13 signal circuit.

14 Q. Does inductive coupling occur between two
15 power cables?

16 MR. MELMAN: Objection, form.

17 You can answer.

18 A. It depends how you define "power cables."
19 The ordinary meaning of "power cables" to ordinary
20 people would be electric power cables in electric
21 utility systems, which are AC power cables,
22 alternating current.

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1 So there is inductive coupling when you
2 have a change in current that leads to a change in
3 magnetic field that leads to a change in the
4 induced current in another inductive nearby wire.

5 I think I've forgotten the question now.

6 Q. Can inductive coupling occur between two
7 AC power cables?

8 A. Yes. That's what a transformer is.

9 Q. Outside of a transformer, can inductive
10 coupling occur between two AC cables that are in
11 close proximity to each other?

12 A. It can, but it would be typically minimal.

13 Q. Why would inductive coupling be typically
14 minimal between two AC cables that are in close
15 proximity to each other?

16 A. Because the AC power cables I believe
17 you're referring to would have high levels of
18 current to begin with. And the small amount of
19 coupling would be a very small change in the
20 preponderance of -- it sounds like a legal term,
21 but in the -- the usual level of current in a
22 circuit.

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1 So this would be a small ripple on a large
2 current.

3 Q. Can inductive coupling occur between an AC
4 power cable and a DC power cable that are in close
5 proximity to each other?

6 A. There is actually no distinction between
7 an AC and a DC power cable. It's a cable that has
8 either AC or DC current in it.

9 So if you understand my point?

10 Q. Yes.

11 A. A piece of copper doesn't care whether
12 it's AC or DC. There are certain cases where it
13 might.

14 But the answer is yes. One cable with AC
15 could induce a small amount of current inductively
16 via induction into another cable, be it AC or DC.

17 Q. Would the induction between a cable
18 carrying AC and a cable carrying DC be minimal,
19 like the induction between two cables carrying AC?

20 MR. MELMAN: Objection, form.

21 A. I think I've already answered that
22 question in the last statement where I said that

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1 it doesn't matter. A piece of copper doesn't know
2 the perturbation incurred by induction. It
3 doesn't matter whether the copper next to it is
4 carrying AC or DC. It would be the same.

5 Q. So a cable carrying AC current has the
6 same magnetic field as a cable carrying DC
7 current?

8 A. No. The magnetic field from a DC current
9 is steady state to the extent that the DC current
10 is itself really steady state.

11 So the current -- excuse me. The magnetic
12 field created by a circuit has the same frequency
13 as the AC -- as the frequency of the AC circuit.

14 So again, most times in the United States,
15 I guess, 60 cycles per second AC would be the
16 thing that we're really talking about when we talk
17 about AC power, as opposed to 50 cycles in many
18 other places.

19 But whatever the cycles are, the magnetic
20 field fluctuates at the same frequency or it
21 doesn't fluctuate at all, as in the case of DC.

22 Q. So if the magnetic field fluctuates for an

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1 AC power cable, would that have an impact on the
2 amount of cross-induction that occurs between that
3 AC power cable and a DC carrying power cable?

4 MR. MELMAN: Objection, form.

5 A. I got confused. Could you restate?

6 Q. So you testified that the magnetic field
7 fluctuates for an AC power cable. Correct?

8 A. The magnetic field created by the current
9 in the AC power cable fluctuates at the same
10 frequency as the frequency of the AC current
11 fluctuation.

12 Q. Does that magnetic field fluctuation have
13 any impact on the amount of cross-induction that
14 would occur if that AC power-carrying cable was in
15 close proximity to a DC power-carrying cable?

16 A. Does the current level -- I'm rephrasing
17 your question. Tell me if it's right.

18 Does the current in an AC cable when
19 fluctuating -- it's always fluctuating. It's AC.

20 Does the level of the current -- the
21 magnetic field that's created is in linear
22 proportion to the amount of AC current. The

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1 induction in anything else conductive nearby, be
2 it DC cable or whatever, would also be linearly
3 related to the current in the AC cable. It
4 doesn't -- you know what "linear" means?

5 Q. So do I have it right that the amount of
6 induction occurring as a result of the current
7 fluctuation in an AC cable fluctuates with -- let
8 me strike that. That's a bad question.

9 What I'm really just trying to understand
10 is, does the induction change with the fluctuating
11 magnetic field for an AC current?

12 MR. MELMAN: Objection, form.

13 A. When you say "induction change," are you
14 saying do the induced voltages and currents
15 change?

16 Q. Yes.

17 A. Okay. Yeah, I would believe or I would --
18 I believe they are linearly related. If the AC
19 current in the AC conductor doubles, the magnetic
20 fields double, the induced currents in some other
21 conductor double. Linear.

22 Q. Do you know if the induced currents in

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1 some other conductor are great enough that it
2 could impact, if it's a data cable, a signal?

3 Let me rephrase the question. I'm reading
4 it in front of me and it looks confusing.

5 If the induced currents in the AC
6 conductor double, could they be great enough to
7 disrupt the current in a DC cable in close
8 proximity to the AC conductor?

9 MR. MELMAN: Objection, form.

10 A. You changed from "DC" to "signal" just
11 then.

12 Did you mean to say "signal" rather than
13 "DC"?

14 Q. I rephrased my question to specify "DC"
15 instead of "signal."

16 A. Ah, okay. Now read me your question
17 again.

18 Q. If the induced currents in the AC
19 conductor double with the fluctuation -- I see
20 you're shaking your head.

21 A. Well, the induced current in the AC cable?
22 We're talking about the AC cable inducing currents

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1 in other things, aren't we, or are we going
2 backwards now?

3 Q. This is my mistake. Let me go back and
4 clarify the question because I'm seeing I
5 introduced a word I shouldn't have there.

6 A. Yeah.

7 Q. So if the AC current in the AC conductor
8 doubles as part of its normal fluctuation --

9 A. I think you mean if the fluctuation amount
10 doubles.

11 MR. MELMAN: Dr. Kern, let Attorney Dixon
12 finish his question. He's trying to formulate his
13 question.

14 Q. If the AC current and the -- sorry.

15 If the AC current in the AC conductor
16 doubles as part of a fluctuation, would the
17 induced currents be great enough to disrupt the
18 current in the DC cable in close proximity to the
19 AC conductor?

20 MR. MELMAN: Objection to form.

21 You can answer.

22 A. The word "disrupt" is sort of a binary

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1 thing.

2 So my answer to your question is no.
3 Disruption is not a linear thing. It's a binary
4 thing. It's either disrupted or not disrupted.

5 Q. So is there any problem with putting an AC
6 cable next to a DC cable, from a cross-induction
7 perspective?

8 MR. MELMAN: Objection.

9 A. I don't believe so.

10 Q. What are some of the reasons why you
11 wouldn't want to put an AC cable in close
12 proximity to a cable carrying DC current?

13 MR. MELMAN: Objection, foundation.

14 A. Could you restate, please? I think I
15 heard you.

16 Q. What are some of the reasons why you
17 wouldn't want to put a cable carrying AC current
18 in close proximity to a cable carrying DC current?

19 MR. MELMAN: Same objection.

20 A. First, it depends on the level of current
21 involved. There's a big difference between a
22 milliamp and a megaamp. So there would obviously

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1 be some limits to the answer.

2 But in general, I don't think it would be
3 generally a problem from a physics and
4 electricity -- from a physical performance
5 perspective for the cables.

6 However, there are good practices for
7 electricians to organize cables such that other
8 electricians will understand what they see
9 readily.

10 There are, in certain cases, electrical
11 code provisions which mandate the isolation of AC
12 and DC cables, primarily for the same reason,
13 which is maintenance.

14 And basically, the ability for a new party
15 looking at something that exists to understand it
16 more readily and more quickly.

17 Q. Other than isolating AC and DC cables, are
18 there other ways for electricians to organize
19 cables such that other electricians will
20 understand what they are looking at?

21 A. You know, there are various standards for
22 color-coding different types of electrical cables.

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1 The insulation jacket can be red, white, green,
2 black, in certain DC cases yellow. I wouldn't say
3 separate in a physical sense but to organize and
4 make obvious in a visual way.

5 Q. What are some of the various standards for
6 color-coding different types of electrical cables?

7 A. Color-coding?

8 Q. Yes.

9 A. They are -- I'm not sure actual standards.
10 They are conventions. Personally, I don't know
11 where those -- if there are rules and regulations
12 on that, but there is definitely -- there's at
13 least for AC power wiring within buildings,
14 premises, there is -- there are standards. I just
15 don't happen to know exactly where they are.

16 They're probably in the National
17 Electrical Code. I know this more from experience
18 than from reading the law, so to speak.

19 Q. That makes sense. In your experience, are
20 DC cables always yellow?

21 A. No.

22 Q. In your experience, are AC cables ever

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1 yellow?

2 A. Not in my experience. No.

3 Q. In your experience, typically what color
4 are AC cables?

5 A. Depends where you are. I'm sure that
6 power companies on their transmission lines don't
7 worry about the colors. But when you get into a
8 building, AC cables definitely have colors.

9 I believe that the neutrals are typically
10 white, but I could be wrong. And the hot ones are
11 typically black, and the grounding ones are
12 typically green.

13 I am quite familiar with DC low voltage
14 circuits where the negative is almost -- is
15 preferentially yellow. The grounded DC is
16 preferentially yellow. But this goes to wiring on
17 boats, not -- on sailboats, not solar panels.

18 Q. So for solar panels, are there
19 color-coding conventions for different types of
20 electrical cables?

21 A. I'm not sure. If there are, it's
22 likely -- I'm not sure. I have seen the use of

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1 red and black in solar arrays. And again, the
2 reason for yellow is that black as negative in
3 solar arrays could be confused with a hot wire in
4 an AC circuit.

5 If a person was not accustomed to -- if a
6 person was in a DC situation and saw a black wire
7 and assumed it was negative, grounded, it could be
8 a very dangerous thing if it happened to be an AC
9 wire that was black and hot.

10 That's the kind of good housekeeping thing
11 that engineers and, I assume, the electrical codes
12 try to promulgate for safety reasons.

13 Q. So for the black and red color-coding in
14 solar arrays, what type of current are those
15 cables carrying?

16 MR. MELMAN: Objection, form.

17 A. In solar arrays, the current is DC, with
18 certain exceptions for infrequently deployed
19 things such as AC modules, alternating current
20 photovoltaic modules; PV, if you like.

21 So there's a "never say never" kind of
22 aspect to what you're asking.

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1 Q. Trackers are used with solar arrays.

2 Right?

3 A. Say it again.

4 Q. Trackers are used with solar arrays.

5 Right?

6 MR. MELMAN: Wait. Objection.

7 You can go ahead.

8 A. Trackers are used --

9 Q. -- with solar arrays?

10 A. Sometimes, not always.

11 Q. Sitting here today, how often are trackers
12 used with solar arrays?

13 MR. MELMAN: Objection, form.

14 A. That's a question that -- when you say
15 "solar array," for example, driving in this
16 morning from 128, I saw about a dozen solar
17 arrays, each one a single module powering a
18 flasher or a signal. Those are not tracking.

19 There are a way lot more of those in the
20 world than 100-megawatt solar fields, which is a
21 solar array as well that might be tracking.

22 So if you're measuring this by the number

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1 of solar arrays in the world, the preponderance
2 would not be tracking.

3 If you're measuring them by -- weighting
4 them by the capacity of the solar arrays, you
5 might begin to see some impact.

6 The evolution of tracking, in my
7 experience in solar going back to the 1970s, is
8 that it comes and goes. Trackers -- let me give
9 you an example.

10 If solar arrays were so cheap that the --
11 if they were so cheap, period, then you wouldn't
12 worry about how much electricity each individual
13 one made. You'd just cover the Earth with them.

14 If you're trying to -- if you're limited
15 in area or if solar panels are expensive, you
16 might use trackers to get more energy from them,
17 from the individual panels.

18 Q. So for an industrial-scale solar plant,
19 would that typically use trackers, as of today?

20 MR. MELMAN: Objection, form.

21 A. By "industrial," I think the usual term is
22 "utility scale." Is that what you mean?

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1 Q. Yes. For a utility-scale solar plant,
2 would that typically use trackers, as of today?

3 A. Often. I wouldn't say anything is
4 typical. It depends on the modules, the terrain,
5 the latitude. They are very popular today.

6 Q. Typically how are those trackers powered?

7 A. Today?

8 Q. Today.

9 A. I think that in the current time frame,
10 the 2020s onward, there has been a movement toward
11 electronic actuators distributed within array
12 fields.

13 But in the early developmental days of the
14 industry, very often the actuator to drive the
15 tracker -- now -- would have been a long pushrod
16 extending east-west through a north-south array --
17 north-south, single-axis tracking array.

18 But trackers -- all trackers aren't the
19 same. In the formative days of the industry --
20 and as a matter of fact, they're still being made
21 today -- two-axis tracking was fairly common.

22 With a two-axis tracker, you can get about

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1 140 percent of the amount of energy out of a
2 single solar panel over the course of a year
3 relative to a fixed south-facing solar panel.

4 With a one-axis horizontal tracker, you
5 can get about 120 percent typically in U.S.
6 latitudes.

7 This changes if you go to the North Pole
8 or the Equator. But typically you can get
9 120 percent of a fixed-array kilowatthour
10 production annually from a tracker.

11 And in between, there are trackers that
12 are tilted one-axis trackers.

13 And further, when you get to two-axis
14 trackers, you actually have situations of
15 concentrating solar where you use mirrors or
16 lenses to focus light onto a solar panel or solar
17 cell.

18 So by and large, trackers of the simple
19 north-south axis are becoming more common.

20 Q. Is AC or DC power used to power the
21 north-south trackers?

22 MR. MELMAN: Objection, form.

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1 A. I don't know for a fact. I suspect AC
2 power would be used.

3 Q. Have you been involved in designing PV
4 arrays that use north-south trackers?

5 A. No.

6 Q. Have you been involved in designing PV
7 arrays that use trackers at all?

8 A. No, I have not been involved in the
9 development of a particular product for a tracker.

10 I am certainly aware of industry friends,
11 associates from the last 30, 40 years, that are
12 doing this, knowing pretty closely what their
13 technology looks like, their business looks like.

14 Q. But you're not sure if those trackers use
15 AC power?

16 A. I expect that they use AC power. The
17 problem being that most electric motors -- simple
18 electric motors are -- are or were AC. But now
19 you've got electric vehicles, and that's all DC.
20 So who knows what's coming down the road?

21 Q. Have you installed trackers in a
22 utility-scale solar plant?

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1 A. No.

2 Q. Have you installed trackers in any type of
3 solar plant?

4 A. When you say "installed," have I rolled up
5 my sleeves and been in the array field doing it?

6 No.

7 Q. Have you been present when trackers have
8 been installed in the array field?

9 A. I think I might have been once at NREL
10 when they were installing -- National Renewable
11 Energy Laboratory, when they were installing a
12 north-south tracker.

13 It was in very close proximity to an
14 office that I met with many, many, many times in
15 the 2000 to 2010 time frame when these things were
16 being developed.

17 Again, most of my experience has been in
18 the development of similar power systems mounting
19 structures, wiring, that sort of thing.

20 Indeed, I was involved in field work on
21 many of these. The first large-scale system I was
22 intimately involved with was not a tracking

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1 system.

2 Q. What was the first large-scale system that
3 you were intimately involved with?

4 A. It was a 1-megawatt power system built in
5 Cagayan de Oro, on the southern island of Mindanao
6 in the Philippines.

7 Q. What work did you perform in relation to
8 that 1-megawatt power system built in the
9 Philippines?

10 A. I wrote the procurement specifications for
11 the electric utility that was buying this,
12 overseen by the International Finance Corporation
13 that was sponsoring it.

14 I reviewed all the proposals. I
15 participated in the selection of the contractor
16 that built it. I reviewed all of the contractor's
17 drawings, electrical, mechanical submissions
18 during the construction.

19 I didn't supervise continuously, but I
20 visited the site on several occasions, checking to
21 see how it was being built.

22 Q. What year or years were you performing

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1 your work on this mega -- 1-megawatt power system
2 in the Philippines?

3 A. Gosh. I believe it was in the -- well,
4 let's see. Time flies when you're having fun.

5 I believe it was in the 2003 to 2006 time
6 frame. Could have started earlier. And my
7 participation continued during the operational
8 phase, so . . .

9 Q. Did this 1-megawatt power system in the
10 Philippines have trackers for its solar arrays?

11 A. No, no. It was fixed, as I said earlier.

12 Q. Did you do any other work on utility-scale
13 solar prior to your involvement with this
14 1-megawatt power system in the Philippines?

15 A. Most of my work involved commercial,
16 industrial and residential scale distributed
17 solar. But most of my work was with electric
18 power companies doing this kind of integration,
19 electronics and wiring stuff.

20 However, in that same time frame of going
21 back to the mid 1980s into the late 1990s, these
22 were at a time when photovoltaics were not

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1 cost-effective. Everything was developmental.

2 So in that time frame, there was a
3 project, for example, called the PVUSA project in
4 Davis, California, that I had visited on many
5 occasions. Many? Half a dozen occasions.

6 And the collegial nature of the industry
7 back in that point in time was such that it was
8 small. People knew each other. We would visit
9 each other's sites. We would get together at
10 professional meetings. We would work on common
11 issues between small- and larger-scale systems.

12 But mind you, in the 1990s people weren't
13 building megawatt systems other than as -- what is
14 the motivation? It was a lot of money and it
15 wasn't paying a lot.

16 So it was utilities building things like,
17 for example, the colleague in Austin, Texas, at an
18 Austin electric utility built a 300-kilowatt
19 system back in the late 1980s, I think. And that
20 was a huge event in the industry.

21 But I built a rooftop system on the top of
22 the electric utility's headquarters building. So,

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1 you know, we're all in the same thing. We know
2 what each is doing.

3 But the distributed rooftop business
4 preceded the utility-scale business because the --
5 basically, because the utility-scale solar needs
6 to compete with central-station electric power
7 generation, whereas distributed solar, if it's
8 behind the meter, is valued much more highly than
9 utility-scale solar, which is on the generation
10 transmission grid.

11 So yeah, it was a small industry, a lot of
12 people very close.

13 Q. Okay. So around the time you worked on
14 your first project in the Philippines for
15 utility-scale solar, were you working on any other
16 utility-scale solar projects?

17 A. No.

18 Q. Since your work on the utility-scale solar
19 project in the Philippines, have you worked on any
20 other utility-scale solar projects?

21 A. Been involved in them? Yes.

22 Q. About how many other utility-scale solar

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1 projects have you been involved in?

2 A. I can think of three that I had a direct
3 involvement in.

4 Q. What years were you involved in those
5 three utility-scale solar projects?

6 A. Again, I could be off by a year or two
7 here, but 2005 to 2012. That time frame. These
8 were outside the United States.

9 Q. Have you been involved in a utility-scale
10 solar project since 2012?

11 A. Since 2012, I've been doing some pro bono
12 work for my college, my high school, my town. I
13 think a megawatt in the town of Lincoln, keeping
14 my hands in it, 20 kilowatts-ish for Dartmouth
15 College in New Hampshire in the White Mountains,
16 and the other one -- I said three. Oh, the other
17 one -- since 2012 . . .

18 I forget. It's been mostly pro bono on
19 the side of guidance.

20 Q. What type of pro bono guidance do you
21 provide on these projects that you've worked on
22 since 2012?

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1 A. Oh, modeling, performance modeling,
2 figuring out the expectations for power
3 production, making sure -- making sure the details
4 were to my liking, the way things were
5 constructed.

6 A good deal of it financial cross-
7 double-checking.

8 Q. Did these pro bono projects involve cable
9 hangers?

10 A. No.

11 Q. Did these pro bono projects involve
12 trackers?

13 A. No. I did get fairly close to one small
14 tracking system that Dartmouth College put out,
15 but I was mostly an observer on that.

16 Q. So you mentioned that you worked on three
17 other utility-scale projects in roughly the 2005
18 to 2012 time frame. Right?

19 A. Correct.

20 Q. Did those utility-scale projects involve
21 trackers?

22 A. One definitely did not. That was a

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1 5-megawatt plant in south India. One did, but it
2 could have been a concentrating solar thermal
3 tracking system, which is beyond the scope of what
4 you're talking about. But it's, again, covering
5 the land with things that move and make power from
6 sunlight.

7 And I'm spacing out on the third one right
8 now. Oh, oh, oh. One with Tata Power near
9 Mumbai. I think it was 2 or 3 megawatts.

10 Q. So in the four utility-scale solar plants,
11 did any of those have AC current-carrying cables?

12 MR. MELMAN: Objection, form.

13 A. I -- the short answer is no.

14 The more caveated answer is probably
15 somewhere within the facility but not adjacent to,
16 abutting, ubiquitously associated with any other
17 cabling, the DC cable.

18 Q. So when you say the -- somewhere in the
19 facility there would be an AC current-carrying
20 cable, would that be connected maybe to an
21 inverter?

22 MR. MELMAN: Objection, form.

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1 A. Well, I hadn't thought of that. Yes,
2 certainly. I'm thinking more or less like a
3 typewriter at the receptionist's office.
4 Typewriter, they don't exist anymore.

5 Q. But it's fair to say that there wouldn't
6 be AC cables within the solar array. Correct?

7 A. Correct.

8 MR. DIXON: Now might be a good time for a
9 break. I think we've been going about an hour, if
10 that works for everyone. Maybe five minutes. Is
11 that good?

12 MR. MELMAN: Sure.

13 (Recess, 10:47 a.m. to 10:59 a.m.)

14 BY MR. DIXON:

15 Q. So can we please turn to page 13 of your
16 declaration, Exhibit 2038.

17 A. Got it.

18 Q. In Paragraph 19 you state, "In my opinion,
19 it is vitally important to possess practical
20 real-world experience in solar PV installations to
21 fully understand and grasp the unique technical
22 issues, challenges, and practicalities in this

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1 area of technology. Academic qualifications,
2 while helpful, are alone insufficient."

3 Did I read that accurately?

4 A. Yes.

5 Q. Why did you include this in your
6 declaration?

7 A. I included this because although I'm an
8 academic, as you discovered, sort of hands-on
9 understanding of the practicality of where things
10 go, how things work, how someone building a
11 system, a solar power system, what they face is in
12 the back of my mind and it needs to be to
13 understand how to make these better.

14 Q. And when you say "practical real-world
15 experience," do you mean field experience?

16 A. I mean field experience with solar panels
17 in various instances.

18 Q. What do you mean by "various instances"?

19 A. What I mean is that a solar panel is a
20 solar panel whether it's in a megawatt field or in
21 a kilowatt field. The wiring between solar panels
22 is the same on a rooftop as it is on a --

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1 potentially the same on a rooftop as it is on a
2 megawatt-scale system. It all boils down to the
3 same technology.

4 Q. So when you refer to field experience and
5 practical real-world experience, you're not saying
6 that someone needs extensive utility-scale field
7 experience?

8 MR. MELMAN: Objection, form.

9 A. Extensive utility-scale photovoltaic? I
10 think experience can scale, but it can't scale
11 infinitely. There are . . .

12 Actually, rephrase the question, please,
13 or repeat the question.

14 Q. Is it vitally important to possess
15 practical real-world experience in utility-scale
16 solar PV installations?

17 A. It's --

18 MR. MELMAN: Wait, wait, wait.

19 Objection, form.

20 You can go ahead.

21 A. It's useful. But my experience in
22 smaller-scale systems is also useful in

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1 utility-scale systems.

2 Q. And that's because the utility-scale
3 systems have common properties with utility
4 scale -- strike that. I said the same thing.

5 A. You did.

6 Q. And that's because smaller-scale systems
7 have common properties with utility-scale
8 photovoltaic systems. Right?

9 MR. MELMAN: Objection, form.

10 A. Yes.

11 Q. So for the purposes of your opinions here,
12 your experience in smaller-scale systems can also
13 help inform -- let me rephrase that question.

14 So your experience in smaller-scale
15 systems helps you -- helped inform your opinions
16 in this matter?

17 A. Yes.

18 Q. Do you view your experience in
19 utility-scale systems as necessary to grasp the
20 unique technical issues, challenges, and
21 practicalities in solar PV installations?

22 A. Your last statement was in solar PV

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1 installations? Are you referring to large or
2 small?

3 Q. In general.

4 A. In general, knowledge about solar panels
5 translates to whether there are -- somewhat
6 translates to whether there are a few or many or a
7 lot. The scale of a system, the appreciation of
8 the scale of a system is -- larger scales is also
9 useful to experience them.

10 Q. When you say it's useful to experience
11 larger-scale systems, what type of experience are
12 you referring to?

13 A. Being within and among and on a large site
14 as opposed to a small site, logistics,
15 conveniences that one might have at a smaller site
16 that don't exist in a remote larger site. That
17 sort of thing.

18 Q. What are some of the conveniences one
19 might have at a smaller site that don't exist in a
20 remote larger site?

21 A. Food, water, air-conditioning, a loading
22 dock, civilization.

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1 Q. What are some of the logistics one might
2 have at a smaller site that doesn't exist at a
3 remote larger site?

4 A. What are the -- could you restate? I
5 missed one word. What are the -- that you might
6 have?

7 Q. What are some of the logistics one might
8 have at a smaller site that doesn't exist at a
9 remote larger site?

10 A. Telephone, a ship-to address, medical
11 services. We're talking about remote places where
12 you're totally on your own versus in a
13 smaller-scale system in an urban environment where
14 you're not.

15 Q. Are all large-scale solar installations
16 remote?

17 A. No.

18 Q. What other type of experience is it useful
19 to have with larger-scale systems?

20 A. I think appreciation of the difficulties
21 of working on the open terrain, security, pests,
22 vandals -- some things that -- distances;

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1 inspecting something and finding that instead of a
2 one-minute walk it's a half-hour roundabout way to
3 get to some other place on the system that's
4 accessible.

5 Q. Are there any other types of experience
6 that's useful to have with larger-scale systems?

7 A. I'm sure there are, but nothing comes to
8 mind at this point.

9 Q. So if we'd turn to page 14 of
10 Exhibit 2038, specifically Paragraphs 23 and 24.
11 These are titled "Person of Ordinary Skill in the
12 Art." Is that correct?

13 A. Paragraph -- yes. B, "Person of Ordinary
14 Skill in the Art."

15 Q. Do you disagree with the petitioner's
16 statement regarding the level of ordinary skill in
17 the art?

18 A. No.

19 Q. And you applied the petitioner's statement
20 regarding the level of ordinary skill in the art
21 in offering your opinions in this matter?

22 A. Yes.

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1 Q. In Paragraph 23 in the statement of the
2 level of ordinary skill in the art, it doesn't
3 refer to experience with utility-scale solar, does
4 it?

5 A. No.

6 Q. So for the purposes of this matter, a
7 person of ordinary skill in the art would not need
8 experience in utility-scale solar?

9 MR. MELMAN: Objection.

10 A. For this definition, yes.

11 Q. Let me clarify. Did you just say for
12 "this deposition" or "this definition"?

13 A. I am saying that this definition of POSITA
14 does not say that it requires experience in
15 solar -- it doesn't mention the word "solar."

16 Q. So if we turn to page 19, Paragraph 37.
17 Do you see that at the top of the page?

18 A. Yes, I do.

19 Q. On the third line up from the bottom of
20 that paragraph, you use the term "balance of
21 systems." Is that accurate?

22 A. Yes.

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1 Q. What is a balance of systems?

2 A. Balance of systems is a catchall in the
3 photovoltaic industry for everything other than
4 the module, the PV module.

5 Q. Would balance of systems include an
6 inverter?

7 A. If it's not a PV module, yes.

8 Q. Does balance of systems include the power
9 grid?

10 A. No.

11 Q. Where is the line of demarcation between
12 balance of systems and power grid?

13 A. It's called the point of interconnection
14 within electric utilities, defined by the electric
15 power company, but typically at or near the -- any
16 metering or switchgear that the utility requires
17 to accept the power from the PV system.

18 Q. Okay. In the first sentence you say, "PV
19 system designers and installers, while seeking to
20 lower both manufacturing and construction costs,
21 are guided and constrained by these NEC safety
22 codes as well as structural codes." Did I read

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1 that accurately?

2 A. Yes.

3 Q. What NEC safety codes constrain PV systems
4 designers and installers?

5 A. Article 690, predominantly. And I think
6 guided and constrained would be the proper . . .

7 Q. Why do you feel that including "guided"
8 would be proper?

9 A. Because it shows designers paths forward,
10 not simply things that you cannot do.

11 Q. So it's recommending paths forward for the
12 development of PV systems? Do I have that right?

13 A. I missed one word in your statement.

14 Recommending?

15 Q. Are you saying that the NEC guides PV
16 systems designers and installers by recommending
17 paths forward for the development of PV systems?

18 MR. MELMAN: Objection.

19 A. It doesn't really guide them on pathways,
20 but it informs them of what they should do and
21 what they cannot do, the strengths.

22 Q. So it recommends them -- strike that.

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1 So it recommends things that they should
2 do in developing PV systems?

3 A. It says what they can do.

4 Q. Didn't you just say that it informs them
5 of what they should do and what they cannot do?

6 MR. MELMAN: Objection, form.

7 A. It sets out rules for building
8 photovoltaic systems.

9 Q. And when it sets out rules for building
10 photovoltaic systems, it's your opinion that the
11 NEC guides PV systems designers and installers?

12 MR. MELMAN: Objection, form.

13 A. It provides guidelines.

14 Q. So in Paragraph 37, why did you say that
15 PV systems designers and installers are guided by
16 the NEC safety codes as well as structural codes?

17 MR. MELMAN: Objection, form.

18 A. Could you restate that, please? Not
19 restate but just repeat. Why are they . . .

20 Q. In Paragraph 37, why did you say that PV
21 systems designers and installers are guided by the
22 NEC safety codes as well as structural codes?

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1 MR. MELMAN: Objection, form.

2 A. Why did I say that? I say that because my
3 experience in actually helping write for -- my
4 group at MIT in the 1970s wrote Article 690, the
5 first drafts of it.

6 So these were things to make -- guidance
7 to make photovoltaic systems safe and to avoid
8 problems and to avoid people from making shortcuts
9 in the process of trying to lower costs. It says
10 how you should do it to make it safe. So it
11 guides the designers.

12 Q. And you also say in Paragraph 37 that
13 noncompliance can result in costly failure to pass
14 an electrical inspection and professional
15 liability in the case of an injury, accident, or
16 damage. Is that accurate?

17 A. That's -- yes.

18 Q. Who enforces the NEC safety codes?

19 A. Local authorities having jurisdiction.

20 Q. If someone were to design a PV system in
21 your hometown, who would be the local authorities
22 having jurisdiction to enforce the NEC safety

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1 code?

2 A. In the Town of Lincoln, it is the Lincoln
3 electrical inspector, whose name I can't remember.

4 Q. Does the local electrical inspector for a
5 utility-scale system -- strike that.

6 For a utility-scale system, would the
7 local town electrical inspector inspect that
8 entire facility?

9 MR. MELMAN: Objection to form.

10 A. In most cases, yes. If an electric
11 utility owned it, public electric utility owned
12 it, it might be exempt.

13 Q. If a public electric utility owned it,
14 would anyone be in charge of NEC code enforcement?

15 A. I think we're in a gray area here because
16 since the restructuring of the electric power
17 industry in many places, there is an uncertainty
18 as to what is and what is not an electric utility.

19 But your question again? I'll give you a
20 yes, no, if you repeat your question.

21 Q. If a public electric utility owned a PV
22 system, would anyone be in charge of NEC code

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1 enforcement?

2 A. I am not sure. My guess would be no.

3 Q. Would there be a risk of liability if a
4 utility-scale PV system was not NEC compliant?

5 A. A risk of liability, certainly.

6 Q. And because of NEC code enforcement and
7 that risk of liability, it's your opinion that as
8 a general matter PV systems designers and
9 installers are cautious in designing the balance
10 of systems in PV systems?

11 MR. MELMAN: Objection.

12 A. Yes.

13 Q. Because they're cautious, they'll look to
14 the NEC for pathways forward that minimize that
15 risk?

16 MR. MELMAN: Objection, form.

17 A. I would refer back and say guided and
18 constrained to minimize that risk.

19 Q. So moving to the next paragraph, you
20 discuss power collection and aggregation in solar
21 PV facilities. Is that right?

22 A. Yes.

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1 Q. What do you mean by "solar PV facilities"?

2 A. Solar power plants.

3 Q. Solar power plants regardless of size?

4 A. Yes.

5 Q. Can you define for me what exactly a PV
6 array is?

7 A. A PV array is a collection of PV modules
8 wired together.

9 Q. What is a PV module?

10 A. A PV module is an assembly of solar cells
11 wired together.

12 Q. What is a solar panel?

13 A. The same thing as a solar module.

14 Q. So -- go ahead.

15 A. A solar panel and a solar module are
16 somewhat interchangeable. Sometimes people would
17 refer to a solar panel as a panel of modules, so
18 there is ambiguity with the word "solar panel" in
19 the industry jargon.

20 Q. What is a string of modules?

21 A. A string of modules is a group of modules
22 connected in series.

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1 Q. So if you'd go to page A2 of Appendix A to
2 Exhibit 2038, does this represent, in the top
3 picture, a string of modules?

4 A. It's unclear. It's impossible to tell by
5 looking at the picture.

6 Q. Why is it impossible to tell by looking at
7 the picture?

8 A. Because you cannot see the back side of
9 the modules to see whether -- how they're
10 interconnected.

11 Q. In Paragraph 38, you also mention string
12 combiners. What is a string combiner?

13 A. Page 19?

14 Q. Page 19. Yes.

15 A. Paragraph 38? I don't see it.

16 Q. So starting on the third line there is a
17 sentence that says, "These unique challenges
18 related to, for example, aggregating and
19 collecting power." Do you have it?

20 A. Yes. Okay. Got it.

21 A string combiner is a device that
22 connects in parallel multiple strings.

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1 Q. When you refer to "multiple strings," are
2 you referring to multiple strings of modules?

3 A. Yes. Multiple strings of modules.

4 Q. How does the string combiner physically
5 connect in parallel multiple string modules?

6 A. It uses terminations of individual strings
7 to a common bus bar.

8 Q. What is a termination of individual
9 strings?

10 A. Usually a connector or a ring terminal.

11 Q. I'm sorry if I'm asking kind of uninformed
12 questions, but I'm not trying to be difficult.
13 I'm just trying to understand --

14 A. Sure.

15 Q. -- how the array actually works.

16 But what is a ring terminal?

17 A. A ring terminal is an electrical device
18 that you would crimp on the end of a wire so as to
19 connect it to a busbar with a screw through the
20 center of the ring.

21 Q. Okay. So if you're installing a string of
22 PV modules and you go to connect it to a string

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1 combiner, you would have the end of a wire. And
2 then you take that end of the wire and crimp on a
3 ring terminal to the end of that string?

4 A. That's one way. Yes.

5 Q. What's another way?

6 A. Oftentimes there are built-in connectors
7 at the ends of individual wires used in solar
8 panels, solar arrays, solar strings. "Plugs" is a
9 common term. Plug and receptacle.

10 Q. Do they come from the wire manufacturer
11 with the plug already built onto the end of the
12 wire?

13 A. Yeah. Yes.

14 Q. And what is a common busbar?

15 A. Usually a piece of copper, rectangular
16 shaped.

17 Q. Would you plug one of the plugs on the end
18 of a string into the piece of copper?

19 A. No. The manufacturer of the string
20 combiner, if that's what we're talking about
21 still, would probably use a ring terminal and a
22 conductor leading out to a connector. And you

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1 would simply connect plug and receptacle.

2 Q. And in Paragraph 38 on page 19 of
3 Exhibit 2038, you mention output feeder cables.

4 A. Uh-hmm. Yeah.

5 MR. MELMAN: Wait, wait. Let Mr. Dixon
6 ask a question.

7 Q. Let me rephrase my question.

8 In Paragraph 38 on page 19 of
9 Exhibit 2038, you state that string combiners
10 output feeder cables to inverters. Is that
11 accurate?

12 A. Yes.

13 Q. Are there any other ways to connect
14 strings of modules to feeder cables other than
15 string combiners?

16 MR. MELMAN: Objection, form.

17 A. No.

18 Q. Are you aware of any PV arrays that
19 connect string modules -- strings of modules
20 directly to an inverter?

21 A. Yes.

22 Q. What types of PV arrays connect string

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1 modules directly to an inverter?

2 A. A PV array as a single string.

3 Q. Is it fair to say that most utility-scale
4 solar doesn't have a single string?

5 A. That's a -- utility-scale solar has many,
6 many strings. So yes.

7 Q. So utility-scale solar plants will always
8 have some form of string combiners?

9 MR. MELMAN: Objection, form.

10 A. Yes.

11 Q. Have you heard of the term "home run
12 cable"?

13 A. Yes.

14 Q. Where does a home run cable fit into the
15 PV system that we were just discussing?

16 A. "Home run" is an ill-defined term. But in
17 my mind, it is associated with a cable run
18 starting at the end of a collection of solar
19 panels that are wired together as a string and
20 running to the next point -- either an inverter or
21 a string combiner, the next point in the flow of
22 the power from the array toward the point of

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1 interconnection with a utility.

2 Q. Can a home run cable be a feeder cable?

3 A. In a situation where there's only one
4 string, yes.

5 Q. Are there situations where feeder cables
6 are aggregated into a string combiner?

7 A. "Feeder cable" is also ill-defined. In
8 the National Electrical Code, Article 690, there
9 are PV source circuits and there are PV output
10 circuits.

11 The correct terminology is that a PV
12 source circuit is fed into a combiner where the
13 current is aggregated with other source circuits
14 and the output of a combiner is a PV output
15 circuit.

16 Now, when you say "feeder circuit," it's
17 ambiguous depending on the context of how many
18 source circuits there are in a system.

19 Q. How is "feeder cable" ambiguous depending
20 upon the context of how many source circuits there
21 are in a system?

22 A. If there is only one source circuit, then

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1 the concept of a feeder is usually meaningless.

2 Q. Would an example of only one source
3 circuit be a PV system that only has one string of
4 modules?

5 A. Only has one? I missed one word.

6 Q. String of modules.

7 A. Yes.

8 Q. How do feeder cables -- strike that.

9 How do inverters convert DC current from
10 feeder cables to AC current?

11 A. With power electronic switches.

12 Q. How do the power electronic switches work?

13 MR. MELMAN: Objection, beyond the scope.

14 A. Like switches.

15 Q. As in on/off switches?

16 A. Yes.

17 Q. So in operating as on/off switches, how do
18 they convert DC current from feeder cables to AC
19 current?

20 MR. MELMAN: Objection, beyond the scope.

21 A. Induction.

22 Q. How does induction convert DC current to

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1 AC current?

2 MR. MELMAN: Same objection.

3 A. Induction is what's used in transformers.

4 Q. Is an inverter a transformer?

5 MR. MELMAN: Objection. And, Mr. Dixon,
6 if you'll give me a running objection to this line
7 of questioning, I won't have to keep interrupting
8 you.

9 MR. DIXON: Agreed.

10 MR. MELMAN: You can answer.

11 THE WITNESS: Do I answer the question?

12 MR. MELMAN: Yes. You can answer if you
13 can.

14 A. What was your question again?

15 Q. Is an inverter a transformer?

16 A. No, not in the usual sense of the word.

17 Q. So how does an inverter transform --
18 sorry. Let me rephrase that question.

19 How does an inverter convert DC current
20 from feeder cables to AC current via induction?

21 A. By high-frequency power electronic
22 switches, transformers, inductors, and capacitors

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1 wired appropriately together as any inverter
2 manufacturer does.

3 Q. Where are inverters located in a solar
4 array?

5 MR. MELMAN: Objection, form.

6 A. Inverters are not located in photovoltaic
7 arrays. They're located in photovoltaic power
8 systems.

9 Photovoltaic arrays are solar panels.

10 Q. Where are inverters located in
11 photovoltaic power systems?

12 A. At convenient locations where DC can be
13 aggregated.

14 Q. But those convenient locations where DC
15 can be aggregated are not within the solar array
16 itself?

17 A. They may be within the same land area.
18 Yes.

19 Q. But the inverters aren't located in and
20 amongst the strings of modules?

21 MR. MELMAN: Objection, form.

22 A. Well, I could tell you that I have built

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1 inverters that are on the module. It's called an
2 AC module.

3 I can tell you that there are string
4 inverters that have been made for each string of
5 modules and distributed through array fields. But
6 these are not common in -- these are not common at
7 all in utility-scale systems.

8 So yes, but not in utility-scale systems.

9 Q. In what types of systems would there be an
10 AC module?

11 A. Typically small rooftop systems.

12 Q. After the inverter outputs an AC
13 current-carrying cable, are those AC
14 current-carrying cables typically in close
15 proximity to any DC current-carrying cables?

16 MR. MELMAN: Objection.

17 A. No.

18 Q. On page 20 of Exhibit 2038, in
19 Paragraph 41, do you see the sentence that says,
20 "Higher module efficiencies for these modules
21 reduce land costs, structural support costs in
22 favor of simple single-axis tracking to improve

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1 electricity production by 20 to 25 percent"?

2 A. Yes.

3 Q. In the 2010 to 2015 period, did the PV
4 industry still favor simple single-access
5 tracking?

6 A. During the -- could you restate, please?
7 I just want to make sure I heard you right.

8 Q. In the 2010 to the 2015 period, did the PV
9 industry still favor simple single-access
10 tracking?

11 MR. MELMAN: Objection, form.

12 A. Yes.

13 Q. In the 2010 to 2015 period, did the
14 preponderance of utility-scale solar systems use
15 simple single-access tracking?

16 A. I believe so. It was evolving.

17 Q. What do you mean by "it was evolving"?

18 A. It wasn't constant through the entire
19 period from 2015 to -- 2010 to 2015.

20 Q. How did it change from 2010 to 2015?

21 MR. MELMAN: Objection, form.

22 A. It probably became more common.

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1 Q. In Paragraph 41 you say, "As time went on,
2 however, it also complicated array field wiring by
3 introducing the requirement for control cabling."
4 Is that accurate?

5 A. That's as stated. Yes.

6 Q. Where is the control cabling located in
7 array field wiring?

8 MR. MELMAN: Objection, form.

9 A. The control cable would have to be led to
10 the actuator device for tracking arrays.

11 Q. Where is the actuator device located for
12 single-access tracking devices?

13 MR. MELMAN: Objection, form and
14 foundation.

15 A. The tracking -- the actuator device is in
16 a tracker on each row at some location.

17 Q. So the data cable -- sorry. Strike that.

18 The control cabling comes from a different
19 location to the actuator device on each row?

20 A. No. Each row would have an actuator
21 device.

22 When you say "control cabling," are you

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1 talking about signal?

2 Q. So in Paragraph 41 you reference control
3 cabling. What do you mean by "control cabling" in
4 Paragraph 41?

5 A. Signal and power.

6 Q. How are signal cables wired in a PV array?

7 A. I don't see control cabling in
8 Paragraph 41.

9 Q. The very last line, do you see "control
10 cabling"?

11 A. I do. Thank you. Control cabling.

12 Q. How are signal cables wired in a PV array
13 field?

14 MR. MELMAN: Objection, form.

15 A. They're wired from -- you said signal
16 wires?

17 Q. Correct. Signal wires.

18 A. They're wired from a controller, which is
19 probably centralized, to individual actuators.

20 Q. When you say the controller is
21 centralized, centralized where?

22 A. Adjacent to or within the array field.

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1 Q. Would there be one controller for the
2 entire array field?

3 MR. MELMAN: Objection, form.

4 A. At least one. The array field may be
5 subdivided.

6 Q. So for its local strings of modules, it
7 would have wires going out to each one of those
8 module strings and attaching to an actuator?

9 MR. MELMAN: Objection to form.

10 A. No.

11 Q. So how does the centralized controller use
12 signal wires?

13 A. They extend it through the centralized
14 controller to an actuator on each -- typically on
15 each row of modules or panels of modules.

16 Q. So the centralized controller has signal
17 wires extending from the centralized controller to
18 an actuator on each row of the modules or panels
19 of modules?

20 MR. MELMAN: Objection.

21 Q. Is that accurate?

22 MR. MELMAN: Objection to form.

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1 A. That is one way. There are instances
2 where one actuator controls multiple rows of
3 panels.

4 Q. But that actuator is still ultimately
5 controlled by the centralized controller?

6 A. By a -- yes.

7 Q. In Paragraph 43, which is page 21 of your
8 declaration, you state that solar PV arrays became
9 commercially viable in the mid to late 2000 time
10 frame. Is that correct?

11 A. That's -- yes. That's stated.

12 Q. What do you mean by "mid to late 2000 time
13 frame"?

14 A. I mean somewhere between 2000 and 2010.

15 Q. On the next page, in Paragraph 47, in the
16 third line up from the bottom of the page, do you
17 see where it says, "A number of DC power strings
18 source circuits are then extended to a string
19 combiner and wired in parallel to aggregate their
20 current"?

21 A. Yes.

22 Q. Is a DC power string the same thing as the

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1 strings of modules?

2 A. Yes. We were discussing.

3 Q. And then in the next paragraph on page 23,
4 about halfway down, do you see, "Typically 4/0,
5 which is about three-quarter inch diameter"? Do
6 you see that?

7 A. Yes, I do.

8 Q. What is 4/0?

9 A. That's 4-aught cable, American wire gauge.

10 Q. What is the relevance of wire gauge?

11 A. It's a standard for the size of wires.

12 Q. Is a 4-aught cable a large cable?

13 A. You would think so. Yes.

14 Q. You don't think so?

15 A. I've seen a lot bigger.

16 Q. In what context were those bigger
17 cables -- sorry. Let me strike that.

18 In what context did you see those bigger
19 cables?

20 A. Electric power systems.

21 Q. PV electric power systems?

22 A. No. Utility electric power systems.

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1 Cable system sizes, American wire gauge. It's
2 easy to look up.

3 Q. What's the largest cable you've seen in a
4 PV electric power system?

5 A. Probably 4 aught.

6 Q. So later in this paragraph you say, "At
7 this stage, wire runs would likely be routed
8 90 degrees from the direction of the rows of PV
9 panels and would typically be placed in trenches
10 with risers to the string combiners." Do you see
11 that?

12 A. Uh-hmm.

13 Q. When you say "at this stage," what stage
14 are you referring to?

15 A. The stage after the combiner, the flow of
16 current starting with the panels into source
17 circuits to a combiner box and then the next
18 stage, the PV output circuits.

19 Q. Is the combiner box the location where the
20 wire runs would likely be routed 90 degrees?

21 MR. MELMAN: Objection.

22 A. No.

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1 MR. MELMAN: Form.

2 Q. At what point in the system would the wire
3 runs likely be routed 90 degrees?

4 A. At the ends of rows of panels.

5 Q. When you say they would typically be
6 placed in trenches with risers to the string
7 combiners, are you referring to output wires that
8 would be trenched?

9 A. It could be both the output wires, the PV
10 output wires per NEC jargon, or PV source
11 circuits. But definitely the PV output wires.

12 Q. In Paragraph 48, are you talking about any
13 specific time period when there would be trenched
14 wires?

15 A. During the 2000-2010 time frame, perhaps a
16 little bit longer.

17 Q. In Paragraph 48 when you're referring to
18 trenching, would that statement be accurate as of
19 2014?

20 A. Yes.

21 Q. Is your statement in Paragraph 48
22 regarding trenching accurate as of today?

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1 A. Less so.

2 Q. How do you know that it's less accurate
3 today?

4 A. Because of things I've learned in the past
5 five years and currently. This is an evolving
6 industry and awareness of evolution changes in the
7 industry.

8 Q. How have you come to learn of the
9 evolution changes in the industry?

10 A. Changes in electrical code, seeing array
11 fields, seeing industry information.

12 Q. When have you seen array fields?

13 MR. MELMAN: Objection to form.

14 A. Large-scale array fields. Every time I
15 have a chance. It's one of those things that
16 catches my attention when I see them.

17 Q. When was the last time you saw a
18 large-scale array field?

19 A. Well, there's a few of them in Colorado
20 where I spend my winters that are fairly big,
21 5 megawatts. I will often if driving by something
22 like that out of curiosity stop and go in and look

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1 at them.

2 I'm trying to think in the last five days
3 whether I've driven by something and just ignored
4 it. They're becoming more and more common.

5 Q. So when you stop by and go in and look at
6 them, are you actually entering the facility or
7 are you just looking from behind a fence or
8 something?

9 A. No. I'm an outsider.

10 Q. So you haven't been able to actually go in
11 and see the details of how the --

12 A. You can see the details from the outside.

13 MR. MELMAN: Let Mr. Dixon finish his
14 question.

15 THE WITNESS: Okay.

16 Q. What details can you see from the outside?

17 MR. MELMAN: Objection, form.

18 A. Configuration of the panels, structure.

19 Q. Would you be able to know if there is
20 trenching by looking at it from the outside?

21 A. You could infer.

22 Q. How would you infer that there's trenching

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1 in the PV array field by looking at it from the
2 outside?

3 A. You would not be able to see -- well, you
4 would see conduits running down into the earth,
5 and you would not see wires supported by other
6 methods above ground.

7 Q. What are some of the other methods of
8 supporting wires above ground?

9 MR. MELMAN: Objection, form.

10 A. There are a number. They're enumerated in
11 Article 690.

12 Q. When was Article 690 -- actually, let me
13 back up.

14 When you refer to Article 690, you're
15 referring to Article 690 of the NEC. Correct?

16 A. Yes, in its multiple editions.

17 Q. When was the first edition of Article 690
18 created?

19 A. That's a good one. In the late 1970s or
20 early 1980s. I believe the late 1970s.

21 Q. Do you know if the first edition of
22 Article 690 enumerated methods of supporting wires

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1 above the ground?

2 A. No, I don't. I would need to go back and
3 read it.

4 Q. Do you know when Article 690 first
5 enumerated methods of supporting wires above the
6 ground?

7 MR. MELMAN: Objection.

8 A. No.

9 MR. MELMAN: Foundation.

10 MR. DIXON: Now might be a good time for
11 lunch. We've been going for about an hour and a
12 half.

13 (Lunch recess, 12:16 p.m. to 1:02 p.m.)

14

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1 A F T E R N O O N S E S S I O N

2 BY MR. DIXON:

3 Q. Good afternoon, Dr. Kern. You had a good
4 lunch?

5 A. Indeed, Mr. Dixon. Thank you.

6 Q. Could you please turn to page 26 of
7 your -- 27 -- sorry -- of Exhibit 2038. And look
8 at Paragraph 60.

9 This paragraph talks about an expectation
10 within the industry from 2000 to 2014 that wire
11 management for solar installations would simply
12 involve selection and application of existing
13 methods and equipment. Is that right?

14 A. Yes.

15 Q. What were some of those existing methods
16 and equipment that you reference in Paragraph 60?

17 A. The ones that are enumerated in
18 Article 690: conduit, cable trays, direct burial
19 in conduit, direct burial without conduit, wire
20 ties.

21 When this industry started, whatever
22 seemed easy. Also, whatever was going to get you

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1 past the local building inspector.

2 Q. At that time, did Article 690 reference
3 hangers?

4 MR. MELMAN: Objection, form.

5 A. Short answer, no.

6 Q. Is there a long answer?

7 A. It still doesn't.

8 Q. Does it use the word "hanger" in
9 Article 690 of the NEC?

10 A. Which year?

11 Q. At any time between 2000 to 2014.

12 A. I don't believe so.

13 Q. Does Article 690 of the NEC use the word
14 "hanger" today?

15 A. I don't believe so. I'm not sure. I'm
16 not positive.

17 Q. Between 2000 and 2014, did any article of
18 the NEC use the word "hanger"?

19 MR. MELMAN: Objection, form.

20 A. I don't know. The NEC is hundreds and
21 hundreds of pages. If I do a search for the word
22 "hanger" and I -- 50 percent odds I find it

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1 somewhere. But in this context, no.

2 Q. So between 2000 and 2014, did Article 690
3 of the NEC reference aboveground cable management
4 systems?

5 A. Literally reference those words
6 "aboveground cable management systems"? Is that
7 what you're asking?

8 Q. Yes.

9 A. I don't know. It certainly enumerates a
10 number of aboveground cable management approaches.
11 I wouldn't say systems.

12 Q. What are the aboveground cable management
13 approaches that Article 690 enumerated between
14 2000 and 2014?

15 A. Was there a question there?

16 Q. Yeah. The question was, what are the
17 aboveground cable management approaches that
18 Article 690 enumerated between 2000 and 2014?

19 A. I know that in 2011 it enumerated a number
20 of them. I don't know if I can relate them
21 exactly, but it's in article -- Paragraph 30B, I
22 believe, Article 690.

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1 Do you have a copy of that to look at?

2 Q. Let me check.

3 A. It's not important to me. It does list --

4 MR. MELMAN: Wait, wait, wait. Mr. Dixon
5 is looking for a copy of Article 690.

6 THE WITNESS: Okay.

7 MR. MELMAN: Let's give him a chance to do
8 that and then ask any additional questions he has.

9 Q. I don't think I have it on me.

10 Can you recall just from memory the
11 aboveground cable management approaches that
12 Article 690 enumerated in 2011?

13 MR. MELMAN: Objection, form.

14 A. I believe it enumerates cable trays,
15 conduit, and several other methods, but I don't
16 explicitly remember. And it had a catchall "and
17 similar," I think was the word, or whatever.

18 Q. What is a cable tray?

19 A. A cable tray is a tray that extends
20 horizontally with elevated sides in which you can
21 lay cable, cables.

22 Q. And a cable tray is an aboveground cable

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1 management approach?

2 A. Yes.

3 Q. Can there be an aboveground conduit to
4 manage cables?

5 A. Yes.

6 Q. What is an example of an aboveground
7 conduit that is used to manage cables?

8 A. Electrical conduit, either EMT, metal; or
9 PVC conduit, tubular.

10 Q. Were cable trays used in solar between
11 2000 and 2014?

12 A. Yes.

13 Q. How were cable trays used in solar
14 applications between 2000 and 2014 suspended above
15 the ground?

16 MR. MELMAN: Objection, form.

17 A. They were attached to the array structure,
18 and wires leading from the solar panels could be
19 laid into the trays and extended distances toward
20 combiner boxes or inverters.

21 Q. What were cable trays attached to within
22 the array structure?

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1 A. Typically the posts supporting the array
2 itself, the panels.

3 Q. Were electrical conduits used in solar
4 applications between 2000 and 2014?

5 A. Yes.

6 Q. How were the electrical conduits used in
7 solar applications between 2000 and 2014 suspended
8 above the ground?

9 MR. MELMAN: Objection, form.

10 A. This is attached to structural members of
11 the ground support of the array itself.

12 Q. When you reference structural members of
13 the ground support of the array, are you talking
14 about the posts supporting the array itself?

15 A. Yes.

16 Q. Were any other structures used to support
17 either electrical conduits or cable trays in a
18 solar array between 2000 and 2014?

19 A. Other than the column supports, there may
20 be additional support from torque tubes between
21 columns, and there may be additional support above
22 the ground in wire runs needed to connect rows of

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1 panels. But by and large, most of the
2 interconnections would be to the structure
3 supporting the panels, the array.

4 Q. You mentioned there may be additional
5 support above the ground in wire runs needed to
6 connect rows of panels.

7 What additional support would there be in
8 that scenario?

9 A. Footings on the ground, concrete or steel,
10 upon which the cable tray or conduit could be
11 attached and supported.

12 Q. Between 2000 and 2014, were cable ties
13 used to manage cables in PV arrays?

14 A. Probably in certain instances cable ties
15 could be used to attach jumper cables between
16 modules to the module frames, but they would be
17 discouraged for so-called home runs or so-called
18 home run wiring.

19 Q. What are jumper cables between modules?

20 A. Most module manufacturers will provide
21 pigtails for each module so that they can be
22 quickly connected to form a series string.

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1 Q. What's the difference between a cable tie
2 and a cable hanger?

3 A. A cable tie is a -- typically plastic but
4 possibly metal device that you can use to cinch a
5 cable to an existing structure to support it.

6 A cable hanger would rely on gravity to
7 capture the cable.

8 Q. So jumping ahead a little bit to
9 Paragraph 82, which is on page 36 of Exhibit 2038,
10 do you recognize this section of your report or
11 your declaration?

12 A. Oh, let me go back to see what the heading
13 is. Overview of the '291 patent. That's the
14 section, apparently.

15 Q. So in Paragraph 82, the last sentence, you
16 discuss dependent Claims 2 through 4 of the '291
17 patent. Right?

18 A. It mentions dependent Claims 2, 3, and 4
19 of the '291 patent.

20 Q. And dependent Claims 2, 3, and 4 of the
21 '291 patent claim cable hangers with at least
22 three, four, and five cable-carrying surfaces. Is

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1 that right?

2 MR. MELMAN: Objection to form.

3 A. I believe that's correct.

4 Q. How would you modify the hanger shown in
5 Figure 2 at the top of page 36 here to have three
6 cable-carrying surfaces?

7 MR. MELMAN: Objection, form.

8 A. Well, I think actually the Figure 2 shows
9 three cable-carrying surfaces.

10 Q. And which surfaces are the three
11 cable-carrying surfaces?

12 A. One is listed as 10. Immediately to the
13 right of 10 there is a cable-carrying surface that
14 is not numbered. And directly above 10 there is a
15 cable-carrying surface with -- shown with a cable
16 in it.

17 Q. How would you modify the cable hanger
18 disclosed in Figure 2 to have five cable-carrying
19 surfaces?

20 MR. MELMAN: Objection, form.

21 A. I think you would repeat the up and down
22 undulation of 10 leading to the unnumbered

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1 cable-carrying surface to its right and just
2 repeat that up and down.

3 Q. Would you have any concerns about whether
4 the cable would still be -- the cable manager
5 would still be able to function and support cables
6 used in PV arrays?

7 A. Going to three?

8 Q. Going to five cable-carrying surfaces.

9 A. No. I have no problem with that.

10 Q. So it would be a relatively simple
11 modification to make to the hanger in Figure 2?

12 MR. MELMAN: Objection, form.

13 A. Provided -- yes, provided the materials
14 and the strength of the materials were properly
15 adjusted to reflect the intended weight-loading
16 capacity that you'd put onto it.

17 Q. How would you go about adjusting the
18 strength of the materials to reflect the intended
19 weight-loading capacity?

20 MR. MELMAN: Objection, form and beyond
21 the scope.

22 A. Make it thicker, use stronger material.

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1 Two basic approaches.

2 Q. So if you'd go to page 44 -- actually,
3 sorry. Page 37 of Exhibit 2038. There's a
4 heading here that says, "Claim Interpretation."
5 Is that right?

6 A. Yes.

7 Q. What is your understanding of how claim
8 interpretation factors into this proceeding?

9 MR. MELMAN: Objection to form. It calls
10 for a legal conclusion.

11 A. Claim interpretation. I'm trying to think
12 of the legal word for -- the meaning of the
13 word -- construction.

14 Claim interpretation, I'm not sure. It's
15 a legal process of interpreting what is in a claim
16 and what is not in a claim.

17 Q. Do you know what materials you consider
18 when interpreting a claim?

19 MR. MELMAN: Objection, form.

20 A. I'm not a lawyer, but I understand that
21 the body of the claim and the preamble of the
22 claim may or may not be limiting, is the

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1 terminology I understood.

2 Q. So when you're understanding the meaning
3 of a claim, do you consult anything other than the
4 body of the claim and the preamble of the claim?

5 MR. MELMAN: Objection, form.

6 A. If needed to understand the claim, the
7 body of the claim, or to find the definition of
8 what is meant by wording in the body of the claim,
9 you can go back to the preamble of the claim to
10 look for that definition or look for that meaning.
11 And from the preamble of the claim, you can go
12 back to the specification, I believe it's called,
13 to further understand the meaning and
14 interpretation of the claim.

15 Q. So in Paragraph 6 of Exhibit -- sorry.
16 Strike that.

17 In Section 6, titled "Claim
18 Interpretation" of Exhibit 2038, do you express an
19 opinion regarding the proper interpretation of the
20 term "electrical cables"?

21 A. Yes. I believe so.

22 Could you show me where I refer to

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1 electrical cable in that, point it out?

2 Yeah.

3 Q. So just looking at the subsection headings
4 in Section 6 of Exhibit 2038, do you identify
5 electrical cables as a term in meeting claim
6 interpretation?

7 MR. MELMAN: Objection to form.

8 A. Yes, I believe the word "electrical
9 cables" or . . .

10 Do you have a copy of the '291 patent,
11 please? I'd like to look at the exact wording.

12 Q. This is Exhibit 1001.

13 (Exhibit 1001, previously marked, is not
14 attached to the transcript.)

15 A. So we are talking about Claim 1. And in
16 Claim 1, Column 10 -- I forget the legal term, but
17 the body claims, the second one refers to at least
18 one electrical cable of the plurality of
19 electrical cables.

20 And the plurality has no antecedent unless
21 you go back to the preamble or precedent. I'm not
22 sure which is the right word. So the plurality of

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1 electrical cables is ambiguous until you look up
2 to the preamble and you see "a plurality of
3 electrical cables."

4 Q. I'm handing you what's previously been
5 marked as Exhibit 2001.

6 (Exhibit 2001, previously marked, is not
7 attached to the transcript.)

8 Q. So if you go to page 44 of Exhibit 2001 --
9 let's back up.

10 Do you recognize Exhibit 2001?

11 A. Yes. I'll look for the signature page
12 just to be sure. Yup.

13 Q. What is Exhibit 2001?

14 A. It is the declaration of Edward Kern,
15 Edward C. Kern, Jr., Ph.D., in support of the
16 patent owner's preliminary response.

17 Q. Is this the declaration you submitted in
18 the spring of 2024?

19 A. Yes.

20 Q. So if you go to page 44 of Exhibit 2001
21 and go specifically to Paragraph 107, first
22 sentence.

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1 A. Getting there.

2 Q. The first paragraph of -- sorry -- the
3 first sentence of Paragraph 107 states, "In the
4 context of the '291 patent, a POSITA would
5 understand that electrical cables are DC and AC
6 current-carrying cables that provide power, i.e.,
7 power cables." Did I read that correctly?

8 A. Yes.

9 Q. Do you agree with that statement today?

10 A. Can you explain to me, before I answer, in
11 the context of the '291 patent, the '291 patent is
12 about solar power systems. So in the context of
13 solar power systems? How limiting are you asking
14 that question? How limiting is the context of the
15 '291 patent?

16 Q. This is your statement.

17 A. Okay. Broadly --

18 Q. I'm deferring to your interpretation.

19 A. Broadly, I would say that the POSITA
20 understands electrical cables to mean power
21 cables, which can be either AC or DC.

22 Q. Did you review the Patent Trial and Appeal

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1 Board's institution decision before authoring your
2 July 2024 declaration in this matter?

3 A. The institution of the review, inter
4 partes review?

5 Q. Correct.

6 A. Yes. But not committed to memory, by a
7 long shot.

8 Q. Okay. So this first statement in
9 Paragraph 107, do you know if you made a similar
10 statement in Exhibit 2038, your July 2024
11 declaration?

12 A. I don't recall. I don't recall.

13 Q. Would you be surprised if you did not make
14 the same statement in Exhibit 2038?

15 A. No.

16 Q. I'll represent that you didn't make the
17 same statement in Exhibit 2038 --

18 A. Would I be surprised, you said, if I
19 didn't? And I said no.

20 Q. I'm saying, I've looked at Exhibit 2038.
21 And after my review, I haven't been able to
22 identify a statement that electrical cables in the

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1 context of the '291 patent are DC and AC
2 current-carrying cables that provide power, i.e.,
3 power cables.

4 A. Yeah.

5 MR. MELMAN: Wait. Mr. Dixon is just
6 making a representation. He hasn't asked a
7 question yet.

8 So let him ask his question.

9 Q. Does that sound correct to you? Did you
10 make that statement in Exhibit 2038?

11 A. I don't recall. I could read it and look
12 for it.

13 Q. I'm handing you a document that's been
14 marked Paper 17.

15 MR. DIXON: I want to go off the record
16 really briefly to discuss how we want to mark
17 this.

18 (Off the record, 1:37 p.m. to 1:37 p.m.)

19 BY MR. DIXON:

20 Q. I'm handing you a document that's marked
21 Paper 17.

22 (Paper 17, previously marked, is not

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1 attached to the transcript.)

2 Q. Have you seen this document before?

3 A. Yes. I believe so.

4 Q. Do you recognize this document as the
5 decision granting institution of inter partes
6 review by the Patent Trial and Appeal Board?

7 A. Yes.

8 Q. Can you please go to page 8 of Paper 17.
9 And there is a heading that says "Claim
10 Interpretation." Do you see that?

11 A. Yup. I do.

12 Q. And four lines from the bottom of this
13 page, the Paper 17 says, "Patent owner argues that
14 electrical cables are power cables such as DC and
15 AC current-carrying cables that provide power and
16 they are not Category 5 cabling for
17 high-performance communications and aerial cables
18 that do not carry current." Do you see that?

19 A. Uh-hmm. Yes.

20 Q. And then if you go to the next page,
21 page 9 of Paper 17, do you see that it says, "On
22 the current record, we preliminarily interpret

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1 electrical cables as wiring that conducts current
2 or signals. The parties are encouraged to present
3 relevant intrinsic and extrinsic evidence
4 regarding the meaning of this term and whether the
5 preamble should be construed as limiting." Did I
6 read that right?

7 A. Yes.

8 Q. Did you present any opinions in
9 Exhibit 2038 regarding the meaning of "electrical
10 cables" outside of your discussion of whether the
11 preamble is limiting?

12 MR. MELMAN: Object to the form.

13 A. Could you restate? Not restate but
14 repeat.

15 Q. Did you present any opinions in
16 Exhibit 2038 regarding the meaning of the term
17 "electrical cables" outside of your discussion
18 regarding whether the preamble is limiting?

19 MR. MELMAN: Objection, form.

20 A. I don't recall.

21 Q. You don't have a section -- sorry.

22 You don't have a subsection of Section 6

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1 claim interpretation that is titled "The Meaning
2 of Electrical Cables," do you?

3 A. I don't see one. Can you point it out if
4 it exists?

5 Q. I don't see one either.

6 In Section 6, claim interpretation, do you
7 say anywhere that electrical cables are power
8 cables such as DC and AC current-carrying cables?

9 A. I don't believe so.

10 Q. So in Paragraph 88 of Exhibit 2038, you
11 provide the meaning of organizing a plurality of
12 electrical cables extending from a plurality of
13 solar panels. Is that an accurate statement?

14 A. In Paragraph 88 -- yes.

15 Q. And you say that organizing a plurality of
16 electrical cables extending from a plurality of
17 solar panels is properly construed as
18 organizing -- sorry. Let me strike that.

19 In Paragraph 88, you define organizing a
20 plurality of electrical cables extending from a
21 plurality of solar panels as having its ordinary
22 and customary meaning specifically separating the

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1 electrical cables extending from the solar panels.

2 Is that an accurate statement of your
3 definition?

4 A. Yes.

5 Q. Is it fair to say that your construction
6 replaces "organizing" with "separating"?

7 MR. MELMAN: Objection, form.

8 A. Replaces? I'm not sure your meaning.

9 Q. Is it fair to say that instead of saying
10 "organizing a plurality of electrical cables,"
11 your construction says "separating the electrical
12 cables"?

13 MR. MELMAN: Objection, form.

14 A. I believe that in the context of extending
15 from a plurality of solar panels pretty much
16 defines the cables as being the DC power cables.

17 And when you're dealing with DC power
18 cables, as I said earlier, good practice is to
19 organize. And one way to organize is to separate.

20 So "organizing" and "separating" in this
21 context to me have an equivalency.

22 Q. In this context, is organizing and

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1 separating -- in this context, do organizing and
2 separating have a one-to-one equivalency?

3 MR. MELMAN: Objection, form.

4 A. Not necessarily.

5 Q. Is that because one way to organize is to
6 separate?

7 MR. MELMAN: Objection, form.

8 A. I think the preferred way would be to
9 separate. Again, this is all coming from the
10 National Electrical Code requirements.

11 Q. What is another way to organize cables?

12 Sorry. Strike that.

13 What is another way to organize electrical
14 cables extending from solar panels?

15 MR. MELMAN: Objection, form.

16 A. I'm not sure I know of any. Organizing
17 and separating happen together, happen when one
18 does something sometimes.

19 Q. Would you say that cable bundling is a
20 form of cable organizing?

21 MR. MELMAN: Objection, form.

22 A. If the cables are of the same nature, then

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1 bundling them would be organizing them. The same
2 type, nature.

3 Q. Couldn't you bundle cables of a different
4 nature and still have them be organized?

5 A. They'd be commingled. I wouldn't call
6 that organized.

7 Q. If they were different colors, could they
8 be organized within a bundle?

9 MR. MELMAN: Objection, form.

10 A. I'd say it more they wouldn't be so much
11 as organized but identifiable.

12 Q. Would you say that a set of cables of a
13 different nature that are in the same bundle is
14 more organized than a set of cables of a different
15 nature laying on the ground?

16 MR. MELMAN: Objection, form.

17 A. More organized than lying on the ground in
18 random spaghetti-like nature, sure. More
19 organized in a useful way? Not sure.

20 Q. But bundling them would still be
21 organizing them in that instance, wouldn't it?

22 MR. MELMAN: Objection, form.

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1 A. I suppose so. I don't have -- you're in a
2 hypothetical situation that brings in more than is
3 within the scope of this. The notion of cables
4 strewn on the ground are less organized than
5 cables bundled? Sure.

6 Q. Were cables previously organized when they
7 were trenched in a solar array?

8 MR. MELMAN: Objection, form.

9 A. Trenched. I would say no.

10 Q. So cables in a bundle are more organized
11 than cables in a trench in a solar array?

12 MR. MELMAN: Objection, form.

13 A. The organization of the cable is in the
14 eyes of the perceiver. You can't perceive cables
15 in a trench.

16 So what is the usefulness of being
17 organized if you can't see them? This is all
18 about orderliness of an electrical installation.
19 And things are organized for the benefit of safety
20 and future maintenance and operation of the
21 system.

22 Q. So wouldn't you be able to have a set of

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1 black cables on one side of the bundle and a set
2 of red cables on another side of a bundle and that
3 would serve the purpose of being orderly in an
4 electrical installation?

5 MR. MELMAN: Objection, form and beyond
6 the scope.

7 A. More orderly but not necessary. If you're
8 referring to cables being of different polarities,
9 for example.

10 Q. So if you had a bundle of cable that was
11 black on one side and red on the other regardless
12 of polarities, isn't that organizing those cables?

13 MR. MELMAN: Objection to form and beyond
14 the scope.

15 A. Cables are black on one side and red on
16 the other?

17 Q. Yes. Just the color of the shielding.

18 A. The jacket will be two colors?

19 Q. So let's say you have six cables in a
20 cable bundle. Three of their jackets are red.
21 Three of their jackets are black. They're split
22 right down the Equator of the bundle between red

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1 and black.

2 Do you understand the hypothetical?

3 A. Yeah.

4 Q. Would you say that those cables are
5 organized?

6 MR. MELMAN: Objection to form and beyond
7 the scope.

8 A. In reflecting on this conversation, I
9 would say that they are not more organized, that
10 organization means if you start with an entire
11 population of anything, of things, and you keep
12 them in one bowl, whatever, they are not
13 organized.

14 Organization begins when you separate
15 things into groups.

16 Q. In the hypothetical that we're discussing,
17 wouldn't they be identified as being in a red
18 group or a black group?

19 MR. MELMAN: Same objections.

20 A. No. They would be identified as being red
21 or black because they would not be grouped.

22 Q. Why wouldn't they be grouped if they were

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1 all the same color?

2 A. They aren't all the same color in your
3 hypothetical.

4 Q. The three black cables are all the same
5 color in my hypothetical. Correct?

6 A. Yes.

7 Q. The three red cables are all the same
8 color in my hypothetical. Correct?

9 A. Correct.

10 Q. So those are grouped into black cables and
11 red cables. Right?

12 A. No. They're identified as black cables or
13 red cables. Grouping would be separating them
14 into separate bundles.

15 Q. Is "grouping" a technical term of art?

16 MR. MELMAN: Objection to form and beyond
17 the scope and relevance.

18 A. Grouping is not, in my experience -- what
19 did you say, a technical form of art?

20 Q. Term of art.

21 A. Term of art. No. I don't know. It's
22 beyond my use of the English language.

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1 Q. Do you know if the patent, Exhibit 1001,
2 uses the term "organizing" in the specification?

3 A. In the specification?

4 Q. So if I point you to Column 4, line 60.
5 It should be in the objectives of the invention.

6 A. Further objectives of the present
7 invention. Yup. Okay.

8 Q. So one objective is to -- one object of
9 the invention is to provide a more organized
10 system to support cables in the solar, mining, and
11 electrical industries. Correct?

12 A. That's exactly what it says.

13 Q. And then if you look at the next further
14 objective, it says, "It is a further object of the
15 present invention to provide a cable support
16 system that provides a safer, secure, strong, and
17 effective separation of cables and wires as to
18 protect the electrical performance of cables in
19 solar, mining and electrical applications."

20 Is that accurate?

21 MR. MELMAN: Objection to form.

22 A. That's what it says.

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1 Going back to your prior, however, "It is
2 a further object of the present invention to
3 provide a more organized system to support
4 cables," blah, blah, blah.

5 "Organized" there refers to system, a
6 system to organize -- I'm wondering which -- in
7 the context of this claim, whether it's -- not
8 this claim. This paragraph. It's an organized
9 system or is it a system to organize? Is there a
10 difference in meaning there?

11 Q. Is there a difference in meaning to you?

12 A. I'd have to think about it. Usually you
13 can take a sentence and strike the prepositional
14 phrase at the end and then the meaning would be to
15 provide a more organized system.

16 I think it's ambiguous.

17 MR. MELMAN: We've been going for about an
18 hour. Maybe it's time for a short break.

19 MR. DIXON: I'm just about to wrap up this
20 line.

21 MR. MELMAN: Okay.

22 Q. So is there a difference in meaning to you

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1 for -- sorry.

2 Is there a difference in meaning to you
3 between "a more organized system" and "a system to
4 organize"?

5 A. Yes.

6 Q. What is that difference?

7 A. One is an organized system. The system is
8 organized. The other is a system to organize
9 something else such as support cables, cables.

10 Q. How would a system be organized?

11 MR. MELMAN: Objection to form, beyond the
12 scope.

13 A. It would be managed well if it were
14 organized, is one way I think of it.

15 Q. Would a system to organize be an organized
16 system?

17 A. Would a system to organize be a more
18 organized system?

19 This is getting so convoluted. I'm not
20 sure I can answer that.

21 Q. And is "organizing" a technical term of
22 art in the solar industry?

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1 A. No.

2 Q. Is it a technical term of art in the NEC?

3 A. I am not sure. And actually, I do not
4 know what would make something a technical term of
5 art in the solar industry, what authority has
6 jurisdiction over that kind of definition.

7 Q. Your experience.

8 A. What?

9 Q. If you were the authority?

10 A. God help me if I were the authority.

11 MR. DIXON: Okay. We can take a break
12 right now.

13 (Recess, 2:04 p.m. to 2:19 p.m.)

14 BY MR. DIXON:

15 Q. Dr. Kern, before the break we were talking
16 about the meaning of organizing a plurality of
17 electrical cables extending from a plurality of
18 solar panels. Do you recall that?

19 A. Yes.

20 Q. And your construction is "ordinary and
21 customary" meaning specifically separating the
22 electrical cables extending from the solar panel.

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1 That's right?

2 A. Yes.

3 Q. Does separating -- sorry. I didn't mean
4 to --

5 A. I'm just trying to find the right page.
6 Got it.

7 Q. It should be page 39, I think, of your
8 declaration.

9 Does separating the electrical cables
10 extending from the solar panels require separation
11 of different types of electrical cables?

12 A. Different types of electrical cables.
13 When you say "type of cable," what do you mean?
14 The color? The purpose?

15 Q. So for example, does it require separating
16 AC current-carrying cables from DC current-
17 carrying cables?

18 A. The code has a requirement for that. Yes.

19 Q. Does your articulation of the ordinary and
20 customary meaning specifically separating the
21 electrical cables extending from the solar panels,
22 does separating the electrical cables mean

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Transcript of Edward C. Kern, Jr., Ph.D.

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1 separating AC current-carrying cables from DC
2 current-carrying cables?

3 A. It means separating AC from DC
4 current-carrying cables. But ordinarily AC
5 current-carrying cables don't extend from solar
6 panels, so it would be a little bit of a nuance
7 there. That's all.

8 Q. Ordinarily where do AC current-carrying
9 cables extend from?

10 A. A typical utility source of AC
11 electricity.

12 Q. In what instances would AC current-
13 carrying cables extend from solar panels?

14 A. Only in the instance where the inverter
15 was built into the solar panel and it created AC
16 electric power at the solar panel.

17 Q. Does your ordinary and customary meaning
18 specifically separating the electrical cables
19 extending from the solar panels require separation
20 of data cables from AC current-carrying cables and
21 DC current-carrying cables?

22 A. Could you rephrase, explaining whether all

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1 of these are extending from the solar panels?

2 Because the way you said it, they're not all
3 extending from the solar panels.

4 Q. So I guess the --

5 A. Or likely to extend from solar panels.

6 Q. So are data cables likely to extend from
7 solar panels?

8 A. No.

9 Q. And I think we spoke earlier about this,
10 but data cables are likely to extend from a
11 centralized command --

12 A. Controller.

13 Q. Controller. That's right. Thank you.

14 Would you ever have a scenario where AC
15 and DC current-carrying cables are extending from
16 a solar panel at the same time?

17 MR. MELMAN: Objection, form.

18 A. No.

19 Q. Would a solar array ever have a scenario
20 where one module string is outputting AC current
21 and another module string within the array is
22 outputting DC current?

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1 A. That's a hypothetical which in some
2 remote -- the short answer, no.

3 The long answer, someone could do it if
4 they wanted to, but I've never heard of it.

5 Q. If you could turn to page 40 of
6 Exhibit 2038. In Paragraph 97, you discuss
7 Caveney's disclosure of cable supports that are
8 secured directly to any fastener or structure. Is
9 that accurate?

10 A. Yes.

11 Q. It's your opinion that all of the
12 structures specifically disclosed in Caveney are
13 preexisting building structures. Right?

14 MR. MELMAN: Objection, form.

15 A. That's what I say here. Yes. Preexisting
16 building structures.

17 Q. Is a ladder rack a structure?

18 MR. MELMAN: Objection, form.

19 A. No. A structure -- it's a structure but
20 not in the structure of the building.

21 Q. So the structures specifically disclosed
22 in Caveney are not all preexisting building

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1 structures because a ladder rack is not a
2 structure in the building -- sorry. Strike that.

3 MR. MELMAN: Wait, wait. Mr. Dixon is
4 asking a question.

5 Q. The structures specifically disclosed in
6 Caveney are not all preexisting building
7 structures because, as you just testified, a
8 ladder rack is not a structure in the structure of
9 the building. Is that right?

10 MR. MELMAN: Objection to form.

11 A. A ladder rack is a structure to support
12 cables. It is not a structure to support the
13 building itself.

14 Q. What do you mean by "preexisting building
15 structures" in Paragraph 97?

16 A. Caveney lists I beams, ladder racks,
17 which -- I believe he lists ladder racks. I'm not
18 positive. If he does, they would be installed
19 prior to the installation of any kind of cable
20 support system hung from those ladder racks.

21 Q. So when you use the term "preexisting,"
22 you mean prior to the installation of any kind of

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1 cable support system?

2 A. The ladder rack is a cable support system.

3 Q. So Caveney is not a preexisting building
4 structure, then. Right?

5 MR. MELMAN: Objection, form.

6 Q. Sorry. That was a terrible question.

7 A. Mr. Caveney is certainly not a preexisting
8 building structure.

9 Q. The patent can't support any part of a
10 building.

11 So a ladder rack is not a preexisting
12 building structure. Right?

13 MR. MELMAN: Objection, form.

14 A. Semantics. A ladder rack could have been
15 installed before a Caveney hanger was installed.
16 So it could be preexisting, but it is not part of
17 the building structure, which I mean to support
18 the floors and the roof and the walls of a
19 building.

20 Q. So in Paragraph 97 when you say
21 "preexisting building structure," are you
22 referring to parts of the building structure that

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1 support the floors and the roof and the walls of a
2 building?

3 A. Yes. I think a ladder rack in that
4 situation is borderline between the building
5 structure. An I beam is certainly part of the
6 building structure. A joist is certainly part of
7 a building structure. A ceiling or a wall is part
8 of the building structure or envelope.

9 A ladder rack might be included as
10 something that a contractor would build in a data
11 room or, you know, in a location in the building
12 before the data contractor, whatever, wiring
13 contractor came in. So it's borderline. But the
14 others are all part of the building structure.

15 Q. Is it fair to say that a ladder rack is a
16 different type of structure than the rest of the
17 structures specifically identified in Caveney?

18 A. As shown in Paragraph 97, I'd say yes. In
19 the context of Paragraph 97.

20 Q. And the ladder rack is a structure that is
21 a cable support system?

22 MR. MELMAN: Objection, form.

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1 A. Yes. Similar to a cable tray. And as a
2 matter of fact, I'm not sure I can distinguish
3 between ladder rack and cable tray. I mean, there
4 must be, but it's beyond my knowledge of that
5 detail.

6 Q. Does Caveney say that its structures must
7 be indoor?

8 MR. MELMAN: Objection, form.

9 A. I don't believe so. It might.

10 Q. Would you like to review Caveney?

11 A. The Panduit product literature or the
12 Caveney patent?

13 Q. The Caveney patent, Exhibit 1003.

14 A. Could you point out where in Caveney it
15 says it, that it's limited or not limited to
16 indoors?

17 (Exhibit 1003, previously marked, is not
18 attached to the transcript.)

19 Q. My question is, does Caveney anywhere say
20 that it is limited to being indoor?

21 MR. MELMAN: And before Dr. Kern answers,
22 I'm going to object to that question based on

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1 form.

2 A. Very quick read, very quick read, it does
3 not identify anyplace where it says it is limited
4 to indoors.

5 Q. Is there any reason the hangers disclosed
6 in Caveney couldn't be used outdoors?

7 MR. MELMAN: Objection, form.

8 A. The hangers disclosed in Caveney within
9 the context of the specification suggest very
10 strongly to me that these are for indoor locations
11 that are not subject to high winds, rain, rodents,
12 high temperatures.

13 The cables that are suggested for use in
14 Caveney don't suggest outdoor-rated cables.
15 Nothing in it suggests outdoor applications. It
16 all appears to me to be focused on data centers,
17 office complexes with Internet -- Ethernet wiring,
18 that sort of thing.

19 Further, the hangers in Caveney do not
20 seem to have provisions to keep cables from
21 escaping from them. They're open hangers facing
22 upward. They don't have enclosures holding them

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1 down, with the exception perhaps of cable ties,
2 which are not a good thing to use outside,
3 outdoors.

4 Q. Is it your opinion that open hangers
5 facing upward would not teach the -- bear with me
6 one moment -- the cable-carrying surface
7 limitation -- limitations, plural, of the '291
8 patent?

9 MR. MELMAN: Objection, form.

10 A. Can you point me to exactly where you are
11 referring to there.

12 Q. So for Claim 1 of the '291 patent, for
13 example, it teaches "a plurality of cable hangers
14 structured to be disposed along, and suspended
15 from, the messenger wire, each cable hanger having
16 a plurality of cable-carrying surfaces, each
17 cable-carrying surface being structured to support
18 at least one electrical cable of the plurality of
19 electrical cables."

20 My question is, does Caveney's open
21 hangers facing upward teach the plurality of
22 cable-carrying surfaces, each cable-carrying

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1 surface being structured to support at least one
2 electrical cable of the plurality of electrical
3 cables?

4 MR. MELMAN: Objection, form, and beyond
5 the scope.

6 A. Does Caveney teach. Caveney does show
7 cable-carrying surfaces capable of supporting at
8 least one electrical cable -- with a broad
9 definition of "cable," because Caveney's are not
10 very strong -- of a plurality of electrical
11 cables.

12 In a limited way, yes, that captures it.
13 Leave it at yes.

14 Q. What do you mean "in a limited way"?

15 A. Well --

16 MR. MELMAN: Wait, wait, wait. Let Mr. --
17 I don't know if Mr. Dixon is finished with asking
18 his question, but let him finish.

19 Q. I'm finished now.

20 MR. MELMAN: Objection, form, and beyond
21 the scope.

22 Q. So you said that "In a limited way, yes,"

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1 Caveney captures the plurality of cable hangers
2 limitation of Claim 1 of the '291 patent. Right?

3 A. Right.

4 Q. What do you mean by "in a limited way" it
5 captures that limitation of Claim 1 of the '291
6 patent?

7 MR. MELMAN: Same objections.

8 A. I was thinking that the descriptions and
9 the drawings in Caveney show U-shaped surfaces,
10 cable-carrying surfaces, but they're very shallow
11 whereas in the '291 patent they are shown as
12 significantly deeper such that cables would not
13 escape from them upward.

14 And in addition, in '291 -- I'm not sure
15 if it's claimed, but it's shown that the cable
16 hangers enclose the cables so that they cannot
17 jump out of the hanger as they might in Caveney,
18 if Caveney is exposed to any kind of atmosphere,
19 any environmental conditions.

20 Again, that's my looking at the
21 specifications, not at the claims.

22 Q. Do you think that claims require that the

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1 cable hangers enclose the cables so that they
2 can't jump out of the hanger, as they might in
3 Caveney?

4 MR. MELMAN: Objection, form, and beyond
5 the scope.

6 A. I'm not a lawyer.

7 Q. You're a person of ordinary skill in the
8 art, though. Right?

9 A. More so, I think.

10 Q. And so if you look at Claim 1 of the '291
11 patent, Exhibit 1001, in reading that claim does
12 it require that the cable hangers enclose the
13 cables so that they can't jump out of the hanger?

14 MR. MELMAN: Objection to form and beyond
15 the scope.

16 A. It doesn't appear to state it.

17 Q. So it's fair to say that Caveney discloses
18 the plurality of cable hangers limitation of
19 Claim 1 of the '291 patent?

20 MR. MELMAN: Objection, form.

21 A. Caveney discloses -- just repeat one time.

22 Q. The limitation -- let me restart the

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1 question so it's clear.

2 So it's fair to say that Caveney discloses
3 the limitation in Claim 1 of the '291 patent,
4 beginning with the phrase "a plurality of cable
5 hangers." Correct?

6 MR. MELMAN: Objection, form.

7 A. Certainly not.

8 Q. Why not?

9 A. Because Caveney, if you continue to read
10 on in that claim, talks about suspended from a
11 messenger wire. And Caveney in no way is
12 structured to be supported from a messenger wire.

13 The only similarity is a cable-carrying
14 surface.

15 Q. So is it fair to say that Caveney
16 discloses the limitations in Claim 1 of the '291
17 patent that cover the cable-carrying surfaces of
18 the hanger?

19 MR. MELMAN: Objection, form.

20 A. I don't know. I don't think those are
21 separable. Are they? This one body claim can
22 have multiple, multiple parts. I don't know. I'm

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1 not a lawyer.

2 Q. Well, one limitation is being suspended
3 from and disposed along a messenger wire. Right?

4 MR. MELMAN: Objection, form, and calls
5 for a legal conclusion.

6 A. You just read something to me. Yeah.
7 Thank you. What was the question?

8 Q. Claim 1 says "a plurality of cable hangers
9 structured to be disposed along, and suspended
10 from, a messenger wire." Right?

11 MR. MELMAN: Objection, form.

12 Q. And then it goes on to disclose how those
13 cable-carrying surfaces of the hanger are
14 arranged. Is that fair?

15 MR. MELMAN: Objection to form.

16 A. How they're arranged? No, it doesn't say
17 anything about how they're arranged.

18 Q. Claim 1 goes on to disclose how the
19 cable-carrying surfaces are structured. Right?

20 MR. MELMAN: Objection, form.

21 A. Being structured. Yes.

22 Q. What does "being structured" mean?

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1 MR. MELMAN: Objection, form, and calls
2 for a legal conclusion.

3 A. Designed.

4 Q. So doesn't Caveney disclose a cable hanger
5 having a plurality of cable-carrying surfaces,
6 each cable-carrying surface being structured to
7 support at least one electrical cable of the
8 plurality of electrical cables?

9 MR. MELMAN: Objection to form and beyond
10 the scope.

11 A. I think it's limited by the preamble to
12 that, not to that claim but the preamble to that
13 body claim.

14 Q. Setting aside the preamble, does Caveney
15 disclose a cable hanger having a plurality of
16 cable-carrying surfaces, each cable-carrying
17 surface being structured to support at least one
18 electrical cable of a plurality of electrical
19 cables?

20 MR. MELMAN: Objection to form.

21 A. You said excluding -- you're saying take
22 that body claim and exclude the first two

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1 sentences, two lines?

2 Q. Yes.

3 MR. MELMAN: Do you have the question? Do
4 you still have the question from Mr. Dixon?

5 THE WITNESS: Yeah.

6 A. If it were written that way, perhaps.
7 It's not written that way.

8 Q. So now I'm just asking, does Caveney
9 disclose a cable hanger having a plurality of
10 cable-carrying surfaces, each cable-carrying
11 surface being structured to support at least one
12 electrical cable of a plurality of electrical
13 cables?

14 MR. MELMAN: Objection, asked and answered
15 multiple times.

16 A. I think Caveney discloses exactly what's
17 written in a plurality of electrical --
18 electric -- excuse me -- a plurality of cable
19 hangers structured to be disposed along, and
20 suspended from, the messenger wire, each cable
21 hanger having a plurality of cable-carrying
22 surfaces, each cable-carrying surface being

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1 structured to support at least one electric cable
2 of the plurality of electric cables.

3 That's what is disclosed in this, and I
4 don't see that in Caveney at all.

5 Q. Turning to page 43, there's a subheading
6 titled "Almy." Right?

7 A. Uh-hmm.

8 (Exhibit 1004, previously marked, is not
9 attached to the transcript.)

10 Q. I'm handing you Exhibit 1004.

11 A. Thank you.

12 Q. Do you recognize Exhibit 1004?

13 A. Yes.

14 Q. This is the Almy reference. Correct?

15 A. Yes.

16 Q. Who is the inventor of Almy?

17 MR. MELMAN: Objection, form, calls for a
18 legal conclusion, beyond the scope.

19 A. Objection. I didn't hear you clearly.

20 Q. Who does Almy identify as the inventor on
21 page 1 of Exhibit 1004?

22 MR. MELMAN: Same objections.

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1 A. Charles Almy, number line 76 or
2 something 76.

3 Q. Are you familiar with Charles Almy?

4 A. I have not met him personally. No.

5 Q. Have you heard of Charles Almy?

6 A. Only through the work I've done on this
7 case.

8 Q. Do you see under "Correspondence Address"
9 it says SunPower/BSTZ?

10 A. Yes.

11 Q. Are you familiar with SunPower?

12 A. Yes.

13 Q. What is SunPower?

14 A. SunPower was a corporation founded by a
15 colleague of mine named Dick Swanson to
16 manufacture solar cells, solar modules, and
17 ultimately in 2007 they acquired another company
18 that I'm familiar with and went into the
19 photovoltaic systems business, PV systems
20 business.

21 I don't know who BSTZ is. Oh, wait a
22 minute. That's the name of the law firm right

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1 afterwards. Sorry.

2 Q. Do you know if Charles Almy worked for
3 SunPower?

4 A. I don't. I think he worked independently,
5 however.

6 Q. Does Almy disclose a messenger wire?

7 A. Almy discloses in the specification 202A,
8 202B in the drawings Figure 2A, which I associate
9 with being a messenger wire or equate to being a
10 messenger wire.

11 Q. Does Almy disclose hangers suspended from
12 either 202A or 202B in Figures 2A and 2B?

13 MR. MELMAN: Objection, form.

14 A. Almy discloses -- uses a different term,
15 wire loops, which have somewhat of an equivalency
16 to a hanger but not entirely.

17 Q. What's the difference between a wire loop
18 and a hanger?

19 A. A wire loop being a loop is a singular --
20 encloses a singular area surface. A wire loop
21 would serve to bundle but not to separate.

22 Q. Do all hangers separate?

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1 MR. MELMAN: Objection, form.

2 A. No.

3 Q. So some bundles could -- sorry. Strike
4 that.

5 Some hangers could serve to bundle but not
6 separate?

7 MR. MELMAN: Objection, form.

8 A. Yes.

9 Q. So how would those hangers be different
10 than a wire loop?

11 MR. MELMAN: Objection, form.

12 A. "Those hangers" being?

13 Q. How would hangers that serve to bundle but
14 not separate differ from the wire loop disclosed
15 in Almy?

16 MR. MELMAN: Objection, form.

17 A. They -- I've been thinking too hard.

18 Please restate the question. How do
19 they -- did you say how do they differ?

20 Q. How would hangers that serve to bundle but
21 not separate differ from the wire loop disclosed
22 in Almy?

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1 MR. MELMAN: Objection, form.

2 A. Geometrically they would be equivalent.

3 The wire loops in Almy are formed by the same
4 material as the apparent messenger wire. And in
5 the case of 202A, it is a continuous wire, so the
6 hanger could not be separated from the messenger.

7 202B, the wire loop is perhaps closer to a
8 single cable-carrying surface hanger. But again,
9 it appears that its manufacture -- manufacturing
10 process, by looking at it, would not have a
11 separate item of as a -- what much of the '291
12 patent deals with in terms of its -- the hanger
13 aspect of the '291 patent.

14 Q. How can you tell by looking at Figure 2B
15 that the manufacturing process of 204B wire loop,
16 it would not be a separate item?

17 MR. MELMAN: I'm not sure if Mr. Dixon is
18 finished articulating his question.

19 Q. How can you tell by looking at Figure 2B
20 that the manufacturing process for wire loop 204B
21 would result in the wire loop not being a separate
22 item?

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1 MR. MELMAN: Objection to form.

2 A. Let me restate the question. How do I
3 look at 204B and realize that it's manufactured
4 separately than 202B?

5 Q. I think -- and please correct me if I'm
6 understanding your testimony wrong.

7 You said that by looking at the Figure 2B,
8 "it appears that its manufacturing process, by
9 looking at it, would not have a separate item of
10 as a -- what much of the '291 patent deals with in
11 terms of the hanger aspect of the '291 patent."

12 I'm trying to understand what you meant by
13 that statement.

14 A. I'm not sure I understand what you just
15 said that I apparently said.

16 Let me just reiterate what I see in
17 Figure 2B. I see a wire 202B running from the
18 left to the right. I see a wire loop 204B that
19 shows one open end that doesn't even appear to be
20 secured to 202B where that one open end is.

21 And then the other end of 204B appears to
22 go under 202B and then back down, but you cannot

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1 see in this illustration the -- what I assume is
2 the other end of 204B.

3 MR. MELMAN: Can we take a short break?

4 MR. DIXON: Yeah.

5 (Recess, 3:06 p.m. to 3:21 p.m.)

6 BY MR. DIXON:

7 Q. Can you please go to page 45 of your
8 declaration, Exhibit 2038. In Subsection C on
9 page 45, you discuss the Carr reference. Is that
10 right?

11 A. Correct.

12 Q. In your opinion, does Carr disclose a
13 messenger wire?

14 A. Yes. He calls it a strand.

15 Q. Carr calls it a messenger strand.
16 Correct?

17 A. Supporting strand.

18 Q. I'm handing you Exhibit 1005.

19 (Exhibit 1005, previously marked, is not
20 attached to the transcript.)

21 Q. This is the Carr reference.

22 So if you go on page 2 of Carr, page 2 of

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1 3 for Exhibit 1005.

2 A. Page 2 of the exhibit?

3 Q. Yeah.

4 A. Page 2 of Carr.

5 Q. So in the column on the left, if you go to
6 approximately line 47 or 48, the first line of the
7 paragraph there starting with "according to this
8 invention," doesn't that sentence call it a
9 messenger strand?

10 A. A messenger strand. Yes, indeed.

11 Q. So you understand Carr to disclose a
12 messenger wire?

13 MR. MELMAN: Objection to form.

14 Q. So do you understand Carr to disclose a
15 messenger wire?

16 MR. MELMAN: Objection to form.

17 A. Carr refers to a supporting strand, a
18 single supporting strand, a so-called messenger
19 strand, and a supporting strand, all in Column 1.
20 He seems to have many different terms for the same
21 thing.

22 Q. In your opinion, does Carr disclose a

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1 messenger wire when it's discussing the supporting
2 strand and messenger strand?

3 MR. MELMAN: Objection, form.

4 A. Is "disclose" and "claim" the same thing?
5 As a term, I just want to be sure I understand.

6 Q. So all I'm asking is, when you read Carr
7 do you understand it to be using a messenger wire?

8 A. I understand it to be using a wire -- we
9 are now calling a messenger wire, under the '291
10 patent, a catenary wire. A catenary supporting
11 something else.

12 Q. Does Almy disclose hangers suspended from
13 that wire?

14 MR. MELMAN: Objection to form.

15 A. I believe --

16 Q. I misspoke. Does Carr disclose hangers
17 suspended from that wire we were just discussing?

18 MR. MELMAN: Objection, form.

19 A. I heard the same thing. How did they
20 differ?

21 Q. I accidentally said "Almy" when I asked
22 the question the first time. I'll ask it again

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1 just to make it clear.

2 Does Carr disclose hangers suspended from
3 the supporting strand, messenger strand, messenger
4 wire, catenary wire, however you want to
5 characterize it?

6 MR. MELMAN: Objection to form.

7 A. Figure 1 certainly shows Carr's hanger
8 suspended from a messenger wire.

9 Q. So in Paragraph 110 on page 46 of
10 Exhibit 2038, your declaration --

11 A. I'm sorry. Paragraph?

12 Q. 110.

13 You say, "Carr only discloses aerial
14 conducting cables or carrier transmission." Is
15 that right?

16 A. That's what Carr discloses. Yes.

17 Q. Does Carr say that it discloses, quote,
18 aerial cable -- aerial conducting cables for
19 carrier transmission?

20 A. Yes.

21 Q. Where does Carr say, quote, aerial
22 conducting cables for carrier transmission?

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1 MR. MELMAN: Objection to form.

2 A. Those are two quotes. The aerial
3 conducting cables is in line 3 of Column 1 in
4 Carr. Aerial conducting cables is also in line 5
5 of Carr that are used for carrier transmission.

6 I believe that -- and in the context of
7 what Carr is dealing with, I understood that to
8 mean aerial conducting cables for carrier
9 transmission.

10 Q. Are all aerial conducting cables for
11 carrier transmission?

12 A. No.

13 Q. Does Carr in any other portion of
14 Exhibit 1005 refer to aerial conducting cables as
15 for carrier transmission?

16 A. A quick look doesn't express it. No. It
17 doesn't.

18 Q. But Carr does discuss aerial cables
19 repeatedly. Right?

20 A. Aerial cables for?

21 Q. Carr does discuss aerial cables
22 repeatedly. Right?

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1 MR. MELMAN: Objection to form.

2 A. Yes, Carr -- I understood Carr to work for
3 Bell Labs. Bell Labs was an R&D facility for
4 American Telephone and Telegraph.

5 Q. What I'm saying is, in Exhibit 1005 when
6 Carr is describing his hanger, he refers to aerial
7 cables. Right?

8 A. Yes.

9 Q. Carr does not describe the aerial cables
10 as carrier transmission cables in any other place
11 than line 5. Right?

12 MR. MELMAN: Objection, form.

13 A. It appears that way.

14 Q. And if you go to Carr's claim at the
15 bottom of the second column, line 55, it claims a
16 hanger device for suspending a pair of cables. Is
17 that right?

18 A. That's correct.

19 Q. And nowhere in the claim does it specify
20 that they are carrier transmission cables. Right?

21 A. So in the claims, a device for suspending
22 a pair of cables. That's correct.

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1 Q. On page 47 of your declaration,
2 Exhibit 2038, you set forth exemplary independent
3 claims. Is that right?

4 A. I'm sorry. Page?

5 Q. 47?

6 A. 47. Paragraph?

7 Q. Paragraph 111.

8 A. 111. Okay.

9 Q. You set forth exemplary independent
10 claims. Correct?

11 A. Yeah.

12 Q. How did you determine which exemplary
13 independent claims to choose?

14 A. These were the two -- in my view, the two
15 primary claims in this patent.

16 Q. Are there other independent claims in this
17 patent?

18 MR. MELMAN: Objection, form, calls for a
19 legal conclusion.

20 A. I believe there are. 19, 24, 14.

21 Q. Is 14 a primary claim in this patent?

22 MR. MELMAN: Objection, form.

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1 A. I don't know.

2 Q. Do you know if AWM is challenging
3 Claim 14?

4 MR. MELMAN: Objection, form, beyond the
5 scope, and calls for a legal opinion.

6 A. I don't know.

7 Q. If you'd turn to page 54 of your
8 declaration and look at Subheading B, does that
9 let you know whether or not AWM is challenging the
10 validity of Claim 14 in this proceeding?

11 A. It appears.

12 Q. Is it your opinion that Claims 1 and 6 are
13 the same as Claim 14?

14 MR. MELMAN: Objection to form, calls for
15 a legal opinion.

16 A. Clearly not. They have different numbers.

17 Q. You just didn't think it was necessary to
18 independently list it along with Claims 1 and 6?

19 MR. MELMAN: Objection, form.

20 A. No.

21 Q. Why did you think it was not necessary to
22 independently list Claim 14 with exemplary

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1 Claims 1 and 6?

2 MR. MELMAN: Objection, form. And
3 objection, relevance.

4 A. My experience with patents is limited.
5 But what I've observed is that the subsequent
6 claims sometimes expand upon the initial, the ones
7 presented first. And it's a . . .

8 I guess I understand it as a way to claim
9 the invention being used in the field as opposed
10 to the invention standing by itself.

11 Q. So are you saying for Claims 1 and 6 it's
12 not claiming the invention being -- as being used
13 in the field?

14 A. No.

15 MR. MELMAN: Objection to form.

16 Q. What do you mean by that?

17 A. My understanding is a claim like 14 would
18 allow you to sue an owner of a system as opposed
19 to the manufacturer of the components in a system
20 for infringement. I may be wrong, but that's my
21 understanding why this type of claim is put in.

22 Q. In your opinion, does Claim 1 require the

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1 system to actually be in use with the plurality of
2 solar panels and the plurality of electrical
3 cables?

4 MR. MELMAN: Objection, form, calls for
5 legal opinion and relevance.

6 A. Restate. I think the answer is no, but
7 I'd like to hear you ask it again.

8 Q. In your opinion, does Claim 1 require that
9 the system actually be in use with the plurality
10 of solar panels and the plurality of electrical
11 cables?

12 MR. MELMAN: Same objections.

13 A. No.

14 Q. Why is that?

15 MR. MELMAN: Same objections, and beyond
16 the scope.

17 A. The way I understood patent law is that --
18 and you can fill in the blanks here. But you can
19 make, sell, or use something. And if you make it
20 and infringe, that's not a good thing. If you
21 sell it and infringe, that's not a good thing.

22 If you buy it from someone who made it and

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1 sold it to you, that's still not a good thing.

2 So if a solar power plant is owned by
3 somebody that bought infringing technology, those
4 people are not above the law. An engineer's view
5 of the law. Probably not quite right.

6 Q. So in your opinion, to meet the
7 limitations of Claim 1 could you just have the
8 components of the system so the messenger wire,
9 the plurality of cable hangers, and the -- with
10 the required structure for the cable hangers,
11 could they infringe just by sitting on the
12 property without having any cables in them?

13 MR. MELMAN: Objection, form, relevance,
14 beyond the scope, calls for legal opinion.

15 A. And weird.

16 So if you bought a whole pile of these
17 locking cable hangers and method of using '291 and
18 put it in the field but didn't use it, would that
19 infringe?

20 Q. Yes.

21 A. If they're made by someone other than the
22 patent owner, yes. Or a licensee, I suppose.

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1 Q. Can you please turn to page 54 of your
2 declaration.

3 A. I'm already there.

4 Q. Did I already say that? I apologize if
5 so.

6 Paragraph 130, you state, "For all these
7 reasons, it is my opinion that Caveney does not
8 disclose or render obvious independent Claim 1 and
9 therefore does not disclose or render obvious
10 dependent Claims 2 through 5 and Claim 9 that
11 depend from Claim 1 or dependent Claim 10 that
12 depends from Claim 9." Is that accurate?

13 A. Yes.

14 Q. In your declaration, have you expressed
15 any other opinions regarding the obviousness of
16 Claims 2 through 5, 9, and 10?

17 MR. MELMAN: Objection, form.

18 A. I don't believe so.

19 Q. Can you go back to the paper -- exhibit
20 marked Paper 17. Can you please turn to page 22.
21 So you understand Paper 17 to be the board's
22 decision instituting inter partes review. Right?

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1 A. Yes, yes.

2 Q. So towards the middle of the first
3 paragraph, do you see the sentence beginning, "In
4 contrast"? Can you read that sentence and the
5 following sentence for me, please?

6 A. "In contrast, the claimed cable hangers
7 are structured with a spiral gripper 24 and
8 locking loop 26 to lock onto messenger wire 12
9 with abutment surfaces 34, 36, 38 that retain the
10 hangers in place." That's the sentence.

11 Q. And the next sentence says, "Prior art
12 hangers fall off or slide out of their spacing,
13 but the locking arm of a claimed cable hanger
14 securely retains the hangers in place even when
15 bumped or knocked during cable installation." Is
16 that right?

17 MR. MELMAN: Objection, form.

18 A. That's what it says.

19 Q. Do you agree that the claimed cable
20 hangers are structured with a spiral gripper?

21 MR. MELMAN: Objection, form, beyond the
22 scope and relevance.

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1 A. The claimed cable hangers are structured
2 with a spiral gripper. I believe that's true.
3 Yes.

4 Q. Do you agree that the claimed cable
5 hangers are structured with a locking loop?

6 MR. MELMAN: Objection, form, beyond the
7 scope, relevance.

8 A. Claimed -- we're talking about the '291
9 patent. Is that correct?

10 Q. Yes. That's correct.

11 A. Not Mr. Caveney's patent?

12 Q. No.

13 A. I certainly recall that they are
14 structured to -- I mean, where are we? Structured
15 to not slip.

16 Q. And they don't slip because of the locking
17 arm of the claimed cable hangers?

18 MR. MELMAN: Same objections.

19 A. That's the alleged purpose of the locking
20 spiral gripper.

21 Q. If we can go back to your declaration, and
22 now page 57, Paragraph 145.

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1 You state, "Dependent Claims 15 through
2 18, 21, and 22 all depend directly or indirectly
3 from Claim 14. Dr. Beik and petitioner rely
4 solely on Caveney for disclosing or rendering
5 these claims obvious."

6 You have some citations.

7 And then you say, "For the reasons stated
8 above relating to independent Claim 14, it is my
9 opinion that Dr. Beik and petitioner have not
10 shown that Caveney discloses or renders obvious
11 the limitations of these dependent claims."

12 Is that accurate?

13 A. What you have read is accurate. Yes.

14 Q. Other than the statements I just read,
15 does your declaration contain any other opinions
16 regarding the obviousness of Claims 15 through 18,
17 21, and 22?

18 MR. MELMAN: Objection, form.

19 A. I don't recall. The context of where I am
20 in this right now is not entirely clear to me.

21 Q. So if you go to page 54, do you see that
22 this section relates to Ground 2?

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1 A. Uh-hmm.

2 Q. So if I modify my question a little bit
3 and say other than the statements I just read,
4 does your declaration contain any other opinions
5 for Ground 2 regarding the obviousness of
6 Claims 15 through 18, 21, and 22, can you provide
7 an answer to that question?

8 MR. MELMAN: Objection, form.

9 A. I can if I take the time to read through,
10 if you'd like me to.

11 Q. Do you recall if you have any Ground 2
12 opinions regarding the obviousness of the
13 dependent claims?

14 A. I do not recall.

15 Q. Is your declaration complete and accurate
16 as of today?

17 A. I believe so.

18 Q. If we could move on to Ground 3 and go to
19 page -- Paragraph 160, page 62.

20 A. Page 62?

21 Q. Yup.

22 A. Which?

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1 Q. Paragraph 160.

2 A. 160. So we're in --

3 Q. Ground 3.

4 A. We're in Ground 3. Okay. 160. Okay.

5 Q. In Paragraph 160, you say that Almy
6 discloses a grid bar drive strut. What is a --
7 sorry. I misquoted your declaration there. I'm
8 going to preemptively correct myself.

9 In Paragraph 160, you say that Almy
10 discloses a rigid-bar drive strut. What is a
11 rigid-bar drive strut?

12 A. A rigid-bar drive strut is a device for
13 rotating and tracking multiple rows of solar
14 panels.

15 Q. Where would the rigid-bar drive strut be
16 located in a PV array?

17 A. It would be located under the solar panels
18 and running perpendicular to rows of solar panels.

19 Q. Where would the motor that controls the
20 rigid-bar drive strut be located within the PV
21 array?

22 MR. MELMAN: Objection, form, foundation.

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1 A. Typically around the periphery of the
2 array, the array field.

3 Q. Would there be a single motor powering the
4 rigid-bar drive strut?

5 MR. MELMAN: Same objections.

6 A. Yes.

7 Q. As of 2014, approximately what percentage
8 of utility-scale solar installations used
9 rigid-bar drive struts?

10 MR. MELMAN: Objection, form.

11 A. First, there would be the fact that
12 rigid-bar drive struts are not used in fixed
13 arrays, which constitute a large fraction of solar
14 power systems.

15 Second, the rigid-bar drive strut type of
16 system has evolved for a number of years going
17 back to the 1990s, and putting a number on what
18 the fraction is, is a little bit pie in the sky
19 for me.

20 But by the late 2000 to 2010 time frame,
21 trackers were becoming common, so the percentage
22 of systems that were trackers versus fixed was

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1 increasing.

2 And also, during the time frame 2010 and
3 following, it's my understanding that the -- and
4 my observation that the actuators for single-axis
5 tracking systems were -- the single drive strut
6 design was gradually being superseded by the
7 actuators distributed through an array field. But
8 the numbers, I don't have in my head. It was
9 changing over time.

10 Q. Were trackers consisting of actuators
11 distributed throughout the array field available
12 as of March 2nd, 2009?

13 MR. MELMAN: Objection, form.

14 A. Available? You mean did it exist
15 somewhere? I'm sure.

16 Q. Were trackers consisting of actuators
17 distributed throughout the array field in use in
18 utility-scale solar farms -- sorry -- plants as of
19 March 2nd, 2009?

20 MR. MELMAN: Objection, form.

21 A. I don't know, actually. And I believe
22 you're referring only to single-axis trackers.

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1 Two-axis trackers, that kind of stuff was around
2 in the 1990s.

3 Q. Did two-axis trackers have data cables?

4 MR. MELMAN: Objection, form.

5 A. Highly likely. These were experimental,
6 instrumented. These were not cost-effective.

7 Q. So two-axis trackers weren't used in
8 utility-scale solar?

9 MR. MELMAN: Objection, form.

10 A. They were used, yes, before utility-scale
11 solar in experimental demonstration projects
12 before solar was cost-effective. Never
13 commercially.

14 Q. Can you explain your statement in
15 Paragraph 161 about why it's not surprising, in
16 your opinion, that Almy doesn't disclose or
17 suggest the use of data carrier cables?

18 A. Yeah. Because Almy's patent was for a
19 tilted single-axis tracking system that was driven
20 by a shaft, a pushrod -- we had a name for it a
21 while ago -- that was located at the periphery of
22 the array field. And so there would be no need or

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1 no motivation or no purpose in having data cables
2 strung alongside the DC cables, DC power cables in
3 Almy.

4 Q. How does the application date of 2009
5 factor into that conclusion?

6 MR. MELMAN: Objection to form.

7 A. The conclusion that it did not? No. The
8 application date of the patent and the issue of
9 the application and the issue -- I'm not sure if
10 the wording in the application is the same as the
11 wording in the final patent. It might not be: It
12 just happens to be that that's what SunPower did
13 and that's what Almy discloses.

14 Q. I'm just trying to understand your
15 statement in 161 that says, "This is not
16 surprising, given the date of Almy's application
17 in 2009."

18 A. Yes. Because in 2009, the common use of
19 pushrod-type systems was predominant or I believe
20 it was predominant.

21 Q. But by 2014 the industry was moving away
22 from the pushrod-type system. Is that right?

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1 MR. MELMAN: Objection, form.

2 A. The pushrod -- other type systems were --
3 that was the direction the industry was headed at
4 that time frame. How far it had gotten . . .

5 Q. Did those other tracker systems have data
6 carrier cables?

7 A. The ones that now have actuators
8 distributed through them.

9 Q. So as of 2014, were the tracker systems
10 that were replacing the pushrod-type systems --
11 sorry. Let me restart that question.

12 So as of 2014, did the tracker systems
13 that were replacing the pushrod-type systems use
14 data carrier cables?

15 MR. MELMAN: Objection, form.

16 A. Yes. They would have to in a limited way,
17 to the limited places that actuators were
18 situated.

19 Q. Would a PV engineer in the 2013 to 2014
20 time frame consult the NEC to determine how to
21 manage these data cables?

22 MR. MELMAN: Objection, form and

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1 relevance.

2 A. I don't believe the NEC deals with data
3 cables. I could be wrong. But predominantly the
4 NEC deals with power cables, AC and DC. There are
5 rules about isolating the AC and DC cables from
6 other things for safety considerations. It's not,
7 to my knowledge, in Article 690.

8 Q. Would a PV engineer in the 2013 to 2014
9 time frame know that AC and DC cables could
10 interfere with data cables?

11 MR. MELMAN: Objection to form and
12 relevance.

13 A. They would understand that AC cables could
14 interfere with data cables. I'm not sure if that
15 is from the NEC, but they would understand that,
16 yes.

17 Q. Can DC cables interfere with data cables?

18 MR. MELMAN: Objection, form.

19 A. No. It's something that if you really
20 tried hard you could make it happen. But no
21 right-minded engineer would fret about that.

22 Q. So can we turn to page 68 of Exhibit 2038.

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1 A. Did you say 68?

2 Q. 68.

3 A. 68. Thank you.

4 Q. Specifically, Section 9, secondary
5 considerations of nonobviousness. Do you see
6 that?

7 A. Sure. Uh-hmm.

8 Q. In Paragraph 180 on the following page you
9 mention the word "nexus." Is that right?

10 A. Yes.

11 Q. In your opinion, what does it mean for
12 there to be a nexus between the claimed invention
13 and the evidence of secondary considerations?

14 MR. MELMAN: Objection to the extent it
15 calls for a legal opinion.

16 A. Yeah. Nexus is a relationship. Is that a
17 fair term? Cause-and-effect type of thing.

18 I'm not sure that was your question. I
19 just answered another question.

20 Q. And still staying in Paragraph 180, but on
21 the next page, you use the word "coextensive."

22 A. Yes.

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1 Q. What does it mean to be coextensive in the
2 context of secondary considerations?

3 MR. MELMAN: Objection, form.

4 A. I have learned that the word "coextensive"
5 means that the physical product or embodiment, or
6 whatever, of something described in a patent is
7 equivalent. They have the same boundaries. They
8 relate to the same thing. They are the same
9 thing.

10 Q. So the physical product needs to be the
11 same as the claims. Is that what you're saying?

12 A. As the specification. And I suppose with
13 the limitations of the claims. But I'm an
14 engineer.

15 Q. Do you know whether or not a product can
16 be coextensive if it includes features that are
17 not disclosed by the patent?

18 MR. MELMAN: Objection to form.

19 A. A product that contains features that are
20 not covered by the patent?

21 MR. MELMAN: And objection also to the
22 extent it calls for a legal opinion.

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1 A. I'm thinking about a situation where
2 something is clearly coextensive and then you put
3 lipstick on one of them. Does that change it
4 significantly enough to make it no longer
5 coextensive?

6 I'm not sure where the -- you could tweak
7 something a little bit. You could add a minor
8 feature. You could add -- I don't know. You
9 could add something to it that made it a tiny bit
10 easier to use or you could add something to an
11 invention that would make it a little bit easier
12 for someone in the field to install it or you
13 could add to an invention something that you found
14 that your customers were having to go out and get
15 separately.

16 I don't think something like that would --
17 I hope something like that would not upset the
18 determination of coextensive because then you'd
19 have no way to protect anything. Just add this to
20 it and it's no longer . . .

21 Q. Can we go to Paragraph 182 on page 70 of
22 Exhibit 2038. You say you've prepared an

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1 Appendix A which is a claim chart mapping the
2 limitations of independent Claims 1 and 6 to CAB
3 standard system.

4 A. Yup.

5 Q. What is CAB standard system?

6 A. As I understand it, CAB standard system is
7 their initial design. It's covered by the '291
8 patent that they have subsequently added
9 additional functionality to the system above and
10 beyond their standard system.

11 Q. What additional functionality did they add
12 to the system above and beyond their standard
13 system?

14 A. This is where --

15 MR. MELMAN: Objection, form, and beyond
16 the scope, relevance.

17 A. I understand they've added some
18 capabilities for grounding.

19 Q. Is grounding a cable management system in
20 a PV array important?

21 MR. MELMAN: Objection. Same objections.

22 A. Grounding is important in a PV array, not

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1 necessarily in a PV array wiring system or wiring,
2 whatever, system.

3 Q. In a messenger-supported aboveground cable
4 management system, does the NEC require grounding?

5 MR. MELMAN: Objection, form, beyond the
6 scope, relevance.

7 A. NEC requires grounding in all systems.
8 And so yes, it requires grounding, period,
9 irrespective of the wiring system.

10 Q. So grounding is important to a cable
11 management system in PV arrays?

12 MR. MELMAN: Same objections.

13 A. No. Grounding is essential to the PV
14 array itself in its entirety, the PV system in
15 itself in its entirety.

16 Q. And a cable management system is part of a
17 PV system. Right?

18 A. An element.

19 Q. So the cable management system needs to be
20 grounded?

21 MR. MELMAN: Objection, beyond the scope,
22 relevance.

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1 A. To the extent that anything within the PV
2 system needs to be grounded, components of a cable
3 management system would need to follow the rules
4 too.

5 MR. MELMAN: I think it's time for a short
6 break.

7 MR. DIXON: Okay.

8 (Recess, 4:22 p.m. to 4:34 p.m.)

9 BY MR. DIXON:

10 Q. So, Dr. Kern, when we left off we were
11 discussing the standard system.

12 A. Yes.

13 Q. Do you recall?

14 A. Uh-hmm.

15 Q. And you mentioned another CAB system that
16 added grounding. Is that right?

17 A. I have heard about another CAB system that
18 has grounding.

19 Q. Have you heard the --

20 A. The standard system clearly does not have
21 grounding. I mention that only as something that
22 one might add as a convenience.

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1 But in hindsight, from just thinking about
2 what I said, it's probably much more of an
3 addition than what I was imagining that would
4 relate to whether something was coextensive or not
5 with the '291 patent.

6 Q. So the addition of grounding is a
7 substantial addition. Is that what you're saying?
8 To the invention disclosed in the '291 patent?

9 MR. MELMAN: Objection, form, relevance,
10 beyond the scope.

11 A. Yeah. I mean, I guess what I'm thinking
12 is that we are talking about the coextensiveness
13 of '291 and the standard CAB system.

14 As I think I pointed out in here, the
15 grounding aspects -- I got led down the wrong way
16 here somewhat. The grounding aspects shown here
17 say that they are not part of the standard system,
18 but other smaller things could be not part of the
19 standard system. Leave it at that.

20 Q. Have you heard of CAB's integrated
21 grounding system?

22 MR. MELMAN: Objection, form, relevance

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1 and beyond the scope.

2 A. Yes.

3 Q. In what context have you heard of CAB's
4 integrated grounding system?

5 MR. MELMAN: Same objections.

6 A. What context? I've heard of it in the
7 sense that there is something other than the
8 standard system.

9 Q. Did you perform an analysis to determine
10 whether the integrated grounding system practices
11 the '291 patent?

12 MR. MELMAN: Objection, beyond the scope,
13 relevance.

14 A. No, I didn't do any investigation of
15 grounding.

16 Q. How did you define what comprised the
17 standard system?

18 MR. MELMAN: Objection, form.

19 A. How did I?

20 Q. So maybe I -- it would be helpful --

21 A. This is the mapping.

22 Q. Maybe it would be helpful to point to your

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1 declaration. So in Paragraph 181 you state, "I
2 understand that for solar power plant
3 installations, CAB sells its standard system for
4 solar cable management which includes mid pier
5 kits, end pier kits, galvanized steel messenger
6 wire, and cable hangers of various configurations
7 for supporting and separating various electrical
8 cables within a PV array."

9 Is that an accurate reading of
10 Paragraph 181?

11 A. Yes.

12 Q. How did you determine that these
13 components were included in the standard system?

14 A. I was shown their product literature.

15 Q. Do you cite any product literature in
16 Paragraph 181?

17 A. No.

18 Q. Do you know if CAB in fact sells a single
19 product called the standard system?

20 A. I don't know if they call it the standard
21 system. I know they sell components. I mean,
22 whether they sell, I've been shown orders for

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1 components used in systems. I don't recall
2 whether it's packaged, marketed as a, quote,
3 standard system. That may be a -- I just don't
4 know.

5 Q. I'm handing you a document that is marked
6 Exhibit 2056.

7 (Exhibit 2056, previously marked, is not
8 attached to the transcript.)

9 A. Whoa.

10 Q. Have you seen Exhibit 2056 before?

11 A. No.

12 Q. I'll represent to you that this was a
13 document produced by CAB in this proceeding
14 reflecting sales of components for the year 2018.

15 A. Could you repeat that? A document? What
16 is this again?

17 Q. This is a document produced by CAB in this
18 IPR, and it shows sales of components --

19 A. Got it.

20 Q. -- and a by-item-number for the year 2018.

21 MR. MELMAN: Mr. Dixon, given this
22 document was produced and marked confidential

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1 under the protective order in this IPR, I'm going
2 to designate the transcript confidential. We'll
3 go back and then identify specific portions.
4 Okay?

5 MR. DIXON: That sounds good.

6 A. So this is a list of their sales?

7 Q. If you see the second column, it says
8 "Name."

9 A. "Project name." Oh, second column.
10 "Name."

11 Q. So do you see that it lists customer names
12 there?

13 A. Sure. Yeah. This is privileged
14 information, isn't it?

15 Q. That's why it's marked confidential.

16 And then do you see in the sixth column
17 over under the header "Description"?

18 A. Yup.

19 Q. And you see a reference in the third line,
20 "[REDACTED]"?

21 A. Sure.

22 Q. And then it also lists an invoice number?

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1 A. Yup. Quantity.

2 Q. Material number in between?

3 A. It's a spreadsheet of sales organized by,
4 it would appear, customer.

5 Q. So if you go about a third of the way
6 down, do you see [REDACTED]?

7 A. A third of the way down? [REDACTED].

8 Q. [REDACTED]?

9 A. [REDACTED]. There you go.

10 Q. So do you see that there are three entries
11 there for Invoice Number 109159?

12 A. Yup.

13 Q. And the description of those materials are

14 [REDACTED]

15 [REDACTED]? Is

16 that accurate?

17 A. Sure.

18 MR. MELMAN: Objection, form.

19 Q. Do you see the listing of material

20 [REDACTED]?

21 A. Is that in the material column?

22 Q. Yes.

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1 A. Yeah. [REDACTED]

2 Q. I think you're in a different purchase
3 order there. It's the column above it.

4 A. Yeah.

5 Q. So do you see one of the descriptions is
6 [REDACTED]?

7 A. [REDACTED]?

8 MR. MELMAN: Objection, form, beyond the
9 scope, and relevance.

10 A. I see the letters that you're describing.
11 Yeah.

12 Q. Do you know what type of product [REDACTED]
13 [REDACTED]?

14 MR. MELMAN: Objection, beyond the scope.

15 A. No, I do not. What kind of material?

16 Q. What kind of component.

17 MR. MELMAN: Objection, beyond the scope.

18 A. No, but I -- no, I don't. I could
19 speculate, but I won't.

20 Q. If I represent to you that it's a [REDACTED]
21 [REDACTED] would you believe that?

22 MR. MELMAN: Objection, beyond the scope.

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1 Objection to form.

2 A. I would ask you what a [REDACTED] is.

3 Q. In preparing your opinions in this IPR,
4 did you ever see a CAB product called a [REDACTED]
5 [REDACTED]?

6 A. No. If I saw it, I did not take notice of
7 it.

8 Q. Do you think a [REDACTED] is a hanger?

9 MR. MELMAN: Objection, form.

10 A. I have no idea.

11 MR. MELMAN: And beyond the scope.

12 A. I have no idea.

13 Q. So for this Purchase Order 109159, do you
14 know if the system [REDACTED],
15 purchased practices the '291 patent?

16 MR. MELMAN: Objection, beyond the scope,
17 relevance.

18 A. It doesn't tell me exactly what it is.

19 No.

20 Q. So you don't know whether Purchase
21 Order 109159 practices the '291 patent?

22 MR. MELMAN: Same objections.

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1 A. No, I don't.

2 Q. On page A6 of Appendix A to your
3 declaration, Exhibit 2038.

4 A. Page 86?

5 Q. A6.

6 A. Thank you. Okay. I'm on A6.

7 Q. You say that [REDACTED] and
8 [REDACTED] are representative of the cable hangers in
9 CAB's standard system. Is that right?

10 A. Yeah.

11 Q. Do you know if [REDACTED] are
12 representative of [REDACTED]?

13 MR. MELMAN: Objection, beyond the scope.

14 A. Did you say [REDACTED]

15 Q. Yes. That's the [REDACTED] were just
16 discussing in the previous exhibit.

17 A. Oh, okay. I have never seen the actual
18 part numbers of the elements enumerated, listed,
19 disclosed in the patent, however.

20 Q. How did you determine that [REDACTED]
21 [REDACTED] are representative of the cable
22 hangers in CAB's standard system?

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1 A. Some of the detail in this figure on these
2 pages, I relied on assistance for this level of
3 detail, part numbers, listing numbers, things that
4 I did not believe were crucial, essential to the
5 issues in this case.

6 Q. In the figures on page A5, did these
7 represent [REDACTED]?

8 MR. MELMAN: Objection, form.

9 A. I don't know. They do not appear to have
10 part numbers printed on them in these photographs.

11 The internal part number listings as
12 opposed to the common names given to these parts
13 in this proceeding, I relied on the common names,
14 not the bill of materials names on various
15 purchase orders in the accounting system of CAB.

16 Q. So looking at the pictures that you
17 created on page A5 of your declaration, you don't
18 know if the hangers depicted in these pictures are
19 either [REDACTED]?

20 MR. MELMAN: Objection, form.

21 A. I do not.

22 Q. Do you know approximately how many hangers

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1 CAB sells?

2 A. I do not.

3 Q. Do you know if all of the hangers CAB
4 sells are identical to one another?

5 A. I assume they are not.

6 Q. Why do you assume that they are not?

7 A. Because different hangers have different
8 numbers of cable-carrying surfaces, so that would
9 make them different.

10 Q. But you've concluded that CAB's products
11 are coextensive with the claims of the -- Claims 1
12 and 6 of the '291 patent. Is that right?

13 A. Yes.

14 Q. And that's even though you haven't
15 reviewed every single product CAB sells that you
16 are claiming is coextensive with the '291 patent?

17 MR. MELMAN: Objection to form.

18 A. I have reviewed what has been presented as
19 the common names for these devices, not the bill
20 of materials part numbers as expressed in a
21 spreadsheet tied to an accounting system that is
22 probably part numbers that customers might be

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1 aware of in preparing purchase orders and part of
2 their design guide.

3 But for these proceedings, I use the
4 common names of the parts.

5 Q. Does a hanger used with the integrated
6 grounding system practice the '291 patent?

7 MR. MELMAN: Objection, form, beyond the
8 scope, relevance.

9 A. I don't know. I haven't reviewed the
10 other patents.

11 Q. Do you know if CAB sells hangers for use
12 in solar that do not separate cables?

13 A. I missed one word. Hangers used in?

14 Q. Solar.

15 A. Solar. That do not separate cables.

16 MR. MELMAN: Objection, form.

17 A. Do I know --

18 MR. MELMAN: And beyond the scope.

19 A. Could you say that again, please?

20 Q. Do you know if CAB sells hangers for use
21 in solar that support cables but don't separate
22 them?

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1 MR. MELMAN: Objection, form, beyond the
2 scope.

3 A. By "hangers" are you referring to hangers
4 that are supported by a messenger strand only or
5 hangers in general?

6 Q. Hangers supported by a messenger strand
7 only.

8 MR. MELMAN: Same objections.

9 A. I am not aware of such hangers.

10 Q. Would [REDACTED] be
11 representative of [REDACTED]
12 [REDACTED]?

13 MR. MELMAN: Objection to form, relevance
14 and foundation.

15 A. I don't know.

16 Q. So you don't know what universe of CAB
17 products [REDACTED] are
18 representative of?

19 MR. MELMAN: Objection to form.

20 A. Well, I've stated here that they are
21 representative of cable hangers and CAB's standard
22 system, but I have relied on others in drafting

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1 this detail.

2 As I said, I have not used the specific
3 part numbers in thinking about what is a hanger
4 and what is not a hanger. It's the language of
5 the patent and the number of surfaces, whatever
6 they are, wire-carrying surfaces that distinguish
7 generically the different types of hangers.

8 But again, I have not personally gone into
9 the parts numbers detail, the evolution of those
10 parts numbers over time in preparing for this
11 discussion.

12 Q. Who did you rely on in drafting this
13 detail regarding [REDACTED]
14 being representative of [REDACTED]
15 [REDACTED]?

16 MR. MELMAN: Objection, lacks foundation.

17 A. I relied on the firm that is representing
18 CAB to provide this kind of lower-level detail and
19 a lot more lower-level detail in terms of
20 references, for example, throughout this document.

21 I have not checked every reference in this
22 document to make sure that it's referring to the

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1 right specific source, line, and paragraph.

2 Q. And I don't want to know anything about
3 communications you had with counsel when I'm
4 asking this.

5 Are you saying that the firm representing
6 CAB drafted the section of this claim chart
7 stating that [REDACTED] are
8 representative of the [REDACTED]
9 [REDACTED]?

10 MR. MELMAN: Objection, form.

11 A. It was a collaborative process and they
12 drafted it. And I did not check the detail.

13 Q. You don't think that determining whether
14 two specific products are representative of a
15 large number of hanger products is an important
16 detail?

17 MR. MELMAN: Objection, argumentative.

18 A. I believe the answer to that is no, but
19 I'd like you to restate the question for me,
20 repeat the question for me.

21 Q. You don't think that determining whether
22 two specific products are representative of a

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1 large number of hanger products is an important
2 detail?

3 MR. MELMAN: Objection, form.

4 A. No, I do not.

5 Q. On page A3, do you see that you make a
6 similar statement regarding [REDACTED]
7 being representative of [REDACTED]
8 [REDACTED]?

9 A. I do.

10 Q. Did you perform any analysis to determine
11 whether [REDACTED] is representative to the
12 [REDACTED]?

13 MR. MELMAN: Objection, form.

14 A. No.

15 Q. At any point when you make a statement
16 that a product is representative in Appendix A to
17 Exhibit 2038, did you personally determine whether
18 that product is representative?

19 A. Appendix A, Exhibit -- where?

20 Q. Appendix A being your entire claim
21 mapping. You make a statement that parts are
22 representative on a number of occasions. Is that

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1 accurate?

2 MR. MELMAN: Objection, form.

3 A. Could you point out to me exactly where
4 that line is?

5 Q. I pointed you to two for the hangers and
6 the messenger wire. I believe you on page A4 say
7 that [REDACTED]

8 [REDACTED].

9 A. You're saying that the captions under
10 these photographs?

11 Q. Correct.

12 Did you perform any of these analyses
13 determining that specific part numbers are
14 representative of groups of parts?

15 MR. MELMAN: Objection, form.

16 A. I never dealt in the detail of what the
17 actual part number in the CAB accounting system
18 relates to the common name given to the parts
19 shown and discussed in this patent, in this
20 proceeding, the patent.

21 Q. On page A2, do you see that you point to
22 components in the second figure and label them

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1 "Pile mid pier attachment L bracket"?

2 A. Yup.

3 Q. "Messenger wire"?

4 A. Yup.

5 Q. Why did you identify the pile and the mid
6 pier attachment L bracket?

7 A. Why did I identify them? I identified
8 them as the means for the messenger wires to be
9 supported -- one means for a messenger wire to be
10 supported a distance above the ground. Presumably
11 the pile goes to the ground and the mid pier
12 attachment L bracket is above the ground and
13 supporting a messenger wire.

14 Common, easy to understand, pertinent
15 language, clear.

16 Q. Does Limitation 1.A recite a pile?

17 A. Replace a pile?

18 Q. Recite.

19 A. Recite. Recite a pile, no.

20 Q. Does Limitation 1.A recite a mid pier
21 attachment L bracket?

22 A. No.

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1 Q. Does Limitation 1.A recite a means for
2 structuring a messenger wire above the ground?

3 A. Yes.

4 Q. Does Limitation 1.A use the word "means"?

5 A. Use the word?

6 Q. Means.

7 A. Mean?

8 Q. Means, M-E-A-N-S.

9 A. Oh, means. Is it a means.

10 I think the point here is that the
11 messenger wire needs to be supported above the
12 ground by some means.

13 A messenger wire's structured to be
14 supported a distance above the ground. And as a
15 convenience, this mid pier attachment L bracket is
16 offered to provide that means and showing the
17 pile -- again, this is in their installation
18 guide, I believe.

19 The pile associated with the mid pier
20 attachment L bracket, again, is a convenience, a
21 means. There could be other means to do it, but
22 this is a convenience, a means to support the

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1 messenger wire a distance above the ground.

2 Q. Could a tracker pile be a means to support
3 the messenger wire a distance above the ground?

4 MR. MELMAN: Objection, form, beyond the
5 scope, and relevance.

6 A. Could a what pile?

7 Q. A tracker pile.

8 A. Who is to say this is not a tracker pile?

9 Q. So a tracker pile could be a means to
10 support the messenger wire a distance above the
11 ground?

12 MR. MELMAN: Same objections.

13 A. Any pile could be a means to support the
14 messenger wire above the ground.

15 Q. So if you look at the image just above
16 this on page A2, you point to organizing a
17 plurality of electrical cables extending from a
18 plurality of solar panels. Do you see that?

19 A. I do.

20 Q. What type of electrical cables are these
21 in this first picture on page A2?

22 A. What type? I can see cables that appear

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1 to be multiple colors. That's the jackets. The
2 type of cable would be either aluminum or copper.

3 The size of the cable, again, there's no
4 scale on this, but the size of the cables suggests
5 to me they are -- and the scale of things suggests
6 to me they are larger than string cables, but they
7 don't seem to be so large as to be photovoltaic
8 output circuit cables.

9 I'm totally speculating trying to answer
10 your question, what types of cables.

11 In the context of the picture, I would say
12 they are cables extending from the solar panels,
13 the plurality of solar panels. But it's difficult
14 to pin it down beyond that.

15 Q. Do you know if the cables shown in the
16 first image on page A2 are DC current-carrying
17 cables?

18 A. I don't know for a fact. But since they
19 are extending from a plurality of solar panels,
20 then they are very likely to be DC. As a matter
21 of fact -- I'll stay with that. Extremely likely
22 to be DC.

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1 Q. But you don't know for sure whether
2 they're DC cables?

3 A. No. They are cables. What current runs
4 through them is just likely to be DC because of
5 where they are shown in this photograph. And we
6 are dealing with photovoltaic power systems, which
7 are DC arrays by and large.

8 Q. Are there any data cables in this image?

9 A. I do not see any data cables in this
10 image.

11 Q. Do you see any AC current-carrying cables
12 in this image?

13 A. No, I do not see any AC current-carrying
14 cables in this image. In the foreground, at
15 least. I mean, as you go into the background, you
16 can't infer what's in the background.

17 Q. And so in this image the hangers are
18 organizing cables that are all carrying the same
19 type of current?

20 MR. MELMAN: Objection, form.

21 A. Yes. DC current.

22 Q. Actually, one more question on this one.

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1 How can you tell that the cables shown in
2 this image at the top of page A2 are extending
3 from a plurality of solar panels?

4 A. The presentation of the picture suggests
5 that it is extending from the solar panels in the
6 background.

7 Q. But you can't see the cables in this
8 picture at the top of page A2 actually extending
9 from the solar panels. Right?

10 MR. MELMAN: Objection, form.

11 A. In order to confirm that they extend from
12 solar panels, one would need to see more clearly
13 where the terminations of these cables heading
14 toward the solar panels in fact connect to the
15 solar panels. Presumably they are extending --
16 presumably they are extending from a plurality of
17 solar panels.

18 The, again, likelihood in this photograph
19 if it hasn't been manipulated is that these are
20 extending from combiner boxes, judged on the size
21 of the conductors. So they would be extending
22 from solar panels but not directly.

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1 They'd be extending from solar panels. In
2 a more general sense, they are coming from solar
3 panels but not extending from solar panels such as
4 a PV source circuit. In a broad sense, they're
5 extending from solar panels toward an inverter.

6 Q. Because the cables that literally extend
7 from solar panels are the string modules. Right?

8 MR. MELMAN: Objection to form.

9 A. The ones that directly extend from solar
10 panels are the string. Yes.

11 Q. Going to page A1, the second image, does
12 this show organizing a plurality of electrical
13 cables?

14 MR. MELMAN: Objection, form.

15 A. Yes. I would love it if the picture were
16 taken at a little bit different angle so I could
17 actually count the number of cables.

18 But I see more than one, one white and one
19 black, maybe two black, maybe another white one
20 hidden.

21 But it would appear that there are four DC
22 electrical cables in the left-hand side of that

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1 hanger, the hanger shown, whose part number I do
2 not know.

3 Q. And going to page A6 -- and I apologize
4 for making you jump around.

5 A. Jumping around is no problem.

6 Q. Do you see the image of a cable carrier --
7 sorry -- a cable hanger with cable carrier
8 identifiers identified?

9 A. I do.

10 Q. Is this cable hanger organizing a
11 plurality of electrical cables?

12 MR. MELMAN: Objection, form.

13 A. It's supporting a plurality of electrical
14 cables. The cable hanger has a divider. In this
15 particular case it is not separating cables, but
16 it's certainly capable of separating cables with
17 the cable carrier divider, should they need to
18 separate cables. It would appear to be an
19 underutilized cable carrier.

20 Q. Do you know if CAB's cable hangers have a
21 coating on them?

22 MR. MELMAN: Objection, form, beyond the

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1 scope.

2 A. Yes.

3 Q. What type of coating do CAB's cable
4 hangers have on them?

5 MR. MELMAN: Objection to form, beyond the
6 scope.

7 A. CAB cable hangers have a coating that
8 prevents corrosion. I don't know the specific
9 chemistry of the coating, but its functionality is
10 to prevent corrosion, resist UV degradation,
11 support and augment the ability of the carrier to
12 grip the messenger wire, and to -- how do you say
13 this?

14 Inside the cable -- inside the hanger
15 material it would be typically metal, conductive.
16 And the coating serves as a dielectric to isolate
17 that metal from anything that potentially could
18 have a hazardous voltage on it.

19 Q. Is the chemistry of the coating on CAB's
20 cable hangers important to conferring those
21 properties?

22 MR. MELMAN: Objection to form and beyond

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1 the scope and relevance.

2 A. Yes. The chemistry involves its abilities
3 to resist ultraviolet radiation, to be a
4 dielectric, to prevent corrosion.

5 Q. Does the --

6 A. I'm not a chemist.

7 Q. Does the '291 patent claim the chemistry
8 of the coating on CAB's cable hangers?

9 MR. MELMAN: Objection, form, beyond the
10 scope.

11 A. I believe I did see in the -- but I didn't
12 pay a great deal of attention to, a reference to
13 the coatings on the CAB cable hangers.

14 Q. That reference just mentions the existence
15 and type of material. Right?

16 MR. MELMAN: Objection, form, and beyond
17 the scope.

18 A. I believe it's Claim 23 is one place I see
19 it. Makes sense.

20 Q. Does Claim 23 or any other claim of the
21 '291 patent claim the thickness of the coating on
22 CAB's hangers?

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1 MR. MELMAN: Objection to form and beyond
2 the scope.

3 A. I don't recall. The coating on the CAB
4 hangers did not seem to be a major consideration
5 in this issue, in this.

6 Q. But it is important to better grip the
7 messenger wire and be UV resistant. Right?

8 MR. MELMAN: Objection, form, beyond the
9 scope, relevance.

10 A. I said that. It says it in the patent. I
11 have not investigated the details of it.

12 Q. Do you know if any other patents other
13 than the '291 patent cover CAB's cable hangers?

14 MR. MELMAN: Objection to form, beyond the
15 scope and relevance.

16 A. I believe in the patent identified as
17 paren 63 it says it's a continuation of prior
18 patents.

19 MR. MELMAN: Can I ask the reporter how
20 long we've been on the record?

21 (Recess, 5:34 p.m. to 5:48 p.m.)

22 BY MR. DIXON:

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1 Q. Can you please turn to page -- or actually
2 Paragraph 172 of your declaration.

3 So about halfway down in Paragraph 172, do
4 you see the statement that, "Further, Carr's
5 hanger device is made of a simple and cheap
6 construction which is capable of supporting two
7 aerial cables"?

8 A. Yes, I see that.

9 Q. Does "simple and cheap construction" mean
10 weak construction?

11 A. It means simple and cheap. It doesn't say
12 anything about its strength.

13 Q. Could a hanger of simple and cheap
14 construction be strong?

15 MR. MELMAN: Objection to form.

16 A. I suppose it could be. "Simple" could
17 mean strong. "Cheap" generally tends to imply
18 maybe not so.

19 Q. Do you think a hanger of simple and cheap
20 construction could support a 4-aught power cable?

21 MR. MELMAN: Objection to form. And
22 beyond the scope.

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1 A. A single 4-aught power cable?

2 Q. Yes.

3 A. Conceivably.

4 Q. Do you know what material the Carr hanger
5 is made out of?

6 A. If I recall, it was made out of steel. I
7 recall it was made out of steel.

8 Q. I think it might be in that first column,
9 line 49 or 50 depending --

10 A. Metallic -- I'm sorry.

11 Q. In Carr Exhibit 1005, in the first column
12 right around line 50, I think it states,
13 "Constructed of a laminated steel strip." So I
14 think your statement is accurate if you agree with
15 what Carr says.

16 MR. MELMAN: Objection, form.

17 A. I think maybe Carr is talking about prior
18 art there.

19 Q. If you look at the first sentence of that
20 paragraph, it says, "According to this invention."
21 Right?

22 A. Oh, wait.

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1 Q. Column 1. This paragraph starts right
2 around line 46.

3 A. Oh, line 46. I'm sorry. Yes, yes. I'm
4 sorry. I was looking at the upper part of the
5 line -- around line 5.

6 Q. So Carr's hanger is constructed of a
7 laminated steel strip Y shown in Figure 4 of
8 rectangular cross-section having considerable
9 hardness and resiliency. The right?

10 A. Right.

11 Q. Are CAB's hangers made out of steel?

12 MR. MELMAN: Objection, beyond the scope.

13 A. I believe so.

14 Q. Are CAB's hangers cheap to make?

15 MR. MELMAN: Objection, beyond the scope,
16 relevance.

17 A. I assume so.

18 Q. Are CAB's hangers of simple construction?

19 MR. MELMAN: Objection, form, beyond the
20 scope, relevance.

21 A. Yes.

22 Q. Earlier you testified that Almy's wire

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1 loops were made out of the same material as the
2 messenger wire disclosed by Almy. Is that
3 accurate?

4 MR. MELMAN: Objection, form.

5 A. That is what appears in Almy, in their
6 drawings, their specification.

7 Q. Do you think the wire loops in Almy are
8 stronger than a steel cable hanger?

9 MR. MELMAN: Objection, calls for
10 speculation, beyond the scope.

11 A. None of these patents show any dimensions
12 to the materials used. The strength depends on
13 the dimensions.

14 Q. So you could adjust the dimensions to
15 create stronger, weaker hangers?

16 MR. MELMAN: Objection, form, calls for
17 speculation, and beyond the scope.

18 A. An engineer would change the dimensions to
19 change the strength.

20 Q. Would that be within the scope of an
21 engineer in the solar industry having ordinary
22 skill in the art?

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1 MR. MELMAN: Same objections. And
2 objection, relevancy.

3 A. Yes.

4 Q. Sorry. I realize my question was unclear.

5 Would changing the dimensions to change
6 the strength be within the skill set of an
7 engineer in the solar industry having ordinary
8 skill in the art?

9 MR. MELMAN: Objection to form, calls for
10 speculation, beyond the scope and relevancy.

11 A. Yes.

12 MR. DIXON: Okay. I have no further
13 questions.

14 MR. MELMAN: Why don't we just take a
15 couple-minute break, let me just review my notes,
16 caucus, and then we'll come back.

17 (Recess, 5:56 p.m. to 6:03 p.m.)

18 MR. MELMAN: We have no redirect. No
19 further questions.

20 Thank you, Dr. Kern.

21 MR. DIXON: Thank you for your time today.

22 (Off the record at 6:03 p.m.)

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1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

2 I, Michelle Keegan, Registered Merit
3 Reporter and Notary Public within and for the
Commonwealth of Massachusetts, do hereby certify:

4 That EDWARD C. KERN, JR., PH.D., the
5 witness whose deposition is hereinbefore set
6 forth, was duly sworn by me before the
commencement of such deposition and that such
7 deposition was taken before me and is a true
record of the testimony given by such witness.

8 I further certify that the adverse party
was represented by counsel at the deposition.

9 I further certify that the deposition of
10 EDWARD C. KERN, JR., PH.D. occurred at the offices
of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo,
11 P.C., One Financial Center, Boston, Massachusetts
02111, on Tuesday, October 1, 2024, commencing at
12 9:38 a.m. to 6:03 p.m.

13 I further certify the inspection, reading,
and signing of said deposition was waived on the
14 record by agreement of all parties.

15 I further certify that I am not related to
any of the parties to this action by blood or
16 marriage, I am not employed by or an attorney to
any of the parties in this action, and that I am
17 in no way interested, financially or otherwise, in
the outcome of this matter.

18 IN WITNESS WHEREOF, I have hereunto set my hand
this 1st day of October, 2024.

19 My commission expires May 15, 2026.

20 
21

22 NOTARY PUBLIC IN AND FOR THE
COMMONWEALTH OF MASSACHUSETTS

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