

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3 -----
4 INDUCTEV, INC.,
5 Petitioner

6 vs

7 WITRICITY CORPORATION,
8 Patent Owner
9 -----

10 Case IPR2024-00105
11 U.S. Patent No. 10,027,184

12 Oral deposition of
13 MARK N. HORENSTEIN, Ph.D.

14
15 VIA VIDEO/TELECONFERENCE
16 TUESDAY, JANUARY 21, 2025
17 9:06 a.m. EASTERN TIME
18

19
20 Job No.: 567320

21 Pages: 1 - 121

22 Reported by: Lisa V. Feissner, RDR, CRR, CLR

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Oral deposition of MARK N. HORENSTEIN, Ph.D.,
held REMOTELY, via ZOOM, on TUESDAY, JANUARY 21,
2025 beginning at 9:06 a.m. pursuant to Notice,
before Lisa V. Feissner, RDR, CRR, CLR, Notary
Public.

1 A P P E A R A N C E S:

2 O N B E H A L F O F P E T I T I O N E R:

3 D A V I D A . Z U C K E R , E S Q U I R E
4 L A T H A M & W A T K I N S L L P
5 5 5 5 E l e v e n t h S t r e e t , N W , S u i t e 1 0 0 0
6 W a s h i n g t o n , D C 2 0 0 0 4
7 2 0 2 . 6 3 7 . 2 2 1 9
8 d a v i d . z u c k e r @ l w . c o m

9
10 O N B E H A L F O F P A T E N T O W N E R:

11 L A N C E A . L A W S O N , P . E . , E S Q U I R E
12 R Y A N M . C O R B E T T , E S Q U I R E
13 B U R R & F O R M A N L L P
14 1 0 1 S o u t h T r y o n S t r e e t , S u i t e 2 6 1 0
15 C h a r l o t t e , N C 2 8 2 8 0
16 7 0 4 . 3 4 7 . 6 4 7 5
17 l l a w s o n @ b u r r . c o m
18 r c o r b e t t @ b u r r . c o m

19
20 A L S O P R E S E N T:

21 K E L L I W E L C H , A / V T e c h n i c i a n
22 M I S H A H I L L , E S Q . , W i T r i c i t y C o r p o r a t i o n

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C O N T E N T S

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By Mr. Zucker	5

P R E V I O U S L Y
M A R K E D E X H I B I T S
(Referenced)

DEPOSITION EXHIBITS	PAGE
InductEV, Inc. Exhibit 1001	15
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WiTricity Corp. Exhibit 2005	10
WiTricity Corp. Exhibit 2007	22

1 P R O C E E D I N G S

2 MARK N. HORENSTEIN, Ph.D.,

3 having been first duly sworn, was examined and
4 testified as follows:

5 EXAMINATION

6 BY MR. ZUCKER:

7 Q Good morning. Would you please state
8 your full name for the record.

9 A Mark Nat Horenstein.

10 Q And Dr. Horenstein, would you please let
11 me know your address.

12 A 40 Hastings, H-A-S-T-I-N-G-S, Street in
13 West Roxbury, R-O-X-B-U-R-Y, Massachusetts, 02132.

14 Q And is that where you're located this
15 morning?

16 A Yes.

17 Q You may have heard this in the
18 introduction, but my name is David Zucker. I'm an
19 attorney for InductEV. I'm here to take your
20 deposition today in this matter.

21 Is there anything --

22 MR. LAWSON: David, before we go forward,

1 I just want to make sure we have it on the record.
2 My name is Lance Lawson. I'm a partner with the law
3 firm Burr & Forman. I am here on behalf of
4 WiTricity Corporation and representing
5 Dr. Horenstein for this deposition this morning.

6 MR. ZUCKER: Great.

7 Q Dr. Horenstein, is there anything that
8 would prevent you from testifying truthfully today?

9 A No.

10 Q I know you've been deposed many times
11 before, so I'll spare you most of the details here,
12 but I do have some introductory questions that I
13 just want to make sure we have on the record.

14 Is there anyone there in the room with
15 you today?

16 A No.

17 Q Do you have any physical or electronic
18 materials with you today?

19 A No.

20 Q And you understand that you're not to
21 communicate with anyone else during this deposition,
22 correct?

1 A About matters pertaining to the
2 deposition, I understand that.

3 Q Sure. Do I take from that comment that
4 you're planning to communicate about other matters
5 with someone?

6 A If I have a conversation with one of the
7 attorneys of the nature, you're doing fine, I assume
8 that's an acceptable conversation, as long as it
9 doesn't touch on the details of the deposition or
10 any answers or questions.

11 Q We can -- any conversation you have with
12 your attorney or with whoever else at a break, we
13 can discuss that at a later time.

14 My point was really to just confirm that
15 while this deposition is happening via Zoom, you are
16 not having any other open methods of communication
17 with anyone. You don't have any messaging apps
18 open, you're not sending emails, you're not texting,
19 anything like that, correct?

20 A That is correct. I understand the rules.

21 Q What is the rate that you charge for your
22 work in this case?

1 A It's a sliding scale. And at the moment,
2 it's 325 per hour.

3 Q You were hired using a litigation search
4 firm, correct?

5 A Yes.

6 Q So is that \$325 figure what you receive
7 or what the search firm charges?

8 A That's what I receive.

9 Q Do you know what the search firm charges
10 for your time?

11 A I do not.

12 Q You said it's a sliding scale. Can you
13 explain what that means?

14 A Yes. The contract they worked out with
15 WiTricity was that the first, I don't know, some
16 multiple of tens of hours, first 25 hours or
17 50 hours, I don't remember, would be at 375, and the
18 next increment would be at 350, and thereafter it
19 would be at 325. So we are at the 325 level for the
20 present proceedings.

21 Q Understood. And does that continue to go
22 down over time?

1 A No.

2 Q 325 is the minimum?

3 A Right.

4 Q You have worked as an expert for
5 WiTricity in prior proceedings, correct?

6 A Yes.

7 Q How many prior proceedings have you
8 worked as an expert for WiTricity in?

9 A I've worked with them, including this
10 proceeding, a total of four IPR proceedings.

11 Q And all four of those are IPRs between
12 WiTricity and InductEV, correct?

13 A I believe -- I know InductEV is the
14 petitioner on all four.

15 Q Okay. You haven't worked with -- strike
16 that. Let me try again.

17 You have not served as an expert for
18 WiTricity in any cases other than IPRs where
19 InductEV is the petitioner?

20 A Correct.

21 Q Do you understand that your counsel in
22 this case is from the law firm Burr & Forman?

1 A I'm sorry. Could you say that again?

2 Q You understand that your counsel in this
3 case is from the law firm Burr & Forman?

4 A That's right.

5 Q Have you worked with the law firm of Burr
6 & Forman in cases other than this one?

7 A Not to my knowledge.

8 Q How much in total have you earned from
9 your work in this particular IPR?

10 A I don't know.

11 Q More than \$10,000?

12 A Yes.

13 Q More than \$50,000?

14 A I don't know. I don't think so.

15 MR. ZUCKER: Could we please introduce
16 Exhibit 2005. And this will be your declaration in
17 this case.

18 (Previously marked Exhibit 2005 presented
19 to the witness.)

20 BY MR. ZUCKER:

21 Q Dr. Horenstein, you should see that in
22 the folder in just a few minutes.

1 A I'm working on it. The most recent would
2 be at the bottom. Is that true? I see. It always
3 brings us to the same place. I get it. Okay.

4 Q So Exhibit 2005 is the Declaration of
5 Dr. Mark N. Horenstein in Support of Patent Owner's
6 Response in IPR 2024-00105, right?

7 A I'm trying to figure out how to open it.
8 I'll take your word for it for now.

9 Q Well, I would like you to be able to open
10 it. So let me know if we need to take a break.

11 A Repeat your question, please.

12 Q I just want to confirm, this Exhibit 2005
13 is your declaration in IPR 2024-00105, right?

14 A Correct.

15 Q And so if we talk about your declaration
16 today, this is the document that we're talking
17 about.

18 Can we agree on that?

19 A Yes.

20 Q Did you write this declaration yourself?

21 A Yes.

22 Q How much time did you spend writing this

1 declaration?

2 A I don't know exactly.

3 Q More than ten hours?

4 A Yes.

5 Q More than 20 hours?

6 A Possibly.

7 Q But you're not sure?

8 A I'm not sure.

9 Q How much time in total have you spent on
10 this particular IPR?

11 A Again, I'm not sure.

12 Q More than 20 hours?

13 A Just on this IPR?

14 Q Correct.

15 A I'm guessing it's more than 20 hours.

16 Q More than 30 hours?

17 A I don't know.

18 Q Okay. You understand that the IPR we're
19 talking about in this morning's session pertains to
20 U.S. Patent No. 10,027,184?

21 A Right.

22 Q And just to make things clear, if we talk

1 about the '184 patent today, you'll understand that
2 that's what I'm talking about, right?

3 A Yes.

4 Q Did you do anything to prepare for this
5 deposition today?

6 A I did.

7 Q What did you do?

8 A I read various documents, including my
9 declaration, and I had preparation sessions with
10 Mr. Lawson.

11 Q Did anyone attend these preparation
12 sessions other than Mr. Lawson?

13 A It's possible that Mr. Corbett was there
14 for some of them. I'm not quite sure if he was
15 there on sessions related to the '184 because we
16 were doing preparation for the '184 and the later to
17 be addressed '654 patent at the same time.

18 Q Did anyone other -- strike that.

19 Was anyone other than Mr. Lawson and
20 Mr. Corbett present at any of these preparation
21 sessions?

22 A No.

1 Q How many preparation sessions did you
2 have?

3 A I would say about four. I'm not sure.

4 Q When were those preparation sessions?

5 A Within the past two weeks, I would say.

6 Q About how much time total did you spend
7 in those preparation sessions?

8 A I'd just be guessing. I don't know.

9 Q More than five hours?

10 A Yes.

11 Q More than ten hours?

12 A Probably.

13 Q What documents did you review during
14 those preparation sessions?

15 A Well, at the very least, the following
16 documents: the patent in question, the '184; the
17 petition filed by InductEV; my report; various prior
18 art references that are addressed in both the
19 petition and in my declaration.

20 Q Do you recall what specific prior art
21 references you reviewed?

22 A I'm sure we'll get to them as we go

1 through my report. I could name one or two, but it
2 would not be exhaustive.

3 Q Are there any other documents that you
4 reviewed as part of your prep session?

5 A No.

6 Q Are there any documents you reviewed as
7 part of your prep session that are not discussed in
8 your report?

9 A Not to my knowledge.

10 Q As part of your preparation for this
11 deposition, did you speak with anyone other than
12 counsel for WiTricity?

13 A No.

14 MR. ZUCKER: Could we introduce Exhibit
15 1001, please.

16 (Previously marked Exhibit 1001 presented
17 to the witness.)

18 MR. ZUCKER: And at the same time, let's
19 also introduce 1005, please.

20 (Previously marked Exhibit 1005 presented
21 to the witness.)

22 BY MR. ZUCKER:

1 Q So taking those in order, Dr. Horenstein,
2 please let me know when you can see Exhibit 1001.

3 A It has appeared on the link.

4 Q Let me know once you can open it and view
5 the document.

6 A Okay. 1001 is the '184 patent, yes.

7 Q Right. That's what I want to confirm.
8 So Exhibit 1001 is the '184 patent that is the
9 subject of this proceeding, right?

10 A That is correct.

11 Q Okay. So you can set that aside for a
12 second.

13 And let me know when you can pull up
14 Exhibit 1005.

15 A Okay.

16 Q Exhibit 1005 is United States Patent
17 Application Publication Number U.S. 2010-0084918 to
18 Fells.

19 Do you see that?

20 A This is Exhibit 1005.

21 Q Right.

22 A Yes, correct.

1 Q Fells is one of the prior art references
2 that's used in the IPR petition in this case,
3 correct?

4 A Yes.

5 Q And you've reviewed Fells as part of your
6 work in this case?

7 A Yes.

8 Q Okay. Can we jump to paragraph 190 of
9 Fells, which is on page 53 of the PDF.

10 A Okay.

11 Q So I said 190. I meant 191.

12 Do you see paragraph 191?

13 A So not 190. 191?

14 Q Yes, 191.

15 A All right.

16 Q And that begins with, Figure 2 shows a
17 wireless power supply 200 of one embodiment of the
18 invention, right?

19 A Yes.

20 Q And then it lists a number of components;
21 the mains rectifier, the DC/DC converter, the
22 inverter, et cetera?

1 A Okay.

2 Q So the mains rectifier 218 of Fells is a
3 component of the wireless power supply 200, correct?

4 A The mains rectifier 218...

5 MR. LAWSON: Counsel, are you referring
6 the witness to the figure?

7 MR. ZUCKER: I'm asking him questions
8 about what Fells teaches.

9 MR. LAWSON: Okay.

10 A The mains rectifier 218.

11 A Sorry. Repeat your complete question
12 again.

13 Q The mains rectifier 218 is a component of
14 the wireless power supply 200 of Fells, correct?

15 A That's correct.

16 Q And the DC/DC converter 216 is a
17 component of the wireless power supply 200 of Fells?

18 A Presumably.

19 Q Well, does "presumably" mean, yes, that's
20 your understanding, or no, that's not your
21 understanding?

22 A It means the following: DC-to-DC

1 converter 216 is not labeled with that tag number in
2 Figure 2, but there is a box that says DC-to-DC
3 converter. So I assume it's a typo error that 216
4 doesn't show up in Figure 2 as a number.

5 Q Fair. Okay. So just to be clear, the
6 DC/DC converter that's described in Fells is a
7 component of the wireless power supply 200, right?

8 A Yes.

9 Q And the inverter that's described in
10 Fells is a component of the wireless power supply
11 200, right?

12 A Yes.

13 Q And the capacitor 214 in Fells is a
14 component of the wireless power supply 200, right?

15 A Yes.

16 Q And the primary coil 212 is a component
17 of the wireless power supply 200, right?

18 A Yes.

19 Q And control unit 208 is a component of
20 the wireless power supply 200 in Fells, correct?

21 A Right.

22 Q And in Fells, the energy storage unit is

1 a component of the wireless power supply 200,
2 correct?

3 A Right.

4 Q And in Fells, the sense circuit is a
5 component of the wireless power supply 200, correct?

6 A Sense circuit 206, it is.

7 Q Okay. And so if we look at Figure 2 in
8 particular, those components that we just mentioned,
9 including the energy storage unit and the sense
10 circuit, are shown within wireless power supply 200,
11 right?

12 A They are inside the dotted box with the
13 number 200, which Fells says is wireless power
14 supply 200.

15 Q Okay. And would you turn to Figure 40,
16 please.

17 A Okay.

18 Q In Fells Figure 40, the energy storage
19 element and the proximity detector are both
20 components of the wireless power supply 200,
21 correct?

22 A Well -- correct.

1 Q Okay. Now, the proximity -- strike that.
2 Let me try that again.

3 Fells describes its proximity detector as
4 a type of sense circuit, correct?

5 A We're referring to Figure 40 or Figure --

6 Q I'm asking about Fells generally.

7 MR. LAWSON: Object to the form.

8 A Could you repeat the question, please?

9 Q Sure. Fells describes its proximity
10 detector as a type of sense circuit, correct?

11 MR. LAWSON: Object to the form.

12 A Can you show me where it describes the
13 proximity detector as a type of sensor, in what
14 paragraph that is?

15 Q So I'll direct you to paragraph 288 of
16 Fells. And it says, quote, in the embodiment
17 illustrated in Figure 40, a sense circuit that acts
18 as a proximity detector 4002 is used to initially
19 detect that a device or a foreign object has been
20 placed in the vicinity of the wireless power supply
21 200.

22 Do you see that?

1 A Yes.

2 Q And so what Fells is saying here is that
3 proximity detector 4002 is a sense circuit that's
4 acting in a particular manner, right?

5 A Yes.

6 MR. ZUCKER: Okay. Could we set that
7 aside for a minute and please introduce
8 Exhibit 2007.

9 (Previously marked Exhibit 2007 presented
10 to the witness.)

11 BY MR. ZUCKER:

12 Q Dr. Horenstein, please let me know once
13 you've had a chance to fully open and view
14 Exhibit 2007.

15 A Okay.

16 Okay.

17 Q Exhibit 2007 is an excerpt of a textbook
18 called Electrical Sensors and Transducers by
19 James R. Carstens, correct?

20 A Yes.

21 Q And this is one of the textbooks that you
22 rely on to support your opinions in your

1 declaration?

2 A Yes.

3 Q So turning to page 3 of Exhibit 2007, it
4 says, Chapter Objectives, To understand the theory
5 and operation of the following magnetic field
6 sensing devices.

7 And then it lists four types of magnetic
8 field sensing devices, correct?

9 A Yes.

10 Q Do you agree that a magnet reed switch is
11 a magnetic field sensing device?

12 A Sometimes.

13 Q What would determine whether a magnet
14 reed switch is or is not a magnetic field sensing
15 device?

16 A Well, there are some magnet reed switches
17 that respond to an external permanent magnet, and
18 then there are others where the reed is magnetized
19 and it responds to the current of a coil that
20 surrounds the magnet reed switch.

21 Q Even in that latter case, the device is
22 sensing a magnetic field, right?

1 MR. LAWSON: Object to the form.

2 A Well, I interpret this chapter, which is
3 called Magnetic Sensors -- and the entire book is
4 labeled Electrical Sensors and Transducers -- that
5 it's categorizing the magnetic reed switch as
6 something that detects -- is meant to detect
7 magnetic fields external to itself.

8 So to the extent that the magnetized reed
9 detects the reed switch's own magnetic field, I
10 wouldn't called it a magnetic field sensor; I'd
11 simply call it what it's entitled in 1A, a magnetic
12 reed switch.

13 Q So to be clear, I'm not asking about the
14 phrase "magnetic field sensor." I'm asking you
15 about the phrase "Carstens uses," which is a
16 magnetic field sensing device. So I'll ask that
17 again.

18 Can we agree that a magnetic reed switch
19 is a magnetic field sensing device?

20 A I will reiterate my previous answer.
21 Sometimes.

22 Q So a magnetic reed switch at least

1 sometimes is a magnetic field sensing device,
2 correct?

3 A Right.

4 Q And in the example you gave where a
5 magnetic reed switch is not a magnetic field sensing
6 device, it's still utilizing a magnetic field; it's
7 just not an external magnetic field, correct?

8 A That's correct.

9 Q So continuing down the list in Carstens,
10 do you agree that an Hall effect transistor is a
11 magnetic field sensing device?

12 A That's right. A Hall effect transistor
13 will respond to -- when it's in proximity to
14 something else that produces a magnetic field, such
15 as a permanent magnet, and that is typically how
16 Hall effect transistors are used.

17 Q Do you agree that an inductive pickup
18 coil is a magnetic field sensing device?

19 A A pickup coil that is inductive would be
20 a magnetic field sensing device.

21 Q Do you agree that a vibrating wire
22 transducer is a magnetic field sensing device?

1 MR. LAWSON: Object to the form.

2 A Sometimes.

3 Q What, in your view, is the distinction as
4 to when a vibrating wire transducer is or is not a
5 magnetic field sensing device?

6 A Well, I've actually worked with these
7 devices and have fabricated some. And sometimes
8 they're meant to interact with a magnetic field and
9 sometimes with an electric field.

10 So not exclusively a magnetic field
11 sensing device.

12 Q Is that a difference in the way the
13 device is constructed or the way it's deployed?

14 A Both.

15 Q So are you saying that it is possible to
16 construct a vibrating wire transducer that is
17 incapable of sensing magnetic fields?

18 A What I'm saying is, one can construct a
19 vibrating wire transducer that is meant to interact
20 with electric fields in the absence of any magnetic
21 fields.

22 Q But even in that case, the vibrating wire

1 transducer is capable of interacting with magnetic
2 fields even if it's not used that way, correct?

3 A Well, it depends how it's constructed.

4 Q Okay. So is it fair to say that in the
5 absence of further detail, the phrase "vibrating
6 wire transducer" covers devices that at least can
7 sense magnetic fields?

8 MR. LAWSON: Object to the form.

9 A Well, to the extent that the description
10 above under number 1 is saying, the following
11 magnetic field sensing devices, one can presume that
12 the author is talking about the type of vibrating
13 wire transducer that interacts with magnetic fields.

14 Q Okay. And then in the following
15 sentence, Carstens says, In this chapter we study
16 those sensors that either use or interact with a
17 magnetic field to cause the sensor to operate.

18 Do you see that?

19 A Yes.

20 Q So that's the definition that Carstens is
21 providing of a magnetic field sensing device,
22 correct?

1 A Well, that first sentence describes
2 sensors that either use or interact with a magnetic
3 field. And then to cause the sensor to operate, I
4 would say your statement is correct.

5 Q Would a person of ordinary skill in the
6 art understand the phrase "magnetic field sensing
7 devices" in Carstens to be the same as "magnetic
8 field sensor," as that term is used in the '654
9 patent?

10 MR. LAWSON: Object to the form.

11 A Wrong patent, sir. I think we're on
12 the --

13 Q Thank you. Let me correct that.

14 A I make that mistake all the time.

15 Q Would a person of ordinary skill in the
16 art understand the phrase "magnetic field sensing
17 devices" to be the same as the term "magnetic field
18 sensor," as that term is used in the '184 patent?

19 MR. LAWSON: Object to the form.

20 A Not necessarily.

21 Q What, in your view, is the difference
22 between those two terms, as a person of ordinary

1 skill would understand them?

2 A Well, the terms "magnetic field sensor"
3 and "magnetic sensor" are used interchangeably in
4 much of the literature, including the '184 patent.

5 And so whether the sensor is interacting
6 with a magnetic field or, like the self-contained
7 magnetic reed switch is using a magnetic field, they
8 all seem to fall under the same umbrella.

9 I could not find any consensus in the
10 field, based on looking at various references, that
11 distinguishes magnetic field sensing from -- a
12 magnetic field sensor from a magnetic sensor.

13 Q Okay. So is it your testimony that a
14 person of ordinary skill in the art would understand
15 that phrase, "magnetic sensor," to refer to the same
16 thing as a "magnetic field sensor," as the '184
17 patent uses that term?

18 MR. LAWSON: Object to the form.

19 A I do believe it would be
20 context-dependent.

21 Q And what context would alter your answer
22 there?

1 A An example would be the '184 patent
2 itself, which in the specification seems to
3 distinguish between a magnetic field sensor and a
4 magnetic sensor as being two different things.

5 Q Can you describe where in the '184 patent
6 you believe that distinction occurs?

7 A Give me one moment.

8 I'll refer you to bottom of column 7,
9 continuing on to column 8.

10 Q Okay.

11 A Roughly lines 60 in column 7 to 4 in
12 column 8.

13 Q Okay. So going back to Carstens and the
14 four types of devices that are listed on page 3,
15 earlier we talked about magnetic field sensing
16 devices. But I understand you're drawing some
17 distinction, so now I want to ask with respect to
18 magnetic field sensors.

19 Do you agree that a magnetic reed switch
20 is a magnetic field sensor?

21 MR. LAWSON: Object to the form.

22 A Same answer as before. Sometimes.

1 Q So just to be clear, your "sometimes" is
2 to say that sometimes the magnetic reed switch is
3 detecting an external magnetic field, and other
4 times it is detecting a self-produced magnetic
5 field?

6 A That's right. When the field is
7 generated outside the reed switch, it's going to be
8 from a permanent magnet or a DC electromagnetic.

9 Q But all versions of a magnetic reed
10 switch detect magnetic fields, correct?

11 A No. I answered this before.

12 Detecting a magnetic field, in my view of
13 what a person of skill would understand, means a
14 magnetic field external to the sensor.

15 So in the cases where the magnetic reed
16 switch detects a magnetic field from a permanent
17 magnet, for example, in a proximity detection
18 application, it would be detecting a magnetic field.

19 When it's used as a current-activated
20 switch using its own coil, I don't believe one would
21 consider that reed switch detecting a magnetic
22 field.

1 Q Well, in that latter scenario, it does
2 detect changes in a magnetic field; it's just a
3 self-produced magnetic field, right?

4 A Well, it responds to the field produced
5 by the coil that surrounds the reed, and it is
6 responding to the current, wherein there is a
7 magnetic field that is produced as a result of the
8 current, but in terms of the physics going on, the
9 magnetic reed is responding to the current flowing
10 in the coil.

11 Q Okay. So even in the scenario where the
12 magnetic reed switch is not responding to an
13 external magnetic field, it's responding to the
14 magnetic field produced by the coil surrounding the
15 reed, right?

16 A I answered this question a moment ago,
17 and that is not what I said.

18 The magnetic reed is responding to the
19 current flowing in the wire that surrounds the
20 magnetic reed switch.

21 Q And the current that is flowing in the
22 wire that surrounds the magnetic reed switch

1 generates a magnetic field, correct?

2 A Well, you have to be a little bit careful
3 because that will depend on the orientation of the
4 magnetism of the magnetic reed, because if the poles
5 of the magnet are not consistent with the way the
6 coil is oriented around the magnetic reed switch, it
7 may or may not be responding to the magnetic field
8 that is incidental to the current flowing through
9 the coil.

10 But one could also build a reed switch
11 where the magnetic field produced is minimal, but
12 the reed switch responds to the current flowing in
13 the coil.

14 The correct law of physics is the $I \times B$
15 force that is part of the Lorentz equation in
16 electromagnetics.

17 Q In that latter case you described, you
18 said the magnetic field produced is minimal. But to
19 be clear, there will still be a magnetic field
20 produced, correct?

21 A There will be a magnetic field produced.
22 As to whether the magnetized reed can interact with

1 it or not is dependent on how the switch is
2 constructed.

3 Q Okay. So do you agree that the phrase
4 "magnetic reed switch" describes a class of devices
5 at least some of which are magnetic field sensors?

6 MR. LAWSON: Object to the form.

7 A When it is designed to detect the
8 presence of a permanent -- of a DC magnet that's
9 external to the reed switch itself, then it is a
10 magnetic field sensing device.

11 Q Right. A magnetic reed switch, at least
12 in some design scenarios, is a magnetic field
13 sensor, correct?

14 A Yes, sometimes.

15 Q Going back to the list in Carstens, is a
16 Hall effect transistor a magnetic field sensor?

17 A Again, it's capable of detecting a DC
18 magnetic field typically produced by a permanent
19 magnet.

20 Q Is that a yes?

21 A Yes, it would detect a DC magnetic field.

22 Q Is an inductive pickup coil a magnetic

1 field sensor?

2 A Yes. It's capable of detecting AC
3 magnetic fields that are produced by a source that
4 is exclusive of the inductive pickup coil.

5 Q And I think we talked about this earlier.
6 But can we agree that the phrase "vibrating wire
7 transducer" refers to a class of devices, at least
8 some of which are magnetic field sensors?

9 A Yes.

10 MR. LAWSON: Object to the form. I
11 believe that's asked and answered.

12 Q Okay. Let's turn to page 14 of Carstens,
13 please. And there's a section about the inductive
14 pickup coil.

15 Do you see that?

16 A Not yet. Are you talking about the
17 exhibit number page or the book page?

18 Q The exhibit number page. It's book page
19 130.

20 A Okay. I see it, heading 4-5.

21 Q Under the heading 4-5, Inductive Pickup
22 Coil, the third sentence says, This type of coil is

1 used to sense the presence of a magnetic field and
2 when used by itself, is used primarily as a
3 proximity sensor.

4 Do you see that?

5 A I do.

6 MR. LAWSON: Counsel, I think you read
7 that wrong. I think you said, This type of coil,
8 when it actually says, This type of sensor.

9 MR. ZUCKER: Thank you. Let me repeat
10 that just to get that correct.

11 Q So the Carstens reference says that an
12 inductive -- strike that. Let me try again.

13 Under the heading 4-5, Inductive Pickup
14 Coil, the Carstens reference says, This type of
15 sensor is used to sense the presence of a magnetic
16 field and when used by itself, is used primarily as
17 a proximity sensor.

18 Is that right?

19 A I see that.

20 Q Do you agree that an inductive pickup
21 coil can be used as a proximity sensor?

22 A In some cases, yes, it can.

1 Q And do you agree that an inductive pickup
2 coil senses the presence of a magnetic field?

3 A Well, if there's a magnetic field being
4 produced by a source that is not part of the pickup
5 coil, then the pickup coil can sense that field that
6 is being produced by the law of induction that's
7 mentioned in this paragraph.

8 Q By the law of induction, the inductive
9 pickup coil can sense the presence of a magnetic
10 field, correct?

11 A If it's an AC magnetic field, then it
12 can. It can't detect a DC magnetic field.

13 Q So let's go back to your declaration. I
14 want to talk about paragraph 82. Let me know when
15 you're there.

16 A Just one moment. It's the paragraph that
17 starts with, Petitioner asserts that an inductive
18 proximity sensor?

19 Q Yes.

20 So just baseline, do you agree that Fells
21 discloses the use of an inductive proximity sensor?

22 A Fells discloses the use of an inductor as

1 a proximity sensor.

2 Q So for example, if we look at Fells
3 paragraph 289, it says, quote --

4 A Just one second.

5 Fells 289, okay.

6 Q It says, Optionally, an inductive
7 proximity sensor could be formed using another coil
8 in the wireless power supply 200.

9 Do you see that?

10 A Yes.

11 Q And so Fells discloses the use of an
12 inductive proximity sensor, correct?

13 A Well, in Fells, the use of an inductor as
14 a proximity detector is based on there being a
15 current sent through the inductor, and that inductor
16 changes -- the circuit connected to the inductor
17 senses a change in inductance caused by a foreign
18 object.

19 Q I think you're maybe getting ahead of me
20 here. I want to ask my question again.

21 Fells discloses the use of an inductive
22 proximity sensor, correct?

1 MR. LAWSON: Object to the form.

2 A Well, Fells states that an inductive
3 proximity sensor could be formed using another coil
4 in the wireless power supply.

5 As to whether Fells' definition of
6 "inductive proximity sensor" is the same as that
7 appearing in Carstens, I don't believe they are
8 describing the same thing.

9 Q So let me take a step back. I'm not
10 asking about Carstens; I'm just asking what I think
11 is a pretty basic question.

12 Fells discloses the use of an inductive
13 proximity sensor, right?

14 A Well, you're saying it's a simple
15 question. But it's not.

16 Q Well, let me stop you here. The words
17 "inductive proximity sensor" appear literally as
18 written in Fells' paragraph 289, right?

19 MR. LAWSON: Counsel, please refrain from
20 interrupting the witness when he's providing an
21 answer to your question, which is what you just did.

22 MR. ZUCKER: I need him to actually

1 answer my questions, not --

2 (Cross-talk.)

3 MR. LAWSON: It's all right, Counsel.

4 Just because you don't like the answer that he's
5 giving you does not mean that you can interrupt him
6 while he's giving you an answer. You have a right
7 to re-ask your question, but you don't have a right
8 to interrupt the witness in the middle of his
9 answer.

10 MR. ZUCKER: What I have a right is to
11 get an answer to the questions I asked, not the
12 answers he rehearsed with you, which is what we're
13 going to do.

14 MR. LAWSON: Counsel, as I said, you can
15 re-ask your question, but you cannot interrupt the
16 witness while he's giving an answer to your
17 question.

18 (Cross-talk.)

19 MR. ZUCKER: I don't believe I did that,
20 but let's move on.

21 MR. LAWSON: I would ask you to refrain
22 from doing that in the future during this

1 deposition.

2 Q So Dr. Horenstein, I'd like to ask my
3 question again. Is that all right with you?

4 A Please go ahead.

5 Q Paragraph 289 of Fells uses the words "an
6 inductive proximity sensor," correct?

7 A Yes, the first line of paragraph 289 has
8 the words, "an inductive proximity sensor."

9 Q So do you agree that Fells discloses the
10 use of an inductive proximity sensor?

11 A No.

12 MR. LAWSON: Objection, asked and
13 answered.

14 You can answer the question.

15 A If you'll permit me to give you my
16 answer, the term "inductive proximity sensor" is not
17 cast in stone in the field, and it's used to mean
18 something in which a voltage is induced, or a
19 current is induced, as it appears in Carstens.

20 But here, it refers to an inductor that
21 has current going through it because those -- that
22 is how Fells has described an inductive proximity

1 sensor.

2 Q So why are you referencing Carstens if
3 I'm only asking about what Fells teaches?

4 A Because we just spent about 10 or 15
5 minutes going through Carstens, and you asked me
6 about the inductive proximity sensor in Carstens,
7 and you're trying to equate that inductive proximity
8 sensor with the one in Fells.

9 And what I'm saying is, it's unclear that
10 they're the same thing, given the way Fells uses
11 that expression versus how Carstens uses that
12 expression.

13 Q So maybe my question was unclear, so let
14 me try it again.

15 I'm not asking you to equate anything.
16 What I want to know is, does Fells disclose an
17 inductive proximity sensor?

18 MR. LAWSON: Object to the form.

19 A To answer your question, I'd have to ask
20 you to define what you mean by "an inductive
21 proximity sensor."

22 Q Would what would a person of ordinary

1 skill understand the term "inductive proximity
2 sensor" to mean?

3 A In the context of Fells?

4 Q Let's start there, yes.

5 A In the context of Fells, an inductive
6 proximity sensor would be a coil of wire through
7 which an AC current is flowing and a circuit that
8 can measure the inductance of that coil.

9 Q Where does Fells state that that's how
10 its inductive proximity sensor functions?

11 MR. LAWSON: Counsel, while he's looking
12 for that to respond to your question, we've been
13 going about 55 minutes. So in the next couple
14 minutes, it would be a good time to take a break.

15 MR. ZUCKER: Sure.

16 MR. LAWSON: Doesn't have to be right
17 now, but in the next couple minutes.

18 MR. ZUCKER: Sure. We'll wrap up this
19 line of questioning, and then we'll take a break.

20 A I'll refer you to the paragraph in Fells
21 288 into 289, which references Figure 40, saying
22 that a thing called proximity detector in Figure 40

1 is described as a coil that is separate from the
2 primary coil of the power transfer system, which is
3 LP in Figure 40.

4 And given that you're telling me -- we
5 were talking about paragraph 289, which directly
6 follows 288. So "optionally" means -- in my
7 interpretation as one of ordinary skill would
8 understand, "optionally" is a continuation of the
9 discussion in paragraph 288, which is talking about
10 Figure 40.

11 And in Figure 40, proximity detector 4002
12 is a separate coil through which current is passed
13 and its inductance is changed if there's a foreign
14 object in its proximity.

15 Q So it's that last part that I have a
16 question about.

17 Fells says that an inductive proximity
18 sensor could be formed using a coil independent of
19 the coil used to transfer power, correct?

20 A Would you repeat that question?

21 Q Yeah. Fells says in paragraph 289, an
22 inductive proximity sensor could be formed using

1 another coil in the wireless power supply 200 which
2 is independent of the coil used to transfer power.

3 Correct?

4 A Yes.

5 Q There are a number of different ways to
6 construct a proximity sensor using a coil, correct?

7 A I don't believe so.

8 Q You believe there's only one way to
9 construct a proximity sensor using a coil?

10 A That's right.

11 Q Okay. And in your view, what is that
12 explanation?

13 A It's the same view that Fells discloses,
14 which is an inductive coil through which a current
15 is flowing wherein the inductance of that coil
16 changes in the proximity of a foreign object.

17 Q Where does Fells state that the
18 inductance of the coil changes in the proximity of a
19 foreign object and that's how this sensor works?

20 A So I found one example that I believe
21 answers your question. But if you ask your question
22 again for clarity, I'd appreciate it.

1 Q So where -- let me try it again.

2 Your view is that the inductive proximity
3 sensor of Fells is an inductive coil through which
4 current is flowing wherein the inductance of that
5 coil changes in the proximity of a foreign object,
6 correct?

7 A Yes.

8 Q What part of Fells are you relying on to
9 reach that conclusion?

10 A I'll refer you to the paragraphs leading
11 up to 193 in Fells, but I will cite the first
12 sentence of paragraph 193. I'll read it for the
13 record.

14 One advantage of this arrangement is that
15 the sense circuit 206, referring to Figure 2, can be
16 made to consume very low power, because it does not
17 need to do anything more complicated than determine
18 if a change in inductance has taken place.

19 Q So that paragraph 193 is referring to the
20 Figure 2 embodiment of Fells, right?

21 A Correct.

22 Q Do you believe that that paragraph 193

1 and the surrounding paragraphs through 196 are also
2 applicable to the Figure 40 embodiment of Fells?

3 A Yes.

4 Q Can a proximity sensor be constructed
5 using an inductive pickup coil?

6 A A pickup coil? It depends. It's
7 context-dependent.

8 Q Is it possible to construct a proximity
9 sensor using an inductive pickup coil?

10 A Like I said, it's context-dependent.

11 Q Does that mean it is at least sometimes
12 possible?

13 A It is sometimes possible.

14 Q Right. To be clear, an inductive pickup
15 coil can be used as a proximity sensor, correct?

16 MR. LAWSON: Object to the form.

17 A If the inductive pickup coil is a passive
18 device that is not energized with a current, then it
19 can be used as a proximity sensor that can detect
20 the proximity of an object producing an AC magnetic
21 field.

22 The other way it could be used is to have

1 current flowing through it and experience a change
2 in inductance in the presence of a metallic object,
3 whether magnetized or not.

4 MR. LAWSON: Counsel, just a reminder,
5 we've been going a little over an hour. So is this
6 a good time to take a short break?

7 MR. ZUCKER: Sure. Why don't we go off
8 the record.

9 (Recess from 10:04 a.m. until 10:20 a.m.)

10 BY MR. ZUCKER:

11 Q Welcome back, Dr. Horenstein.

12 A Thank you.

13 Q Did you speak to anyone during the break?

14 A No.

15 Q Before the break, we were talking about
16 paragraph 289 of Fells.

17 Do you still have that up?

18 A I do.

19 Q In the second sentence, it mentions a
20 capacitive proximity detector.

21 Do you see that?

22 What would a person of ordinary skill

1 understand that capacitive proximity detector to
2 refer to?

3 A Something whose capacitance changes when
4 in the proximity of a foreign object or in the
5 proximity -- that's my -- sorry, that's it. In the
6 proximity of a foreign object.

7 Q So would the capacitive proximity
8 detector that's described in Fells be a powered
9 sensor or a passive sensor, or could it be either?

10 A It could not be a passive sensor. It
11 would typically be a powered sensor.

12 Q Why could it not be a passive sensor?

13 A Fundamentally, there's no way to really
14 do it electronically, the difference between
15 inductors and capacitors.

16 Q I'm trying to just make sure I
17 understand.

18 Are you saying that there is no way to
19 construct a passive capacitive proximity detector in
20 general, or are you saying there's something
21 specific to Fells that makes that impossible?

22 A It's impossible in general.

1 Q Okay. And the inductive proximity sensor
2 in Fells, could that be a passive sensor or a
3 powered sensor or either?

4 A The inductive proximity sensors disclosed
5 in Fells are active.

6 Q In general, there is a such thing as a
7 passive inductive proximity sensor, correct?

8 A In general, that is correct.

9 Q Your view is just that that's not what's
10 disclosed in Fells?

11 A Correct.

12 Q I think we talked about this before, but
13 what portions of Fells are you relying on to
14 conclude that the inductive proximity sensor must be
15 powered and not passive?

16 A Every embodiment of the sensors in Fells
17 are powered. And I referred before to paragraphs
18 288 and 289, which reference Figure 40 as disclosing
19 proximity detector that is based on a coil that is
20 powered.

21 Q Well, paragraph 289 discusses a proximity
22 sensor using a coil. It doesn't specify whether

1 it's powered or not, right?

2 A It does indirectly, because the fourth
3 sentence starts with, Another type of proximity
4 detector 400 --

5 THE WITNESS: Excuse me. Can we take a
6 five-second break. My dog got into the room.

7 MR. ZUCKER: Certainly.

8 (A discussion was held off the record.)

9 BY MR. ZUCKER:

10 Q So my question is, paragraph 289 does not
11 specify whether the inductive proximity sensor is
12 powered or passive, correct?

13 A I disagree.

14 Q Why?

15 A Paragraph 289 contrasts a capacitive
16 proximity detector, which must be powered, with the
17 inductive proximity detector. Another type of
18 proximity detector is a capacitive proximity
19 detector. And that's after having stated that
20 the -- so I started the paragraph with inductive
21 proximity sensor.

22 So paragraph 289, in my view, is

1 contrasting these two types of sensors, which by
2 their nature would be powered.

3 Q So your view is that the inductive
4 proximity sensor must be powered because the same
5 paragraph also discusses a capacitive proximity
6 sensor, and that is powered?

7 A I don't think that's quite what I'm
8 saying.

9 I'm saying that the duality between the
10 capacitive proximity detector and the inductive
11 proximity sensor is one manifestation of that
12 conclusion that all the inductive sensors in Fells
13 are powered, but also because every -- in every
14 embodiment where the sensor is based on an
15 inductance, the inductance is powered.

16 Q That's sort of circular logic, isn't it?
17 I'm asking you whether the inductive proximity
18 sensor here is powered, and you say, yes because
19 every inductive sensor in Fells is powered. But
20 that's the very question I'm asking you.

21 A Well, inductive proximity sensor, not a
22 construed term, to my best recollection. So one has

1 to evoke the understanding of a person of skill,
2 what does Fells mean by an inductive proximity
3 sensor.

4 There's no evidence or disclosure or
5 explanation of a passive inductive proximity sensor
6 anywhere in Fells.

7 So the only conclusion I can reach is
8 that the inductive proximity sensor in 289 is
9 powered, and its distinction is that it doesn't have
10 to be connected to the main coil of the wireless
11 power transfer system.

12 Q Do you agree that a person of ordinary
13 skill in the art at the time of the invention of the
14 '184 patent would have understood that both passive
15 and powered inductive proximity sensors existed?

16 A That is correct, that those two types of
17 sensors existed. I don't believe that person would
18 interpret the proximity sensors in Fells as being
19 passive.

20 Q Do you agree that a person of ordinary
21 skill in the art at the time of the invention of the
22 '184 patent would have been able to construct both

1 passive and powered inductive proximity sensors?

2 A I agree it's possible.

3 Q That's not something that would have been
4 beyond the skill of an ordinary practitioner, right?

5 A It would depend on what the practitioner
6 was trying to do. To detect foreign objects with a
7 proximity detector, it would be very difficult to do
8 that with a passive coil without taking a completely
9 different approach, which is not what's discussed in
10 Fells.

11 Q I'm not asking about Fells. I'm just
12 asking, in general, do you agree that a person of
13 ordinary skill in the art at the time of the
14 invention of the '184 patent would have had the
15 knowledge to construct a passive inductive proximity
16 sensor?

17 MR. LAWSON: Object to the form, asked
18 and answered.

19 A Again, depending on what that person was
20 trying to achieve and whether either of those types
21 of sensors was appropriate for the application, a
22 person of skill would understand the basic physics

1 behind both implementations of inductive proximity
2 sensor.

3 Q Okay. Do you agree that the inductive
4 proximity sensor disclosed in Fells relies on
5 magnetic principles?

6 A It relies on the principle of induction.

7 Q Is that different than magnetic
8 principles?

9 A You have to tell me what you mean by
10 "magnetic principles."

11 Q Sure. Well, let's look at your
12 declaration, paragraph 82. Let me know when you've
13 got that up.

14 A Okay.

15 Q In the third sentence of paragraph 82,
16 you write, Both an inductive proximity sensor and a
17 magnetic field sensor rely on magnetic principles.

18 Do you see that?

19 A I do.

20 Q Do you agree that Fells' inductive
21 proximity sensor relies on magnetic principles?

22 A To the extent that it relies on the

1 self-inductance of the proximity sensor, then yes,
2 it relies on fundamental magnetics.

3 Q The inductive proximity sensor in Fells
4 produces a magnetic field, correct?

5 A It "produces"? Is that the word you
6 said?

7 Q Yes.

8 A Correct.

9 Q And the inductive proximity sensor in
10 Fells then responds to changes in inductance values
11 that correspond to changes in that magnetic field
12 created by a metallic object, correct?

13 A What you say is true, but it is not
14 sensing the field that it produces; it's just
15 producing that field.

16 Q The inductive proximity sensor in Fells
17 produces a magnetic field and then responds to
18 changes in that field, correct?

19 A No.

20 Q What part of that is incorrect?

21 A As I said a moment ago, and as I believe
22 I say elsewhere in this declaration, the proximity

1 detector in Fells responds to changes in the
2 inductance of its sensor coil.

3 Q And those changes in inductance of the
4 sensor coil will correspond to changes in the
5 magnetic field that has been produced, correct?

6 A Not necessarily.

7 Q What would be an example of a change in
8 inductance that does not change the magnetic field?

9 A I'm not sure. But I stand by my
10 statement that the sensor in Fells responds to a
11 change in inductance.

12 And whether or not it's associated with
13 the magnetic field it's producing is a question I'd
14 have to think about in more detail, so I'm not sure
15 of the answer. I suspect there are examples of
16 situations you're talking about where the magnetic
17 field is not changed.

18 But that said, the only proximity it
19 could detect is with a nonmagnetic foreign object
20 that changes the inductance of the coil used for the
21 inductive proximity sensor.

22 Q As we sit here today, can you give me any

1 examples of when a change in the inductance of the
2 sensor coil of Fells' inductive proximity detector
3 will not correlate to a change in magnetic field?

4 A You have to tell me what you mean by
5 "change in the magnetic field."

6 Q Can you give me any example of when a
7 change in the inductance of the sensor coil of
8 Fells' inductive proximity sensor will not generate
9 some alteration or perturbation in the magnetic
10 field?

11 A Again, what do you mean by "perturbation"?

12 Q Do you have an understanding of what it
13 means to change a magnetic field?

14 A Yes. But are we talking about a point
15 change or an aggregate change or an integral change
16 in the magnetic field inside the coil?

17 Q Any of those would be considered changes
18 in the magnetic field, right?

19 A Well -- and again, I'm evoking the
20 knowledge of electromagnetics that a person of skill
21 would have had.

22 If you take the line integral through the

1 coil and around the outside, that defines the
2 current density going through the integration
3 pathway. And foreign object or not, that
4 integration is going to be the same. That
5 integration defines the inductance of the coil.

6 (Reporter interruption.)

7 Q Looking at paragraph 92 of your
8 declaration -- do you see that?

9 A 92.

10 Q And you talk about a distinction between
11 sensors that require power to operate and sensors
12 that are passive elements.

13 Do you see that?

14 A Yes.

15 Q And then you say, While not a requirement
16 of claim 1, this distinction between the two types
17 of sensors adds further support to my opinion.

18 Right?

19 MR. LAWSON: Object to the form.

20 A Correct.

21 Q So just to be clear, you agree that it is
22 not a requirement of claim 1 of the '184 patent that

1 the magnetic field sensor be a passive element,
2 correct?

3 A It's the passive part that is not
4 explicitly stated in the -- in claim 1.

5 Q Claim 1 requires a magnetic field sensor
6 but does not require that that sensor necessarily be
7 a passive element.

8 Agreed?

9 MR. LAWSON: Object to the form.

10 A I can't agree with you, because the
11 entire patent is about passive field sensors and
12 every embodiment in the '184 is a passive field
13 sensor. So in that context, I would be of the
14 opinion that the magnetic field sensors in the
15 claims are passive sensors.

16 Q I'm trying to understand your
17 declaration, which says, quote, While not a
18 requirement of claim 1.

19 So I understand you to be saying that the
20 passive element is not a requirement of claim 1. Am
21 I misunderstanding?

22 A What I'm saying is, the words -- the word

1 "passive" does not appear in the claim, is what I'm
2 saying in paragraph 92.

3 Q Well, what you say in paragraph 92 is,
4 it's not a requirement of claim 1, correct?

5 A I think you have to take the whole
6 paragraph together. So let's start at the
7 beginning.

8 The paragraph talks about an inductive
9 proximity sensor which requires power to operate.
10 And I'll skip the parentheses. The magnetic field
11 sensors disclosed in the '184 patent are passive
12 elements that require no current or power.

13 And when I say, not a requirement of
14 claim 1, I'm saying that the words of the previous
15 sentence don't appear in the claim.

16 But then the next part of the sentence is
17 self-explanatory, in my view; This distinction
18 between the two types of sensors adds further
19 support to my opinion that Fells does not disclose
20 the magnetic field sensor element of claim 1.

21 What does that last sentence say?
22 Claim 1 of the '184 patent is talking about the

1 embodiments of magnetic field sensor -- I'm sorry --
2 the type of magnetic field sensor that are disclosed
3 in every single embodiment in the patent.

4 Q Okay. So let's talk about Fells
5 Figure 40.

6 So the element in Fells Figure 40 labeled
7 LP 212, is the primary coil, correct?

8 A I'm not caught up with you yet. Hang on.
9 Okay. Now I'm looking at Figure 40.
10 Could I ask you to repeat your question.

11 Q The element 212 in Fells Figure 40
12 labeled LP, that's the primary coil, correct?

13 A Yes.

14 Q When the primary coil receives an
15 alternating current from the inverter, it will
16 generate a magnetic field, correct?

17 A Right.

18 Q Does that magnetic field reach the
19 proximity detector?

20 A Well, if you look at this picture, the
21 proximity detector is off to the side of LP.

22 Q So does the magnetic field generated by

1 the primary coil reach the proximity detector?

2 A Fells doesn't say.

3 Q Okay. So is it your opinion that Fells
4 affirmatively teaches that the magnetic field of the
5 primary coil does not reach the proximity detector,
6 or is it your opinion that Fells doesn't specify one
7 way or the other whether the magnetic field of the
8 primary coil reaches the proximity detector?

9 MR. LAWSON: Object to form.

10 A I am of the opinion that the proximity
11 detector is something that is external to the
12 primary coil, LP, and is, at best, off to the side.

13 Q What does "at best, off to the side"
14 mean?

15 A It could be even further away than
16 immediately to the side of LP.

17 Q Oh. Being immediately to the side or off
18 to the side doesn't necessarily mean that it's
19 outside of the magnetic field, right?

20 A I think that is not true.

21 Q So is it your opinion that if the
22 proximity detector is to the side of, as opposed to

1 directly on top of the primary coil, then the
2 proximity detector is not within the magnetic field
3 of the primary coil?

4 MR. LAWSON: Object to the form.

5 A I think, given the nature of the primary
6 coil and the secondary coil with which it interacts,
7 they would be closely spaced and the magnetic field
8 would not protrude very much to the sides of those
9 coils, such that inductive proximity detector would
10 not be able to detect the field of LP.

11 Q How far does the magnetic field generated
12 by LP 212 reach?

13 A Not very far.

14 Q Do you have any way of quantifying that?

15 A It's a one over distance cubed
16 relationship. So for every doubling of the
17 distance, the strength goes down by a factor of 8,
18 and it very quickly dissipates to a level that's not
19 measurable.

20 In addition, it's not like you can point
21 an inductive proximity sensor, even if it's a
22 passive one, at the primary coil and pick things up,

1 because it's only the field that goes
2 perpendicularly through the coil of the proximity
3 detector that will register anything.

4 And I would maintain that the magnetic
5 fields between LP and the secondary coil that's not
6 shown, LS, would be principally on the axes of these
7 two coils and not lateral to them.

8 Q Does Figure 40 show the actual physical
9 position of the proximity detector, or does it just
10 show the logical relationship between the
11 components?

12 A If you look at the way Figure 40 is
13 described in paragraph 288 of Fells, it says, In the
14 embodiment illustrated in Figure 40, a sense circuit
15 that acts as a proximity detector 4002 is used to
16 initially detect that a device or foreign object has
17 been placed in the vicinity of the wireless power
18 supply.

19 It doesn't say on the wireless power
20 supply coils. It's just been placed in the
21 vicinity.

22 And so that's the job of the proximity

1 detector 4002, detecting objects that are in the
2 vicinity of LP.

3 And particularly the next sentence that
4 starts about the sixth line down, The proximity
5 detector is completely separate from the primary
6 coil 212 and not connected to it. In one
7 embodiment, the proximity detector only knows that a
8 change in the devices or objects present has
9 occurred.

10 So I interpret that sentence as saying,
11 the proximity detector 4002 in Figure 40 is
12 something off to the side used to detect objects
13 that appear in the vicinity of the wireless power
14 supply circuit, in particular its primary coil.

15 Q Okay. So you read the first sentence of
16 Fells paragraph 288, which talks about detecting a
17 device or foreign object placed in the vicinity of
18 the wireless power supply, right?

19 A Yes.

20 Q And the next sentence says, It also
21 detects if a device or foreign object is removed
22 from the wireless power supply 200.

1 Did I read that right?

2 A You read the words correctly.

3 Q That sentence does not mention vicinity,
4 right?

5 A It doesn't include the word "vicinity,"
6 but I think any reasonable person and in particular
7 a person of skill would know that because the sensor
8 also detects if a foreign object is removed, it
9 means removed from the vicinity of the wireless
10 power supply.

11 I can't imagine any other interpretation,
12 because in order to remove something, if it was
13 being removed from being on the primary coil, it
14 would have to have a way to get there, and that's
15 not covered by the sentence that precedes it, in the
16 vicinity of.

17 So that is -- I interpreted the sentence,
18 by that fifth line down, meaning removed from the
19 vicinity of the wireless power supply.

20 Q Right. You're importing that word
21 "vicinity" into the later sentence even though the
22 word doesn't appear there?

1 A Well, "importing" sounds like a legal
2 term that applies to patents.

3 I am applying the understanding of a
4 person skilled in the art and what that person would
5 have understood those two sentences to mean based on
6 plain English.

7 Q You mentioned earlier the degradation, I
8 think, of a magnetic field over a certain distance.

9 Do you recall that?

10 A Not exactly.

11 Q Sure. Well, we talked about the magnetic
12 field having a one over distance cubed relationship,
13 right?

14 A That's right.

15 Q And so as you move farther out from the
16 primary coil, the strength of the magnetic field
17 that's generated by the primary coil will become
18 lessened, right?

19 A That is correct.

20 Q And at what point are you saying is the
21 end, the outer bound of the magnetic field?

22 A Again, it depends on the context. And

1 when you say "outer bound," it means as defined by
2 how? And the definition is based on the sensitivity
3 of the proximity detector.

4 And, you know, it would only be a
5 guesstimate based on the typical construction of
6 wireless power transfer coils.

7 So I could give you a general idea, but I
8 wouldn't say it's a precise answer.

9 And that would be, for example, if the
10 coil were 10 centimeters in diameter, you know,
11 within about 5 millimeters away from the two coils,
12 the field will have diminished substantially to, you
13 know, 1/100th or 1/1000th of its value inside the
14 area in between the coils.

15 Q Okay. So if you are at a distance away
16 where the field has diminished to, let's call it
17 1/2, is that still within the magnetic field?

18 A Well, the distance at which the field is
19 diminished by 1/2 is going to not be very far away.
20 I used the reference distance 1 centimeter in my
21 guesstimate example, and that was, like, 1/100th.
22 Now you want me to go back to 1/2.

1 And your question was, would that -- I
2 forget exactly what your question was, the last part
3 of it. So could you repeat it?

4 Q Well, I'm trying to get an understanding
5 for how much the magnetic field can dissipate and
6 still have the position of the sensor be considered
7 within the magnetic field.

8 And so I wanted to start with what I
9 thought was an easy question, which is, if the
10 sensor is close enough that the magnetic field is at
11 half of its initial strength, that sensor is within
12 the magnetic field, correct?

13 MR. LAWSON: Object to the form.

14 A You have to tell me what you mean by
15 "within the magnetic field."

16 Q Well, that's the claim term, right,
17 positioned within the magnetic field.

18 A Yes. That claim term means the magnetic
19 field produced by the primary resonator and received
20 by the secondary resonator.

21 Q Okay. So if the magnetic field sensor is
22 positioned at a point where it receives the magnetic

1 field produced by the primary resonator at 1/2 of
2 the initially produced strength, is that magnetic
3 field sensor within the magnetic field?

4 MR. LAWSON: Object to the form.

5 A Doesn't tell me how the sensor gets
6 there. It would depend on the gap between the two
7 resonators and the physical size of the sensor. And
8 without that information, it is hard to tell.

9 Q Okay. So if I point you to a magnetic
10 field sensor and ask you to tell me, is this or is
11 this not within the magnetic field of the primary
12 coil, what would you have to do to make that
13 determination?

14 MR. LAWSON: Object to the form.

15 A Well, what is the -- what are the
16 dimensions of the sensor, first of all, and what's
17 the gap spacing between the primary and secondary
18 coils? If you can't tell me that, I can't answer
19 your question.

20 Q And so if you have the dimensions and the
21 gap spacing, what is the calculation that you would
22 use to determine whether the magnetic field sensor

1 is or is not positioned within the magnetic field?

2 A You have to understand that the vector
3 direction of the magnetic field sensor that we're
4 talking about depends a lot and whether it can act
5 like a sensor. If the vector direction of the
6 sensor, typically along its axis, is perpendicular
7 to the direction of the field, then it won't measure
8 anything. It's got to be parallel to the direction
9 of the field.

10 So unless you can tell me what the length
11 of the sensor is, I can't tell you whether it can
12 get into the field of the sensor -- of the --
13 sorry -- the resonator such that it could produce
14 any meaningful signal.

15 Q Okay. So is that the test that you're
16 using for whether it's positioned within the
17 magnetic field, whether the sensor produces any
18 meaningful signal?

19 A I'm using what the understanding would be
20 of any reasonable person skilled in the art, not
21 splitting hairs about what we call fringing fields
22 along the edges. But the claim says that the sensor

1 has to be within the magnetic field of the -- pardon
2 me, what's the exact language -- yes, the element of
3 the claim, and I'm starting at line 20 of column 12
4 of the '184, says, wherein the at least one magnetic
5 field sensor is positioned within the magnetic field
6 of the wireless energy transfer system.

7 So it doesn't say, you know, the field
8 produced by the primary coil, and you're asking me
9 to evaluate how far its fringing field goes.

10 It says, the field of the wireless energy
11 transfer system, and that means the field that makes
12 it all the way to the secondary coil. And that will
13 be in the -- it would be maximum in the center of
14 the two coils, and it would be of high strength as
15 you took the observation point outward.

16 And at some point, those fields would
17 cease to go through both of the coils, and then you
18 would be in the fringing realm that you're trying to
19 ask me how far into that can I put the sensor from
20 Fells and pick up a signal.

21 It's not relevant to what the claim is
22 saying.

1 Q You've mentioned the fringing field a
2 couple times. Can you explain what you mean by
3 that?

4 A Yes. The field we have been talking
5 about, in answering the question how far out does it
6 go, all those questions, pertaining to just LP, a
7 lot of the field from LP gets coupled into LS, the
8 secondary coil. And some of it doesn't; it just
9 circulates around the edges of the primary coil.

10 And it doesn't -- it's not used as part
11 of the wireless energy transfer, but it exists
12 around the edges. We call it the fringing field.

13 Q Is Fells' proximity detector within the
14 fringing field of LP?

15 A I don't believe so, in the context in
16 which it is described in Fells.

17 Q What are you basing that on?

18 A I believe I've answered this question.

19 But where it says, in the vicinity of the
20 primary coil -- and that's in paragraph 288 -- in
21 the vicinity of the wireless power supply in
22 paragraph 288. It doesn't say, right at the edge of

1 the primary coil; it says, in the vicinity of the
2 wireless power supply.

3 Q The area within the fringing field of LP
4 would also be within the vicinity of the wireless
5 power supply, right?

6 MR. LAWSON: Object to the form.

7 A You're asking me if the sensor could be
8 placed within that zone where the fringing fields
9 emanate from the primary coil, and I don't believe
10 it's possible to answer that question without
11 knowledge of the dimensions of the sensor and the
12 spacing between the primary and the secondary.

13 Q So I think I asked this before.

14 But are you saying it would be impossible
15 to place Fells' sensor there, or are you saying that
16 without more detail on the diameter, Fells doesn't
17 specify one way or another whether its sensor is
18 within the field emanating from the primary coil?

19 MR. LAWSON: Object to the form. You did
20 ask that before.

21 A I think my answer to the question you've
22 just posed is that it's splitting hairs trying to

1 fit Fells' sensor into what is disclosed in the '184
2 wireless power transfer system. And, you know, the
3 relationship between the inductive proximity sensor
4 in Fells and what's disclosed in the '184, it, too,
5 is on the fringe.

6 And I do not believe that anything that's
7 disclosed in Fells maps onto the things that are
8 enclosed in the '184 patent. That would be my
9 opinion as an expert and a person of skill.

10 Q I appreciate that answer, although I
11 think it's not actually addressing my question,
12 which is, is it your view, reading Fells, that it
13 would be impossible to place Fells' sensor within
14 the field emanating from the primary coil, or just
15 that Fells does not specify one way or another
16 whether the sensor is placed within the field
17 emanating from the primary coil?

18 MR. LAWSON: Object to form. Asked and
19 answered.

20 A I think, given what's disclosed in Fells,
21 it's closer to not being possible than being
22 possible.

1 Q So I'm still unclear on whether you're
2 saying it's actually impossible or just unlikely, or
3 it doesn't say either way.

4 A I think "unlikely" is the best --

5 MR. LAWSON: Object to the form.

6 You can answer.

7 A I think "unlikely is" the best word to
8 put into the answer here.

9 Q Okay. So would you mind if I restate
10 that just so that we have it clearly?

11 A Sure.

12 Q So your view is that it is not strictly
13 impossible but unlikely that Fells' sensor would be
14 placed within the magnetic field emanating from the
15 primary coil?

16 MR. LAWSON: Object to the form.

17 A My answer is, there's nothing in Fells to
18 imply or suggest what you're saying. It's a
19 scenario that you're making up in the question, but
20 it's not disclosed in Fells.

21 So whether it's possible or not, you
22 know, technically, it could be possible, but you

1 know, I could also make Fells -- a sensor out of
2 three atoms somehow, and if I did that, could I get
3 it into the field?

4 You know, it's kind of a hypothetical
5 question, and I don't believe it's addressed in any
6 part of Fells.

7 Q Does Fells specify that the proximity
8 detector is outside of the magnetic field emanated
9 by the primary coil, or is that also not addressed
10 in Fells?

11 A I would say the answer is, yes, Fells is
12 saying that the proximity detector is outside.

13 Q And you're basing that on Figure 40?

14 A No. I'm basing that on all the passages
15 in the specification that we've been citing in this
16 line of questioning.

17 Q So if you could turn to paragraph 98 of
18 your declaration. Please read that and let me know
19 once you've had a chance to do so.

20 A Okay, I've read that.

21 Q Okay. So this is discussing the Hall
22 effect sensor that's disclosed in Fells, right?

1 A Yes.

2 Q Do you agree that the Hall effect sensor
3 in Fells detects foreign objects in the vicinity of
4 the wireless power supply?

5 A The Hall effect sensor can detect such
6 objects if they're magnetic, because that's what a
7 Hall effect sensor responds to, DC magnetic fields
8 produced by an object.

9 Q Can the Hall effect sensor in Fells
10 disclose magnetic foreign objects placed on or over
11 the wireless power supply?

12 A I don't believe it could. It would not
13 be a practical way to deploy Hall effect sensor.

14 Q So is it your understanding of Fells that
15 the Hall effect sensor does not detect in the area
16 on or over the wireless power supply?

17 A That's correct.

18 Q Is it your understanding of Fells that
19 the inductive proximity sensor does not detect in
20 the area on or over the wireless power supply?

21 A That's correct.

22 Q Your understanding is that the inductive

1 proximity sensor only detects in the surrounding
2 vicinity of the wireless power supply but not on or
3 over the power supply?

4 A You're using the language "on or over the
5 power supply." I'm interpreting all of this as on
6 or over the primary coil of the transfer system, not
7 on the box that -- which all the circuit boards are.
8 So let's just clarify that.

9 Do you mean on the primary coil
10 resonator?

11 Q Yeah. Let's start there, on the primary
12 coil resonator.

13 A So your question -- which, probably, you
14 should repeat it.

15 Q Sure. Does Fells' inductive proximity
16 sensor detect objects that are placed on or over or
17 in the vicinity of the primary coil resonator?

18 A Well, the first two, no. And the third,
19 yes.

20 Q Okay. So just to be clear, your view of
21 Fells is that the inductive proximity sensor can
22 detect objects that are in the vicinity of the

1 primary coil resonator but cannot detect objects
2 that are actually within the magnetic field of the
3 primary coil resonator, correct?

4 A Correct.

5 Q Is that the same answer for Fells' Hall
6 effect sensor?

7 A Yes.

8 Q Okay. And so you talked about the
9 proximity detector as being off to the side of the
10 primary coil, right?

11 A Yes.

12 Q And so if an object is approaching the
13 primary coil, the proximity detector -- strike that.
14 Let me try again.

15 If an object is approaching the primary
16 coil from the direction in which the proximity
17 detector sits, it would be detected, right?

18 A Well, if the foreign object were close
19 enough to the proximity detector, then the proximity
20 detector would be able to detect the foreign object.

21 Q Sure. But isn't it possible that the
22 foreign object is approaching from the opposite

1 side, where the proximity detector is not located,
2 and, therefore, it will enter the field of the
3 primary coil before being detected by the proximity
4 detector?

5 MR. LAWSON: Object to the form.

6 A That is possible.

7 Q Wouldn't that be a problem for Fells?

8 MR. LAWSON: Object to the form.

9 A If a foreign object came in from a place
10 where there isn't a detector, that would be a
11 problem.

12 Q One way to solve that problem would be to
13 ensure that the area in which detection is covered
14 includes the area on or over the primary coil
15 itself, right?

16 A Well, I don't think that is a reasonable
17 statement. I don't think that's true.

18 Q What part of that is incorrect?

19 A Given the way Fells discloses its
20 sensors, they couldn't be inside the primary -- the
21 field of the primary coil of the wireless power
22 transfer system because the field being produced

1 would interfere with the sensor and the sensor
2 itself would become a foreign object.

3 Q It's possible to do foreign object
4 detection even with metallic components or circuitry
5 within the magnetic field, correct?

6 MR. LAWSON: Object to the form.

7 A If one uses one of the embodiments in the
8 '184, it is possible.

9 Q Are you saying the only way to perform
10 foreign object detection with a sensor in the
11 magnetic field is to use the '184 patent?

12 A If you want to be able to detect foreign
13 objects over the whole surface area of the
14 resonator, yes, I believe that's the only way to do
15 it; "that" meaning the embodiments in the '184
16 patent.

17 MR. LAWSON: Counsel, we've been going
18 almost 50 minutes. So we don't have to stop right
19 now, but if we can stop in a next couple minutes to
20 break, it would be appreciated.

21 MR. ZUCKER: Yeah. We can --

22 Let's go off the record.

1 (Recess from 11:09 a.m. until 11:23 a.m.)

2 BY MR. ZUCKER:

3 Q Welcome back, Dr. Horenstein. Did you
4 speak to anyone during the break?

5 A No.

6 Q Okay. Would a person of ordinary skill
7 in the art of the '184 patent have an understanding
8 of what an inductance bridge is?

9 A I suspect so.

10 Q And what would that understanding be?

11 A Well, any circuit that's a bridge
12 consists of four elements -- often the same type of
13 element, not necessarily; often the same value, not
14 necessarily -- connected together in a diamond
15 configuration, where the signal is obtained across
16 the diamond from one node to another.

17 Q So if we were to look, for example, at
18 Fells paragraph 291, there's a reference to an
19 inductance bridge, right?

20 A One second.

21 Okay.

22 Q And Fells is talking about a bridge that

1 is sensitive to inductance changes, right?

2 A I think your answer is more general than
3 that. That paragraph talks about making a bridge
4 comprising any of the following elements, inductor,
5 capacitor, or resistors. And if there's an inductor
6 that's in that bridge, the bridge would be sensitive
7 to the value of inductance of the inductor.

8 Q And if the bridge senses a change in an
9 inductance, would that correlate to a change in
10 magnetic field?

11 A It would correlate to a change in
12 inductance.

13 Q Does the change in inductance necessitate
14 a change in magnetic field?

15 A Not necessarily.

16 Q Can you give me an example of how
17 inductance could change without changing the
18 magnetic field?

19 A Sure. If I have an inductor that's
20 solenoidal, like a tube with coil wound around it,
21 of a particular value of inductance, I put a current
22 through the coil, I get a magnetic field inside.

1 Now, if I cut the coil in half, the
2 inductance is reduced by $1/2$, but if I put twice as
3 much current through the coil, I'll get the same
4 magnetic field as I had before.

5 Q The type of inductive bridge that's being
6 discussed in Fells is sensitive to external
7 inductance changes, right?

8 A It's implied that the bridge is inside
9 the sense circuit, meaning it's electronic in
10 nature. So the inductance would be external to --
11 it would be a component in the bridge, a separate
12 component.

13 Q And so the external inductance change
14 that's being sensed by the bridge would correspond
15 to a change in magnetic field, right?

16 A Again, maybe; maybe not.

17 Q Can you give me an example of how an
18 external inductance change does not correlate to a
19 change in magnetic field?

20 A I believe I just gave you an example
21 where I changed the size of the inductor and the
22 current going through it.

1 Q Well, the inductance bridge in the sense
2 circuit of Fells, the inductance changes that you're
3 talking about are those generated by the presence or
4 arrival of foreign objects, right?

5 A One moment. Or you could help me by
6 referring me to, other than the words in the
7 paragraph we're discussing, a diagram of a bridge in
8 Fells.

9 Q I don't know that there is or isn't one.
10 I want your understanding of how Fells measures
11 inductance changes.

12 A Well, Fells is suggesting that the sense
13 circuit includes a bridge circuit of which the
14 inductance detecting foreign objects is a member.

15 Q Okay. And when the sense circuit detects
16 an inductance change indicative of a foreign object,
17 that would correlate with a change in magnetic
18 field, right?

19 A Well, just to be clear, I'll give you the
20 scenario where I don't cut the inductor in half and
21 double the current, I don't alter any of the
22 elements in the bridge. And then a foreign object

1 approaches the sensing coil, which is part of the
2 bridge, so that the bridge registers a signal
3 commensurate with the foreign object.

4 In the case where you had a scenario
5 where the field inside the inductor changed, it
6 would still be the field that it's producing. And
7 so it can't detect its own field; it's making the
8 field. What it changes -- what it, sorry, detects
9 is the change of its inductance, and it's actually
10 the rest of the bridge circuit that detects the
11 change in inductance.

12 Q To be clear, though, you're saying
13 it's -- that's not what's being detected. Are you
14 disputing that there is a change in the magnetic
15 field?

16 A I'm saying there's a change in
17 inductance, just to be clear. And what I'm saying
18 is, in the hypothetical you keep pushing, which I
19 keep saying is not true, that the sensor changes --
20 senses the change in its own magnetic field, I'm
21 saying, even given that, if there was a change in
22 magnetic field somehow produced by a foreign object,

1 say it was a magnet, then the bridge circuit would
2 be sensing the change of inductance; it wouldn't be
3 measuring a change in magnetic field that is
4 produced by the inductor because it's an inductor.

5 Q You keep addressing whether or not this
6 circuit is measuring the change in magnetic field.

7 What I want to know is, do you agree that
8 when there is a change in inductance, there will, in
9 fact, be a change in magnetic field?

10 MR. LAWSON: Object to the form, asked
11 and answered.

12 A It's possible, under the right
13 circumstances, that the magnetic field inside the
14 inductor will change when the value of inductance is
15 changed. There are some times it will, some times
16 it won't.

17 But I think you're asking me, is that
18 sensing a magnetic field. And my answer is, no,
19 it's not.

20 Q You keep answering whether it's sensing
21 the magnetic field, but that's not what I'm asking
22 you.

1 I'm asking you, if there is a change in
2 inductance caused by the arrival or removal of a
3 foreign object, will that change the magnetic field?

4 A Possibly; possibly not. It's really
5 context -- or situation-dependent.

6 Q What is the context that would change the
7 answer to that question?

8 A It would be the nature of the foreign
9 object.

10 Q Okay. So if there is a change in
11 inductance caused by the arrival or removal of a
12 metallic foreign object, will that change the
13 magnetic field?

14 A Also depends on what kind of metal.

15 Q Okay. Can you give me an example of a
16 type of metal where it would change the magnetic
17 field?

18 A I'm trying to remember the name of it.
19 It begins with the letter N. I'm afraid I can't
20 remember the name of it. It's a certain alloy that
21 is able to shield magnetic fields. It's used in
22 science and not for building anything that is

1 structural. I'm afraid I don't remember the name of
2 it at the moment; I just know it's gray.

3 Q Okay. So in the absence of some type of
4 shielding, do you agree that a change in inductance
5 caused by the arrival or removal of a metallic
6 foreign object will change the magnetic field?

7 A I guess I have to ask what magnetic field
8 you're talking about. Where inside the inductor are
9 we talking about?

10 Q Is there some part of the inductor for
11 which the answer to that question is yes and some
12 part for which the answer is no?

13 A That could be the case.

14 Q Well, can you tell me what parts of the
15 inductor the answer to that question is yes and what
16 parts are no?

17 A It really depends on the construction of
18 the inductor and the shape and relative size of the
19 foreign object.

20 Q Okay. Let's look at paragraph 190 of
21 Fells. Excuse me, I did it again. I mean paragraph
22 191.

1 A Okay.

2 Q And about halfway down, there's a
3 sentence that says, The sense circuit 206 detects
4 when an object is placed in (or removed from) the
5 proximity of the wireless power supply 200.

6 Do you see that?

7 A Yes.

8 Q So can we agree that the Figure 2
9 embodiment of Fells includes a mechanism that
10 detects when an object is placed in or removed from
11 the proximity of the wireless power supply?

12 A Yes.

13 Q And the Figure 2 embodiment of Fells also
14 performs what's called a calibration inductance
15 measurement or a sense circuit calibration, right?

16 A Just one moment. Let me just bring up
17 Figure 2.

18 I recall there's a discussion of
19 calibration in Fells. I'm not exactly sure where
20 it's disclosed.

21 Q Sure. So if we look at paragraph 196,
22 for example, there's a mention of a calibration

1 inductance measurement, right?

2 A Yep.

3 Q And this relates to the functionality of
4 the sense circuit?

5 A Yes.

6 Q So just to be clear, we agree that the
7 Figure 2 embodiment of Fells performs this
8 calibration inductance measurement, right?

9 MR. LAWSON: Object to the form.

10 Actually, Counsel, paragraph 196 talks
11 about Figure 3. Is that what your question is
12 referring to?

13 MR. ZUCKER: No. I appreciate you not
14 answering for the witness.

15 MR. LAWSON: I'm asking about which
16 paragraph in Fells that you're referring to.

17 MR. ZUCKER: Paragraph 196, just like I
18 stated before.

19 Q Do you see that, Dr. Horenstein?

20 A It's abundantly clear to me that that
21 paragraph refers to Figure 3. And we were talking
22 about Figure 2. That was going to be the first part

1 of my answer, which figure are we talking about.

2 Q Thank you for confirming that Mr. Lawson
3 was, in fact, testifying for you.

4 Now, Figure 3 is an example --
5 (Cross-talk.)

6 MR. LAWSON: I object to that, Counsel.
7 That's -- you're mischaracterizing. I wasn't
8 testifying for anything. I was clarifying which
9 paragraph you were talking about and which figure
10 you were talking about.

11 MR. ZUCKER: Paragraph 196, just like I
12 said.

13 Q So Figure 3 of Fells is an example timing
14 diagram, correct?

15 A That's what it says.

16 Q Okay. So Figure -- the discussion of
17 Figure 3 talks about the wireless power supply 200
18 and the sense circuit 206, right?

19 A Yes.

20 Q The Figure 2 embodiment of Fells performs
21 the sense circuit calibration and the other factors
22 that are shown in the Figure 3 timing diagram,

1 right?

2 A That's right.

3 Q Okay. So that's all I wanted to
4 establish.

5 We can agree that the Figure 2 embodiment
6 of Fells performs these functions, including the
7 calibration measurement, that are described with
8 respect to the Figure 3 diagram, correct?

9 A Okay.

10 Q Do you agree?

11 A Yes. Sorry.

12 Q Thank you.

13 Now, I want to turn back to the '184
14 patent. Can we look at claim 1 itself.

15 A I'm looking at it.

16 Q Okay. And claim 1 recites, A wireless
17 energy transfer system with foreign object debris
18 detection, the system comprising -- and then a
19 number of limitations, right?

20 A Yes.

21 Q And so all of those limitations that come
22 after "the system comprising" are components of the

1 wireless energy transfer system, correct?

2 A I'll agree with that.

3 Q And the first limitation says, quote, A
4 wireless energy transfer source comprising a source
5 resonator configured to generate an oscillating
6 magnetic field.

7 Do you see that?

8 A Yes.

9 Q And so the source resonator is a
10 component of the wireless energy transfer source,
11 correct?

12 A I believe you misstated it. It's a
13 component of the wireless energy transfer system.
14 You used the word "source."

15 Oh, you're right. My mistake.

16 The wireless energy transfer source
17 comprises the source resonator.

18 Q Just to be clear, the source resonator is
19 a component of a broader term called "a wireless
20 energy transfer source," which is itself a component
21 of a broader term called "a wireless energy transfer
22 system."

1 Agreed?

2 A Yes.

3 MR. LAWSON: Object to the form.

4 Q Okay. Now, let's look at Figure 2 in the
5 '184 patent.

6 A All right.

7 Q Figure 2 is an example of two magnetic
8 field sensors labeled 202 and 204, correct?

9 A I'm sorry. We're on Figure 2 of the
10 '184?

11 Q Yes.

12 A Sorry.

13 Figure 2, okay.

14 Q Figure 2 of the '184 patent shows two
15 magnetic field sensors labeled 202 and 204, correct?

16 A Yes.

17 Q Each of these two loops that's shown is
18 itself an individual magnetic field sensor, correct?

19 A In Figure 2, yes.

20 Q And in Figure 2, there's a labeled B
21 field showing a circle with an X with it?

22 A Yes.

1 Q That B field is generated by the primary
2 coil of the system, correct?

3 A Well, not necessarily. Let me see what
4 it says about Figure 2 in the patent.

5 I think the labeling of B in Figure 2 is
6 intended to be more generic, just explaining the
7 physics of how the sensor operates.

8 Q So I want to make sure I understand that.

9 You're saying you agree that the B field
10 label indicates a magnetic field but it may or may
11 not be generated by the primary coil in the system?

12 A Figure 2 just illustrates a magnetic
13 field that is perpendicular to the area of each of
14 the coils.

15 Q Right. So when the system of the '184
16 patent operates, there is a primary coil that
17 generates a B field, right?

18 A Yes.

19 Q And when that happens, magnetic flux from
20 that primary coil will go through each of the sensor
21 coils, correct?

22 A Well, in principle, yes.

1 Q And if the primary coil is arranged so
2 that flux flows through a secondary sensor coil,
3 that would be one example of what could be referred
4 to as an inductance bridge, right?

5 A I'm not sure where you get that
6 information, but no.

7 Q What part of that is incorrect?

8 A I think you need four elements to make a
9 bridge circuit.

10 Q Okay. So --

11 A Sorry. If it says that somewhere in the
12 '184, I would ask you to direct me to it. But I
13 don't think it does.

14 Q Okay. We can move on from that.

15 So if a foreign object is placed into the
16 B field, the voltage across the inductive sensors
17 will change, correct?

18 A The voltage across the terminals of the
19 sensor in which the foreign object is placed or has
20 appeared.

21 Q Right. If a foreign object is placed
22 into the B field that's generated by the primary

1 coil, the voltage across the terminals of the sensor
2 will change, correct?

3 A Yes.

4 Q And that voltage change will also
5 correspond with a change in impedance of the sensor,
6 right?

7 A Well, we're talking about which sensor,
8 the Figure 1 sensor or the Figure 2 sensor?

9 Q Let's start with the Figure 2 sensor.

10 A Well, these are two separate sensors;
11 sensor 1 and sensor 2, let's call them.

12 If a foreign object appears in the area
13 of one of the sensors, its impedance would change.

14 Q If a foreign object is placed into the
15 magnetic field that's being generated by the primary
16 coil, the voltage across the sensor terminals and
17 also the impedance across the sensors will change,
18 correct?

19 A Well, only the sensor on which the
20 foreign object is lying.

21 Q Okay. So if the foreign object is placed
22 into the magnetic field of the first sensor, then

1 the voltage across the sensor terminals and the
2 impedance will change, right?

3 A That's correct.

4 Q And if the foreign object is placed into
5 the magnetic field of the second sensor, the voltage
6 across the sensor terminals and the impedance of the
7 second sensor will change, right?

8 A That's right.

9 Q So let's turn back to Fells and look at
10 paragraph 246, please.

11 Fells paragraph 246 says, in
12 the this [sic] embodiment, the energy storage
13 element 1604 is monitored so that it does not
14 deplete fully, preventing operation of the sense
15 circuit 206.

16 Do you see that?

17 A Yes.

18 Q And then a couple sentences later, it
19 says, In addition, the sense circuit 206
20 periodically monitors the energy in the energy
21 storage element 1604 via the energy level output
22 from the energy storage unit 204.

1 Do you see that?

2 A Yes.

3 Q So can we agree that Fells' system
4 periodically checks the energy level of the energy
5 storage element?

6 A Correct.

7 Q And Fells says that if the energy storage
8 element were to be fully depleted, that would
9 prevent operation of the sense circuit, right?

10 A Correct.

11 Q And if the sense circuit was not
12 operational, then it could not close switch 1 when a
13 device arrives in proximity to the wireless charger,
14 right?

15 I assume you're reading what you need to
16 answer?

17 A Yes, I'm reading.

18 Q Okay.

19 A Sorry.

20 All right. What was the original
21 paragraph you were asking me about?

22 Q We were looking at paragraph 246.

1 A Okay. Could you repeat your question?

2 Q If Fells' sense circuit is not operating,
3 then it cannot close switch 1 when a device arrives
4 in proximity to the wireless charger, correct?

5 A Ask the question one more time.

6 Q If Fells' sense circuit is not operating,
7 then it cannot close the switch, switch 1, when a
8 device arrives in proximity to the wireless charger,
9 correct?

10 A My understanding of paragraph 246 is the
11 sense circuit is always working.

12 Q I'm asking a different question.

13 If Fells' sense circuit was not
14 operating, it could not close switch 1 when a device
15 arrives in proximity to the wireless charger, right?

16 A But the system being described is
17 designed so the sense circuit is always operating.

18 Q Again, you're answering a different
19 question than I'm asking.

20 Do you agree that if Fells' sense circuit
21 was not operating, it couldn't close switch 1?

22 MR. LAWSON: Object to the form, asked

1 and answered.

2 A Well, under the qualification that the
3 sense circuit as described in Fells is always
4 operating because it's designed to keep the energy
5 storage above a minimum threshold, then
6 hypothetically, if the sense circuit wasn't working,
7 it would not be able to close switch 1.

8 Q Okay. Fells discloses some embodiments
9 that don't use a rechargeable battery, right?

10 Just to speed things up, I'll point you
11 to the last paragraph of -- the last sentence of
12 paragraph 247.

13 A Your question was, are there any
14 embodiments that don't have an energy storage unit?

15 Q No.

16 A What's your question.

17 Q Fells discloses that in some cases, the
18 energy storage unit is a non-rechargeable battery.

19 Agreed?

20 A Okay.

21 Q Does that mean you agree?

22 A Yes.

1 Q Okay. And if the energy storage unit is
2 non-rechargeable, then in some cases, it can be
3 exhausted, right?

4 A Okay. That's what it says.

5 Q And if the energy storage unit is
6 exhausted, then the sense circuit will not operate,
7 correct?

8 A Okay.

9 Q And if the sense circuit will not
10 operate, then it cannot close switch 1 when it
11 detects a device in proximity to the charger,
12 correct?

13 A Yes.

14 Q And if the switch 1 is not closed, then
15 the LC tank resonator of Fells cannot turn on,
16 correct?

17 A Cannot -- finish the sentence again,
18 cannot what?

19 Q If switch 1 is not closed, then the LC
20 tank resonator of Fells cannot turn on, correct?

21 A That is correct.

22 Q In other words, having a non-depleted

1 energy storage element is a necessary precondition
2 for the tank resonator of Fells ultimately turning
3 on?

4 A In the embodiment of Figure 2.

5 Q Are there other embodiments of Fells
6 where you believe that's not the case?

7 A For starters, Figure 33 has no energy
8 store, nor does Figure 34. I'm sorry, yeah,
9 Figure 34 does not.

10 Q Okay. In Figure 40 of Fells, do you
11 agree that having a non-depleted energy storage
12 element is a necessary precondition for Fells'
13 resonator ultimately turning on?

14 A Okay. Yes.

15 Q Let's go back to your declaration and
16 talk about paragraph 124. Let me know when you're
17 there.

18 A Okay.

19 Q So in your first sentence, you talk
20 about, Petitioner's proposition that the dotted
21 lines in Fells' diagrams indicate an integrated
22 enclosure encompassing all components within the

1 dotted lines.

2 Do you see that?

3 A Yes.

4 Q And you say that's contrary to the
5 explicit teaching of Fells, right?

6 A Okay. Yes.

7 Q What part of Fells is contrary to the
8 idea that the dotted lines indicate an integrated
9 enclosure?

10 A Well, first of all, the dotted lines are
11 understood to be things that allow for the
12 identification of components. And 200, everywhere
13 it appears in any of the embodiments, is described
14 as the boundaries of what's enclosed in the wireless
15 power supply of Fells. But nowhere does it say 200
16 is an enclosure.

17 And I guess that would be my answer.

18 Q Okay. Well, the only thing you cite in
19 this paragraph is Figure 7 of Fells, right?

20 A Let me look at Figure 7. Just a moment.

21 Okay. Figure 7. To organize the way I
22 say in paragraph 124, a ULP circuit and a main

1 circuit 204 -- 704, sorry.

2 Q And then in paragraph 125, you say, Fells
3 also references a reference number 704 as a circuit
4 board?

5 A Yes.

6 Q Why does that prove or disprove whether
7 the dotted lines are an enclosure?

8 A Because 704 indicates what's on the
9 circuit board, not -- not an enclosure that's
10 enclosing those components. It's called the circuit
11 board.

12 Q The fact that they're on the circuit
13 board doesn't mean that they couldn't also be within
14 an enclosure, right?

15 A Maybe; maybe not. It just doesn't say --
16 (Cross-talk.)

17 A -- definitively that it's in an
18 enclosure.

19 Q This is my point. The reference to
20 Figure 7 and the use of a circuit board doesn't
21 definitively answer one way or another whether the
22 dotted lines are enclosures, correct?

1 MR. LAWSON: Object to the form.

2 A I'll supersede your question by saying,
3 every patent I've ever read in my history of reading
4 patents, a dotted line designates something to
5 identify components, not an enclosure. And I don't
6 believe anywhere in Fells does it identify the
7 dotted lines as enclosures. So Fells is not an
8 exception to that general observation.

9 Q Okay. So that's not at all responsive to
10 my question, and we'll move to strike it ultimately.

11 But my question was, the reference to a
12 circuit board, which is the only part of Fells that
13 you cite here, doesn't definitively answer one way
14 or another whether the dotted lines are enclosures,
15 correct?

16 MR. LAWSON: Object to the form, asked
17 and answered.

18 A In my experience, it does not identify
19 704 as an enclosure. The circuit board does not
20 necessarily have an enclosure.

21 Q Right. Does not necessarily. It doesn't
22 mean it can't be an enclosure; it just doesn't

1 answer, in your view, one way or another whether it
2 has one, correct?

3 A It could also be an eggshell. I mean,
4 you're just saying it could be an enclosure, but
5 there's no evidence that it's intended to be an
6 enclosure.

7 Q My question is, is there anything about
8 the word "circuit board" that affirmatively makes
9 you conclude that it's not in an enclosure?

10 A Yes.

11 MR. LAWSON: Objection.

12 THE WITNESS: I'm sorry.

13 MR. LAWSON: Object to form.

14 You can answer.

15 A Because it says it's a circuit board.
16 The specification says 704 is a circuit board. It
17 does not say it's an enclosure; it says it's a
18 circuit board, which is a piece of epoxy with
19 components soldered to it, no enclosure, no case,
20 nothing of the sort is indicated in Fells by calling
21 it a circuit board.

22 Q 704 is also referred to as the main

1 circuit in the figure, correct?

2 A That's right.

3 Q A main circuit can be within an
4 enclosure, right?

5 A Look, anything in the world can be in
6 enclosure. I'm sitting in a house. That's my
7 enclosure.

8 There's no indication that 704 is
9 anything other than the main circuit formed on a
10 circuit board. That's what Fells says.

11 Q It could well be a main circuit formed on
12 a circuit board and also within an enclosure, right?

13 A You keep saying that, and I keep saying
14 anything in the world can be in an enclosure. Your
15 question is meaningless.

16 MR. LAWSON: Objection to form.

17 Q I think you're getting close to actually
18 answering my question here, which is, there is
19 nothing in Figure 7 that precludes element 704 from
20 being within an enclosure, right?

21 MR. LAWSON: Object to the form, asked
22 and answered.

1 A I disagree.

2 Q What is it in 704 that precludes the
3 existence of an enclosure?

4 A Because it's called a circuit board.

5 Q Do you agree that circuit boards can be
6 placed within enclosures?

7 A A circuit board could be placed in a
8 wooden box or inside a plastic bag. Yeah, I guess
9 you could call that an enclosure.

10 So yes.

11 Q A circuit board could also be placed
12 within a plastic epoxy housing of the type designed
13 to hold small electronic components, right?

14 A Well, you're kind of making it up because
15 there's nothing in Fells that says that that's what
16 704 is.

17 So I'm going to say no.

18 Q Just to be clear, is it your position
19 that a circuit board cannot be placed within a
20 plastic epoxy housing of the type designed to hold
21 small electronic components?

22 MR. LAWSON: Object to the form.

1 A What I'm saying is, it's possible because
2 anything in the world of electronics is possible.
3 But you're asking me, does Fells indicate that
4 that's happening, and no, it does not.

5 Q I'm not asking you if Fells indicates
6 that that's happening. I appreciate that that's the
7 question you want to answer, but it's not the
8 question I've asked, and you've refused to answer
9 the question eight times now. So I'll ask again.

10 Would a person of ordinary skill in the
11 art agree that a circuit board can be placed within
12 an enclosure?

13 MR. LAWSON: Object to the form, asked
14 and answered.

15 And you have asked the question about
16 eight different times, and the witness has answered
17 your question.

18 MR. ZUCKER: He hasn't answered it once,
19 and I'll continue to ask it until I get a clear
20 answer. I appreciate that he may not like the
21 answer. But let me try that one more time.

22 Q Would a person of ordinary skill in the

1 art in the '184 patent agree that a circuit board
2 can be placed within an enclosure?

3 MR. LAWSON: Object to the form.

4 A Look, sir, I know the game you're
5 playing. You want me to say a sound bite that you
6 can cherry pick and put into your brief. So I'll
7 say it again.

8 Anything can be put in an enclosure, and
9 a person of skill would know that anything in the
10 world can be put in an enclosure.

11 So if the answer to your question is yes,
12 so be it, but it's irrelevant to Fells.

13 Q So what I want, the game I'm playing, is
14 to get a complete and accurate and truthful answer
15 to my question, which is, would a person of ordinary
16 skill in the art of the '184 patent agree that a
17 circuit board can be placed within an enclosure?

18 A No.

19 MR. LAWSON: Object to the form.

20 Q Your position is that a circuit board
21 cannot be placed within an enclosure?

22 MR. LAWSON: Object to the form.

1 A In a wireless energy transfer system.

2 Q Your position is that in a wireless
3 energy transfer system, a circuit board cannot be
4 placed within an enclosure?

5 MR. LAWSON: Object to the form.

6 A Not the system of Fells.

7 Q Well, now you're getting away from my
8 question.

9 Do you agree that a circuit board can be
10 placed within an enclosure?

11 MR. LAWSON: Object to form.

12 A What kind of enclosure?

13 Q Any kind of enclosure.

14 A Yeah, I could put a circuit board in a
15 house. There's a circuit board; it's in my house;
16 it's in an enclosure.

17 So yes.

18 Q And you could also put a circuit board
19 within a small plastic housing of the type designed
20 to hold electronic components.

21 Agreed?

22 A It would depend.

1 MR. LAWSON: Object to form.

2 Q What would it depend on?

3 A What the components were and what the
4 plastic was made out of.

5 Q So in paragraph 127, you say that, the
6 foreign object debris detection system integrated
7 into the enclosure means that the foreign object
8 debris detection system is united with the enclosure
9 to form a functioning or unified whole.

10 Do you see that?

11 A I'm sorry. Where are you reading?

12 Q Paragraph 127 of your declaration.

13 A Okay.

14 Q What does it mean for a foreign object
15 debris detection system to be united with an
16 enclosure to form a functioning or unified whole?

17 A In the context of the '184 patent, it
18 means the disclosed sensing meshes are formed into
19 the plastic housing the resonator.

20 Q I'm sorry, I think you dropped out. The
21 disclosed what?

22 A Inductive loops in the '184 patent can be

1 molded together with the resonator coil.

2 Q I'm still not following that.

3 A That's my answer. Sorry.

4 Q So again, can you give me an example of
5 how a foreign object debris detection system could
6 be united with an enclosure to form a functioning or
7 unified whole?

8 A It's clear, the first part of the
9 sentence is as would have been understood by a
10 person of skill in the art. In the context of
11 claim 12, it means taking the sensors disclosed in
12 the patent, which detect foreign objects, and
13 include them in the molded housing of the resonator.

14 Q So the sensors would actually have to be
15 molded into the plastic housing of the resonator?

16 A That's what "integrated" would mean in
17 the context of claim 12.

18 Q Okay. Can you give me any examples of
19 what "integrated" means in the context of claim 12,
20 in your view, other than having sensors actually
21 molded into the plastic housing of a resonator?

22 A Well, it says that the -- claim 12 says

1 the foreign object debris detection system can be
2 integrated into the enclosure that houses at least a
3 portion of the wireless energy transfer source.

4 That's what the claim means.

5 Q So I understand that.

6 Can you give me any examples of something
7 that would meet that, other than the example you
8 gave me earlier of the sensors molded into the
9 plastic housing?

10 A Another example?

11 Q Any other examples, yes.

12 A You have to tell me what kind of foreign
13 object debris detection system we're talking about.

14 Q I'm asking for any other examples you can
15 give me of what it means for the foreign object
16 debris detection system to be united with the
17 enclosure to form a functioning or unified whole.

18 MR. LAWSON: Object to form.

19 A Well, I'll reiterate that -- excuse me
20 one moment -- the paragraph begins with what a
21 person of skill would have understood in the context
22 of claim 12.

1 And it means exactly what I said a moment
2 ago, the disclosed sensors would be integrated into
3 the enclosure that would be housing the resonator,
4 which is what "at least a part of" in the claim
5 would mean.

6 Q Going back to the '184 patent, we talked
7 about the sensors in claim 2 -- in Figure 2.

8 Do you recall that?

9 A Yes.

10 Q And if there is an object that enters the
11 B field that's shown here, then the -- there will be
12 a change in inductance that the sensors can measure
13 in order to detect the object, correct?

14 A Well, that is the principle being
15 illustrated by Figure 2.

16 Q Okay. Can the sensors in Figure 2
17 distinguish between a valid device to be charged as
18 opposed to a foreign object?

19 A Generally not. They're designed to
20 simply -- to detect in a very simple way changes in
21 magnetic field.

22 MR. ZUCKER: Okay. Thank you very much,

1 Dr. Horenstein. I have no further questions for you
2 this morning.

3 THE WITNESS: Okay. Thank you.

4 COURT REPORTER: Is there anything else
5 for the record?

6 MR. LAWSON: I want to -- Counsel, let's
7 take a five-minute break. I would see if we need to
8 do any redirect. We'll come back on the record.
9 Let's come back on the record at 12:15.

10 MR. ZUCKER: Sure.

11 (Recess from 12:11 p.m. until 12:19 p.m.)

12 MR. LAWSON: We're back on the record.

13 At this time, WiTricity doesn't have any
14 questions on redirect for the witness.

15 (Off the record at 12:19 p.m.)
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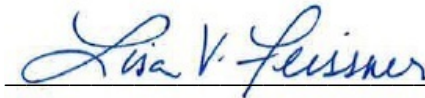
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C E R T I F I C A T E

I, Lisa V. Feissner, RDR, CRR, CLR, do
hereby certify that the witness was first duly sworn
by me and that I was authorized to and did report
said proceedings.

I further certify that the foregoing
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proceedings; that said proceedings were taken by me
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typewriting under my supervision; that reading and
signing was not requested; that I am neither
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by, any of the parties to the action in which this
deposition was taken; and that I have no interest,
financial or otherwise, in this case.

IN WITNESS WHEREOF, I have hereunto set
my hand this 21st day of JANUARY, 2025.



Lisa V. Feissner, RDR, CRR, CLR

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