

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ANKER INNOVATIONS LTD.,

Petitioner,

v.

POWERMAT TECHNOLOGIES, LTD.,

Patent Owner.

Case IPR2024-00994 (Patent No. 9,048,696)

VIDEOCONFERENCE DEPOSITION OF:

PATRICK MERCIER, Ph.D.

ON BEHALF OF PATENT OWNER

POWERMAT TECHNOLOGIES, LTD.

April 23, 2025

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11:05 a.m. - 2:56 p.m. EST

REPORTED BY:

Tamara L. Houston

CA CSR No. 7244, RPR, CCRR No. 140

Job Number J12760644



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REMOTE VIDEOCONFERENCE DEPOSITION OF PATRICK
MERCIER, Ph.D., taken on behalf of the Patent Owner,
commencing from 11:05 a.m. to 2:56 p.m., EST, Wednesday,
April 23, 2025, before Tamara L. Houston, CSR No. 7244,
CCRR, RPR.

APPEARANCE OF COUNSEL:

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WEDNESDAY, APRIL 23, 2025, 8:05 a.m.

--o0o--

All counsel present stipulate
that the witness shall be sworn remotely
by the court reporter

* * *

Whereupon, PATRICK MERCIER, PH.D.,
having been called as a witness was duly
sworn to tell the truth, the whole truth,
and nothing but the truth testified as
follows:

--o0o--

EXAMINATION BY MR. STEPHENS:

Q. Welcome, Dr. Mercier.

A. Thank you.

Q. My name is Nick Stephens. I'm an attorney
with Fish & Richardson, and I'll be asking questions
today on behalf of the Petitioner.

Do you understand?

A. Yes.

Q. Would counsel for Powermat like to make their
appearance?

MR. NASH: Yes.

My name is Brady Nash on behalf of patent
owner, Powermat Technologies, Ltd., and I'll be

1 defending Dr. Mercier today.

2 (Reporter addresses audio difficulty.)

3 MR. NASH: And I'm from the law firm Mayer
4 Brown, LLP.

5 BY MR. STEPHENS:

6 Q. And, Dr. Mercier, you understand that we are
7 here to discuss your testimony that you submitted in IPR
8 2024-00994?

9 A. That's right.

10 Q. And this is an IPR proceeding involving the
11 '696 patent, correct?

12 A. Correct.

13 Q. You understand that this deposition is being
14 transcribed today?

15 A. I do.

16 Q. To ensure a clean record and to save the court
17 reporter, it will be important that we do our best not
18 to speak over each other today. So I'll do my best not
19 to interrupt you while you're providing your responses,
20 and I'd ask that you do the same while I'm asking
21 questions.

22 Sound fair?

23 A. Understood.

24 Q. If you need a break at any time, please let me
25 know. I'll, in general, try to break every hour or so.

1 But if otherwise you'd like some time, we can also break
2 at other times as well.

3 A. Okay.

4 Q. Do you understand that you are under oath
5 today?

6 A. I do.

7 Q. Is there any reason that you cannot give
8 truthful and accurate testimony?

9 A. No.

10 Q. And apart from the video connection that we
11 can all see, do you have any other forms of
12 communication with counsel?

13 A. No.

14 Q. Are you in communication with anyone else
15 currently?

16 A. No.

17 Q. And do you have any notes or other materials
18 with you?

19 A. I do have a printed copy of my declaration,
20 un- -- unmarked.

21 Q. Any other material?

22 A. No.

23 Q. And before we started, I shared electronic
24 versions of several documents from the record in this
25 IPR.

1 I believe you were able to download those,
2 correct?

3 A. Yes.

4 Q. Will you be able to pull those open if I
5 reference them during our questions today.

6 A. Yes.

7 Q. I'd just like to review a few terms in the
8 documents that I'll mention today.

9 When I refer to "patent owner" or "Powermat"
10 I'm referring to Powermat Technologies, Limited.

11 Do you understand?

12 A. Yes.

13 Q. When I use the term "Petitioner" or "Anker,"
14 I'm referring to Anker Innovations Limited.

15 Do you understand?

16 A. Yes.

17 Q. I'll also be using the acronym "POSITA."
18 Have you heard of that acronym before?

19 A. I have.

20 Q. And it refers to a person of ordinary skill in
21 the art, correct?

22 A. That's right.

23 Q. What's your understanding of a POSITA?

24 A. Well, let me just refer to my declaration.

25 Q. While you're locating that in your

1 declaration, I just want to confirm, is the declaration
2 copy that you have, is that Exhibit 2006?

3 A. Let me just open 2006. Yes.

4 Q. Okay.

5 A. It is, yeah. So in my declaration, I
6 understand that a person of ordinary skill in the art
7 would have working knowledge of a wireless charging and
8 induction system. They would have an undergraduate
9 degree, bachelor of science degree in something like
10 electrical engineering with at least two years of
11 experience working in this area or equivalent education,
12 like a master's degree in a relevant field.

13 Q. What paragraph are you referring to in your
14 declaration?

15 A. Paragraph 40.

16 Q. Did you analyze the issues set forth in your
17 declaration from the perspective of a POSITA?

18 A. I did.

19 Q. And will your answers today, when we get into
20 the substance of the issues, be -- reflect the
21 understanding of a POSITA unless you indicate otherwise?

22 A. That's right.

23 Q. Now, I may refer to your declaration further
24 during the questions. When I refer to your declaration,
25 I'll be referring to Exhibit 2006 unless I indicate

1 otherwise.

2 Is that fair?

3 A. That's clear. Thank you.

4 Q. And when I refer to the '696 patent, that's
5 been marked as Exhibit 1001 in this proceeding.

6 Do you understand?

7 A. Yes.

8 Q. When I refer to the file history or the
9 prosecution history of the '696 patent, I'll be
10 referring to Exhibit 1002.

11 Do you understand?

12 A. Yes.

13 Q. And I'll be also referring to Onishi, which is
14 a prior art reference marked as Exhibit 1004 in this
15 proceeding.

16 Do you understand?

17 A. Yes.

18 Q. If I refer to Flowerdew, I'll be referring to
19 Exhibit 1005.

20 Do you understand?

21 A. I believe Exhibit 1005 is Purdy.

22 MR. NASH: Yeah, Counsel. It appears some of
23 the exhibits you shared don't match up with the exhibits
24 in the petition.

25 MR. STEPHENS: The exhibits I shared, did I --

1 I see. I will correct that, if needed.

2 BY MR. STEPHENS:

3 Q. In the petition, Flowerdew has been marked as
4 Exhibit 1005.

5 Is that your understanding?

6 A. I would need to go back and look. I don't
7 remember the exact exhibit number.

8 Q. Fair enough.

9 When I refer to Baarman or Baarman '392, I'll
10 be referring to Exhibit 1008, which I realize the file
11 name I sent was Exhibit 1006.

12 Is that clear?

13 A. Yes. Yeah. I apologize for the mixup.

14 (Court Reporter requested clarification.)

15 MR. STEPHENS: I apologize for the incorrect
16 file names.

17 BY MR. STEPHENS:

18 Q. Can you describe how you prepared for the
19 deposition?

20 MR. NASH: I'm going to caution the witness
21 not to divulge any privileged information.

22 But to the extent you can answer that
23 question, you may do so without divulging privileged
24 information.

25 THE WITNESS: Certainly.

1 So I reviewed my declaration. I reviewed the,
2 you know, '696 patent and the prosecution history as
3 well as the references that I cite in my declaration.
4 And then I spent some time talking with Counsel, going
5 over, you know, the salient points of my declaration.

6 BY MR. STEPHENS:

7 Q. Apart from Counsel, did you confer with anyone
8 else in preparing for the deposition?

9 A. No.

10 Q. Approximately how much time did you spend
11 preparing for the deposition?

12 A. I would have to look back at my records.
13 Yeah. Less than 20 hours.

14 Q. More than 10 hours?

15 A. I'm -- I'm not exactly sure.

16 Q. Were there any documents that you reviewed in
17 preparation for the deposition apart from the material
18 that's identified in your declaration?

19 MR. NASH: And I'm going to caution the
20 witness not to divulge any privileged information. He
21 can answer the question if he can do so without
22 divulging privileged information.

23 THE WITNESS: Not that I recall.

24 BY MR. STEPHENS:

25 Q. Without divulging any privileged

1 communications, would you describe the process by which
2 you prepared your declaration?

3 A. Certainly.

4 So, of course, I read the '696 patent to the
5 prosecution history. I read Dr. Woods's expert
6 declaration and the -- the associated references in that
7 document, and I collaborated with counsel on discussing
8 the salient points and writing up the declaration.

9 Q. Did you personally draft the words in your
10 declaration?

11 A. I collaborated with counsel to draft the words
12 in the declaration.

13 Q. What -- what do you mean by you "collaborated
14 with counsel"?

15 MR. NASH: Again, I'm going to caution the
16 witness not to divulge any privileged answer.

17 But you may answer the question if you can do
18 so without divulging privileged communications.

19 THE WITNESS: Sure.

20 S we discussed, again, the salient points,
21 discussing, you know, the points that were raised by
22 Dr. Woods. And I, you know, gave my opinions and gave
23 some -- did some writing myself. And in that writing,
24 we collaborated with to refine into what ultimately
25 became the final form document.

1 BY MR. STEPHENS:

2 Q. And paragraphs 36 to 37 of the declaration,
3 you've identified certain materials that you indicated
4 that you'd reviewed in preparing the declaration.

5 Do you see that?

6 A. I do.

7 Q. Are there any other documents not identified
8 here or in your first declaration that you considered
9 when forming the opinions in your declaration?

10 A. Not to my recollection. You know, obviously
11 I'm -- I'm a POSITA in this area; and I've, you know,
12 seen many documents and so on during my experience as an
13 engineer. But I didn't refer to those specifically when
14 forming my opinions in this declaration.

15 Q. Do you currently have any opinions about the
16 '696 patent that are not contained in either of the
17 declarations that you submitted in this proceeding?

18 MR. NASH: Objection. Form.

19 THE WITNESS: I mean the declaration contains
20 the totality of my opinions in regards to this IPR
21 discussion.

22 BY MR. STEPHENS:

23 Q. Have any of your opinions changed regarding
24 the '696 patent since you submitted the declaration,
25 Exhibit 2006?

1 A. No.

2 Q. Are you aware of any errors in your
3 declaration?

4 A. I am not. There may be typos and so on as --
5 as there tend to be, but I'm not aware of any at the
6 moment.

7 Q. Are there any specific typos that you're aware
8 of at this time?

9 A. No.

10 Q. Have you previously served as an expert in an
11 inter partes review proceedings?

12 A. Yes.

13 Q. On about how many times?

14 A. One other time.

15 Q. And is that related to -- was that on behalf
16 of another party or --

17 A. Yes.

18 Q. How many times have you been deposed?

19 A. This is my third deposition.

20 Q. Were you deposed in the prior IPR in which you
21 submitted a declaration?

22 A. I'm sorry. I'm trying to remember. There's
23 been a lot of casework. Some is district court; some is
24 IPR. And I'm trying to remember if -- if my previous
25 depositions were directly related to IPR or not.

1 I -- I -- I believe both of my prior
2 depositions were related to district court cases, but
3 I'd have to go back and look.

4 Q. Okay. I'd like to turn to the '696 patent,
5 Exhibit 1001.

6 A. Okay.

7 Q. And once you have that document, let's turn to
8 Figure 6b, please.

9 A. Okay. One moment.

10 MR. NASH: I'm sorry. You said Figure 6b?

11 MR. STEPHENS: Figure 6b, that's correct.

12 THE WITNESS: Okay. I'm here.

13 BY MR. STEPHENS:

14 Q. Are you familiar with Figure 6b?

15 A. I am.

16 Q. And you authored opinions regarding Figure 6b
17 in your declaration, correct?

18 A. That's correct.

19 Q. Can you describe what's shown in Figure 6b?

20 A. Certainly.

21 So this is a plot of the operational voltage
22 at the output of an inductive couple where frequency --
23 "fR" is the resonant -- the characteristic resonant
24 frequency at the inductive couple. The X axis is the
25 transmission frequency. Again, Y axis at the

1 operational voltage.

2 "fT" indicates the frequency that is selected
3 for transmission across the inductive couple. And
4 there's a few other frequency markers there indicating
5 other things, as well as other regions.

6 Q. How would you describe the overall shape of
7 the curve shown in Figure 6b?

8 MR. NASH: Objection. Form.

9 THE WITNESS: It's roughly parabolic.

10 BY MR. STEPHENS:

11 Q. And is a parabolic curve typical of a response
12 curve for an inductive power transmission system?

13 MR. NASH: Objection. Form.

14 THE WITNESS: Well, it depends what exactly
15 we're plotting.

16 BY MR. STEPHENS:

17 Q. And it plotted a transmission frequency versus
18 operational voltage.

19 A. Yes. An approximately parabolic shape is --
20 is common.

21 Q. And you mentioned the axis shown in Figure 6b
22 on the X axis is transmission frequency, correct?

23 A. Correct.

24 Q. And the Y axis is operational voltage,
25 correct?

1 A. Correct.

2 Q. What is the operational voltage?

3 A. I'm not sure if the operational voltage is
4 precisely defined in the '696 patent, but my knowledge
5 as a POSITA would -- would say that this is the output
6 voltage of the inductive couple.

7 Q. Can you explain what you mean by "the output
8 voltage of the inductive couple"?

9 A. Sure.

10 So if you refer to, say -- let's say Figure 1c
11 in the '696 patent. We have element -- let me -- let me
12 know when you're there.

13 Q. I see it.

14 A. Okay.

15 We have element 220, which is the primary
16 inductor that then couples to element 320, which is the
17 secondary inductor. I'm referring to the output of the
18 secondary inductor.

19 And I should be more specific here in saying,
20 you know, this is -- the output of the secondary
21 inductor is going to be a sinusoidal-like waveform in
22 the time domain.

23 And what Figure 6b is showing is the amplitude
24 of what that voltage would be in the frequency domain.

25 Q. So what's shown in Figure 6b is a plot of the

1 amplitude of the voltage induced across the secondary
2 inductor when coupled to the primary inductor across a
3 range of frequencies; is that correct?

4 A. That was --

5 MR. NASH: Objection. Mischaracterization.

6 (Court Reporter requested clarification.)

7 MR. STEPHENS: I am just asking for my --
8 confirmation if my answer [sic] was correct. I wasn't
9 trying to characterize his testimony.

10 BY MR. STEPHENS:

11 Q. Is that correct, Dr. Mercier?

12 A. That would be my understanding, yes.

13 Q. So the voltage that's depicted in Figure 6b is
14 a voltage across a single induction coil, correct?

15 A. It's the voltage at the output of the
16 secondary inductor when it's coupled to the primary
17 inductor. It wouldn't be the voltage of a single
18 inductor in isolation. That has -- as described in the
19 '696 patent.

20 Q. But it's the voltage across a single inductor
21 when coupled to the primary inductor, correct?

22 A. Yes, that's correct.

23 Q. And you mentioned some frequencies that are
24 shown in Figure 6b. One of those is fR.

25 Do you see that?

1 A. I do, yes.

2 Q. And what's your understanding of fR?

3 A. That is the characteristic resonant frequency
4 of the inductive couple.

5 Q. And so the induced voltage across the
6 secondary coil is highest at the characteristic resonant
7 frequency of the inductive couple; is that correct?

8 A. In this diagram, that is correct, yes.

9 Q. In general, would you expect the induced
10 voltage of any inductive power transmission system to be
11 highest at the characteristic resonant frequency of the
12 inductive couple?

13 MR. NASH: Objection. Form.

14 THE WITNESS: Not necessarily so.

15 BY MR. STEPHENS:

16 Q. In what cases would that not be the case?

17 A. If the coils have very strong coupling, it's
18 possible that the resonant frequency will split into two
19 separate peaks, at which point, you know, the curve
20 wouldn't look like this at all, as one example.

21 Q. And can you explain what you mean by the
22 resonant frequency would split into two different peaks?

23 A. I can try. It's a -- it's a little
24 complicated in the mathematics.

25 But, yes, if you take two coils and you bring

1 them very close together and they couple strongly, it is
2 possible for the pulse to split, resulting in two
3 distinct peaks in the voltage frequency transmission
4 plot.

5 Alternatively, another example of this is if
6 the characteristic resonant frequencies of the primary
7 inductor and the secondary inductor are different, which
8 can be the case or, frankly, is the case in practical
9 systems.

10 If they are sufficiently different, you would
11 see a similar shape where you would have two peaks with
12 some sort of valley in between.

13 Q. In the '696 patent, are the primary and
14 secondary inductors -- do they have the same inductance?

15 MR. NASH: Objection. Form.

16 THE WITNESS: I would have to review the
17 patent to see if it discloses that or not. I don't
18 recall off the top of my head.

19 BY MR. STEPHENS:

20 Q. Is there anything that you can glean about the
21 inductances of the primary and secondary coils from
22 Figure 6b?

23 MR. NASH: Objection. Form.

24 THE WITNESS: That's a hard question to
25 answer. Figure 6b depends on many, many things, and so

1 it would be hard to glean any specific information from
2 the inductors just by looking at Figure 6b.

3 BY MR. STEPHENS:

4 Q. Would it be possible to obtain a curve like
5 that shown with Figure 6b if the primary and secondary
6 coils had different inductances?

7 A. It's possible.

8 Q. And would it be possible to obtain a curve
9 like that shown in Figure 6b if the primary and
10 secondary coils had the same inductances?

11 A. Yeah, it's possible.

12 Q. Now, the X axis that we discussed earlier
13 reflects transmission frequency, correct?

14 A. That's correct.

15 Q. And what does -- what is a transmission
16 frequency in this context?

17 A. In general -- again, I don't know how it's
18 defined in the '696 patent. I'd have to review it more
19 carefully.

20 In general, the transmission frequency in a
21 wireless inductive system is the frequency that is
22 delivered to the primary coil for induction in the
23 secondary coil.

24 Q. And based on your understanding, is that what
25 the transmission frequency represents in Figure 6b?

1 MR. NASH: Objection. Form.

2 THE WITNESS: That would be my understanding,
3 yes.

4 BY MR. STEPHENS:

5 Q. There isn't a scale depicted for either the
6 operational voltage or the transmission frequency in
7 Figure 6b, correct?

8 A. That's correct.

9 Q. Why would the inventors, do you believe, omit
10 the scale from this drawing?

11 MR. NASH: Objection. Calls for speculation.

12 THE WITNESS: Yeah, I was going to say I'm not
13 sure I want to speculate on behalf of the inventors.

14 BY MR. STEPHENS:

15 Q. Are you able to -- well, strike that.

16 Would a POSITA be able to understand this
17 drawing without the scale explicitly given?

18 MR. NASH: Objection. Form.

19 THE WITNESS: Yeah. As it pertains to what is
20 discussed in the '696 patent and the salient inventions,
21 I believe so, yes.

22 BY MR. STEPHENS:

23 Q. So it's not necessary for a plot like Figure
24 6b to include indications of scale -- I'll strike that.

25 In your opinion, it's not necessary for a plot

1 like that shown in Figure 6b to have scale markers to be
2 understood by a POSITA?

3 MR. NASH: Objection. Form. And objection.
4 Calls for speculation.

5 THE WITNESS: I would say it's necessary to at
6 least have correct labeling as to what's being depicted
7 here. And with the correct labeling along with, you
8 know, associated descriptions of the -- of the plot, a
9 POSITA would be able to understand enough information to
10 understand the scope of the invention and the intended
11 use.

12 BY MR. STEPHENS:

13 Q. Do you have an understanding of the scale of
14 the parameters shown in Figure 6b?

15 MR. NASH: Objection. Form.

16 THE WITNESS: I'm not sure what you mean.

17 BY MR. STEPHENS:

18 Q. I'll give this one example.

19 So transmission frequency is plotted on the X
20 axis, correct?

21 A. Correct.

22 Q. Could the transmission frequency be plotted on
23 a linear scale?

24 A. I'm sorry. You said could it be plotted on a
25 linear scale?

1 Q. Yes.

2 A. It could.

3 Q. Could the transmission frequency be plotted on
4 a --

5 (Court Reporter requested clarification.)

6 BY MR. STEPHENS:

7 Q. -- on a logarithmic scale?

8 Did you understand the question, Dr. Mercier?

9 A. Yeah, I'm just thinking.

10 I guess I'll say when I looked at this
11 picture, I didn't consider this to be plotted on a
12 logarithmic scale. Usually, if a logarithmic scale were
13 being used, there would be some indication of a
14 logarithmic scale; otherwise, I would assume a linear
15 scale.

16 Q. If a logarithmic scale were employed, would
17 that affect the shape of the plot?

18 A. It might.

19 Q. It might or it would?

20 A. Well, certainly the plot would look a little
21 bit different, yeah.

22 Q. So the '696 patent refers to linear and
23 near-linear regions, correct?

24 A. That's correct.

25 Q. Is it your understanding then that the linear

1 and near linear regions are discussed in the context --
2 excuse me, are discussed in the context of a linear
3 scale?

4 A. In a linear scale of what?

5 Q. Transmission frequency.

6 MR. NASH: Objection. Form.

7 THE WITNESS: I guess I could say that was --
8 that was how I read the patent, yes.

9 Is that necessarily so? I'm not sure. I'd
10 have to think about that more.

11 BY MR. STEPHENS:

12 Q. So in Figure 6b, there are regions labeled 6
13 and 8, correct?

14 A. That's correct.

15 Q. What are those -- what do those regions
16 represent?

17 A. Region 8 is representing the near-linear
18 region as described by the '696 patent, and I believe
19 they refer to region 6 in the same way.

20 Q. What -- what is a near-linear region?

21 A. So as I note in my declaration on paragraph
22 48, near linear can be for multiple reasons.

23 One, although not strictly sufficient, is the
24 curve looks straight in those regions. Mathematically,
25 the slope in both regions is close to constant and does

1 not vary greatly.

2 And in contrast, a nonlinear region -- for
3 example, regions 4a and 4b near the resonant frequency
4 don't look like a straight line, and mathematically the
5 slope of the curve changes greatly in that area.

6 Q. And there are two additional frequencies
7 identified in Figure 6b, f_U and f_b .

8 Do you see those?

9 A. Yes.

10 Q. What do those frequencies represent?

11 A. So frequency f_b is corresponding to the
12 upper-bound frequency in the approximately linear
13 region; whereas, frequency f_U corresponds to the
14 lower-bound frequency in the approximate linear region.

15 Q. And so at frequencies closer to f_U , the
16 induced voltage at the secondary coil would be higher
17 than frequencies closer to f_b ; is that correct?

18 MR. NASH: Objection to form.

19 THE WITNESS: As depicted in Figure 6b, yes.

20 BY MR. STEPHENS:

21 Q. Why is that the case?

22 A. I mean, it can be described mathematically,
23 but kind of giving an intuitive discussion, the voltage
24 of the -- or the operational voltage of the inductive
25 couple is highest -- tends to be highest at the resonant

1 frequency, and as you go to frequencies higher than the
2 resonant frequency, it -- it drops off.

3 And so f_U is at a lower frequency relative to
4 f_b , so it would be -- so the operational voltage at f_b
5 would, therefore, be lower than the operational voltage
6 at f_U as depicted in Figure 6b.

7 Q. Do all parabolic frequency curves for an
8 inductive power transmission system have an
9 approximately linear region?

10 MR. NASH: Objection. Calls for speculation.

11 MR. STEPHENS: Counsel, I'll remind that there
12 are no speaking objections.

13 THE WITNESS: I was trying to think of a
14 counter example. I can't think of a counter example at
15 the moment.

16 BY MR. STEPHENS:

17 Q. So Figure 6b -- strike that.

18 And we discussed a moment ago the
19 characteristic resonant frequency of the inductive
20 couple f_R , correct?

21 A. That's right.

22 Q. Do all parabolic frequency curves for an
23 inductive power transmission system have a
24 characteristic resonant frequency?

25 MR. NASH: Objection. Form.

1 MR. STEPHENS: I'll actually rephrase my
2 question.

3 BY MR. STEPHENS:

4 Q. Do all parabolic frequency curves for an
5 inductive power transmission system have a
6 characteristic resonant frequency for the inductive
7 couple?

8 MR. NASH: Objection. Form.

9 THE WITNESS: I'm -- I'm sorry. As I
10 mentioned earlier, there are cases where if the coils
11 are very tightly coupled, you would get a pole-splitting
12 phenomenon. In that case, there would be two peaks with
13 a valley in the middle. I'm not sure what you would
14 call the resonant frequency in that case, if there even
15 is one.

16 And so I'm not sure that I could say -- and
17 maybe there's a -- there's a different definition for
18 characteristic resonant frequency in that case. So it's
19 hard to say.

20 If you have a parabolic-shaped curve, as in
21 your original question, then yes, I would say there is a
22 characteristic resonant frequency in all cases. But if
23 it's not parabolic-shaped, then it may be different.

24 BY MR. STEPHENS:

25 Q. Are there factors that would affect the

1 steepness of the parabolic curve in an inductive power
2 transmission system?

3 MR. NASH: Counsel, I apologize. I didn't
4 hear the first part of your question.

5 Can you repeat that for me?

6 BY MR. STEPHENS:

7 Q. Are there any factors that would affect the
8 steepness of the curve in an inductive power
9 transmission system?

10 A. Yes, there are many factors; how tightly the
11 coils are coupled, the relative quality factors of the
12 components, and load characteristics and so on.

13 Q. And you mentioned -- I think your first factor
14 was how tightly the coils are coupled, correct?

15 A. Yes.

16 Q. What does that mean?

17 A. Mathematically, there is something called the
18 coupling coefficient in an inductive coupling system.
19 That varies between zero and one. If the coupling
20 coefficient is equal to one, then the coils are very
21 tightly coupled. And if it was closer to zero, we would
22 say they are loosely coupled.

23 And as a proxy, the distance between the coils
24 governs the value of the coupling coefficient. So the
25 closer the coils are together, the more tightly they are

1 coupled; and the further they are apart, the more
2 loosely they are coupled.

3 Q. So if two coils were coupled more tightly,
4 would that tend to make the curve steeper or shallower?

5 MR. NASH: Objection. Form.

6 THE WITNESS: All else being equal, it would
7 tend to make them a little steeper.

8 BY MR. STEPHENS:

9 Q. And, conversely, if the -- if the coils were
10 more loose coupled, would that tend to make the curve
11 shallower?

12 MR. NASH: Objection. Form.

13 THE WITNESS: In general, yes. It's hard to
14 say with -- with, you know, certainty simply because
15 there is many other parameters that affect the operation
16 of the circuit and the shape of the curve. But I could
17 say, in general, that that could be true.

18 BY MR. STEPHENS:

19 Q. Does the alignment between the primary coil
20 and the secondary coil affect how tightly the coils are
21 coupled?

22 A. It does.

23 Q. In what way?

24 A. Again, depending on the relative geometries
25 and shapes and sizes of the coils, they tend to be more

1 strongly coupled if they are axially aligned.

2 Q. And would the coupling between -- or would --
3 how tightly coupled the coils are, would that impact the
4 characteristic resonant frequency of the inductive
5 couple?

6 MR. NASH: Objection. Form.

7 THE WITNESS: It could. Because of the
8 pole-splitting phenomenon that I mentioned earlier and,
9 you know, as you change the coupling coefficient, the
10 mathematics of the system changes, and that could affect
11 things, especially if the two coils don't share the
12 exact same resonant frequencies. There could be all
13 sorts of things that change.

14 BY MR. STEPHENS:

15 Q. What do you mean by the two coils might not
16 share exact same resonant frequencies?

17 A. Sure.

18 So in most or many wireless power transfer
19 inductive coupling applications, one would resonate the
20 primary coil with the capacitor and, likewise, do so
21 with the secondary coil with the second capacitor. And
22 that would create, you know, each coil having their own
23 resonance.

24 And if the relative value of the primary
25 inductor and primary capacitor gives a -- a

1 characteristic resonant frequency of that first coil,
2 it's possible that could be different than the
3 characteristic resonant frequency of the secondary coil
4 when it's tied to its own capacitor.

5 And, in fact, Dr. Woods agreed with this
6 analysis in reading his declaration and his transcript.

7 Q. Could the characteristic resonant frequency of
8 the inductive couple be different from the resonant
9 frequency of the primary inductor?

10 A. It could -- it could be, yes. And, in fact,
11 I'll refer you to Dr. Woods who actually answered this
12 question as well in his deposition where he mentioned
13 that each coil has a separate resonant standalone
14 frequency, and when you put them together, there will be
15 a resonance that is the mean -- usually, approximately
16 the mean between them.

17 Q. So when the primary coil -- strike that.

18 When the primary coil and the secondary coil
19 are coupled, do they share a characteristic resonant
20 frequency?

21 A. So the primary coil could have its own
22 resonant frequency. The secondary coil could have its
23 own resonant frequency. That may be the same or most
24 likely will be a little different. And when you bring
25 them together, you can measure the characteristic

1 resonant frequency of the inductive couple that could be
2 different from the characteristic resonant frequency of
3 either coil in isolation.

4 Q. Okay. So that's what I just want to
5 understand a little better.

6 I'd like to consider the scenario where the
7 primary coil and the secondary coil have been brought
8 together so they are coupled, okay?

9 A. Okay.

10 Q. And we've, I think, established that there is
11 a characteristic resonant frequency of the inductive
12 couple; is that correct?

13 A. Right.

14 Q. Is there separately a different resonant
15 frequency for the primary coil when it is coupled to the
16 secondary coil?

17 MR. NASH: Objection. Form.

18 THE WITNESS: Well, certainly mathematically,
19 there is. Yes. Yeah, mathematically, there is.

20 BY MR. STEPHENS:

21 Q. Can you unpack that?

22 A. So the primary circuit has, you know, its own
23 inductance and capacitance that forms a resonator, and
24 it has its own resonant frequency which can be modeled
25 mathematically. Same thing on the secondary side.

1 And then when you bring the two coils
2 together, you form a new system that has, you know, a
3 new characteristic resonant frequency that may be
4 different from the resonant frequencies at the
5 individual coils.

6 Q. So when the two coils are brought together,
7 there is a characteristic resonant frequency of the
8 coupled system as a whole, correct?

9 A. That's right.

10 Q. And there is no longer a -- in that coupled
11 system -- I guess what I'm trying to understand is, is
12 there a separate resonant frequency for each coil in
13 that coupled system?

14 MR. NASH: Objection. Form.

15 THE WITNESS: So we are trying to make
16 something that is quite complicated into something very
17 simple in this discussion, and so it's really hard to
18 say -- to simplify it down in that regard, right?

19 So, for example, we've discussed two different
20 scenarios in which, you know, an inductive-coupled
21 system may have a characteristic resonant frequency that
22 is different from the resonant frequencies of the
23 individual coils vis- -vis pole-splitting or if the
24 characteristic resonant frequency of the coils are
25 sufficiently different relative to the relative values

1 of the inductance, the coupling coefficient, mutual
2 conductance, and so on --

3 (Court Reporter requested clarification.)

4 THE WITNESS: So due to the pole-splitting
5 phenomenon, or if the characteristic resonant
6 frequencies of the two individual coils are sufficiently
7 different and you bring them close together, or in some
8 cases, they could be loosely coupled, all of this
9 depends on the coupling coefficient, the relative values
10 of the inductances, the mutual inductance, and so on.

11 It's possible that, again, you'd have this
12 two-peak phenomenon with the valley in between at which
13 point I don't know how you define the characteristic
14 resonant frequency. But those two peaks would be
15 related to the individual resonant frequencies of the
16 individual coils.

17 So I understand your question. I get what
18 you're trying to -- to ask. The fact is, is the
19 situation is complicated and very nuanced beginning on
20 many parameters, and it's hard to make generalized
21 statements.

22 BY MR. STEPHENS:

23 Q. I'd just like to consider the scenario where
24 in the coupled system, let's assume that there is a
25 single resonance peak, okay?

1 A. Okay.

2 Q. I think your testimony is that the
3 characteristic resonant frequency of the inductive
4 couple can be different from the resonant frequency of
5 the individual coils in isolation, correct?

6 A. That's right.

7 Q. What I'm trying to figure out is something a
8 little bit different. I want to just consider those
9 coils as part of the coupled system.

10 And my question is: Is there a separate
11 resonant frequency for the individual coils in the
12 coupled system that's different from the characteristic
13 resonant frequency of the inductive couple?

14 MR. NASH: Objection. Form.

15 BY MR. STEPHENS:

16 Q. Does that make sense?

17 A. Yes. I understand the question.

18 And my original answer was -- I would say,
19 yes, mathematically, that's the case. And perhaps let
20 me expand on that to see if this helps.

21 So I can draw an equivalent circuit model of
22 the inductive-coupled system, you know, including the
23 inductors, the mutual inductance vis-a-vis the coupling
24 coefficient and so on.

25 And I can, you know, point out the resonant

1 frequency of the primary coil; I can point out the
2 resonant frequency of the secondary coil; and I can do
3 the system analysis and determine the resonant frequency
4 of the inductively coupled system.

5 So in that regard, yeah, I can identify each
6 of the individual resonant frequencies at play here.

7 Q. And in identifying the resonant frequencies
8 of, say, the primary coil in the coupled system, are you
9 looking at the -- are you accounting for the presence of
10 the secondary coil?

11 MR. NASH: Objection. Form.

12 THE WITNESS: Okay. I'm not sure I quite
13 understand what you're asking.

14 BY MR. STEPHENS:

15 Q. I guess what I'm trying to understand is you
16 said that you can identify the resonant frequency of the
17 individual coils in the coupled system, correct?

18 A. Yes.

19 Q. Is that different than the resonant frequency
20 of the coils in isolation?

21 MR. NASH: Objection. Form.

22 THE WITNESS: I think I would have to go
23 through the mathematics more carefully to be able to
24 answer that question.

1 BY MR. STEPHENS:

2 Q. Do you understand the question?

3 A. I think so. Yeah.

4 Q. But sitting here right now, at least, you're
5 not able to think of a scenario where those frequencies
6 would be different, correct?

7 A. No, that's not what I said.

8 I said that mathematically, you know, if
9 the -- for example, the two resonant frequencies of the
10 primary and secondary inductors were different but when
11 brought together, they produced a parabolic-like curve
12 with a single peak, mathematically, you can still
13 identify the resonant frequencies of the primary, the
14 secondary, and the inductive couple, and they could all
15 be different in that scenario.

16 Q. Yeah. I'm still not sure I'm following. I
17 think I get -- you can identify these three different
18 frequencies, correct?

19 A. Yes.

20 Q. But when you're talking -- when you're
21 referring to the resonant frequency of the primary coil,
22 is that the same as the resonant frequency of the
23 primary coil when it's not coupled to the secondary
24 coil?

25 MR. NASH: Objection. Form.

1 THE WITNESS: I see. And -- and when we're
2 talking about this, we're assuming there's some sort of,
3 you know, resonant capacitor there for -- for, you know,
4 creating that resonance.

5 Again, as I mentioned, I'd have to go through
6 the math to understand -- to answer that question with
7 certainty. If I had to speculate and guess, then, yeah,
8 the resonant frequency of the primary coil in a coupled
9 system would be the same as the resonant frequency of
10 the primary coil in isolation, but it's still
11 individually identifiable in the mathematical model.

12 BY MR. STEPHENS:

13 Q. Okay. Thank you. That's very helpful.
14 Would it be the same for a secondary coil?

15 A. Yes.

16 MR. STEPHENS: We've been going for just over
17 an hour.

18 Shall we take a ten-minute break?

19 THE WITNESS: That would be great.

20 (Recess: 12:12 a.m. to 12:27 p.m.)

21 BY MR. STEPHENS:

22 Q. Welcome back, Dr. Mercier.

23 A. Thank you.

24 Q. During the break, did you discuss the
25 substance of your testimony with Counsel?

1 A. No.

2 Q. I'd like to go back to Figure 6b of the '696
3 patent.

4 A. Okay.

5 Q. And we were discussing earlier the near-linear
6 regions 6 and 8.

7 Do you recall that?

8 A. Yes.

9 Q. In Figure 6b, the ends of the near-linear
10 region 8 are marked by the frequency f_U and f_b , correct?

11 A. That's correct.

12 Q. And there's a transmission frequency, f_t ,
13 selected between f_U and f_b , correct?

14 A. That's right.

15 Q. A transmission frequency closer to f_U would
16 induce a higher voltage at the secondary coil, correct?

17 A. That's right.

18 Q. And a transmission frequency closer to f_b
19 would induce a lower voltage at a secondary coil,
20 correct?

21 A. That's right.

22 Q. Would a frequency in the near-linear region
23 farthest from the characteristic resonant frequency be
24 used to continually transmit a small amount of power to
25 the receiver?

1 MR. NASH: Objection. Form.

2 THE WITNESS: I'm sorry. Can you repeat the
3 question to make sure I understand?

4 BY MR. STEPHENS:

5 Q. Sure.

6 If the transmission frequency, f_t , were
7 selected to be close to f_b , could that frequency be used
8 to transmit a small amount of power to a receiver?

9 MR. NASH: Objection. Form.

10 THE WITNESS: Well, you know, it -- there's a
11 lot of parameters that go into designing a system like
12 this. The amount of power delivered to the load depends
13 on many factors, including the selection of the
14 transmission frequency, what the load demands are, you
15 know, the coupling coefficient and mutual inductance
16 alignment, inductor values, and so on.

17 Technically, at any point in the curve, you
18 can transmit power. Just, you know, depends on how much
19 is needed. And so at any point on the curve, you can
20 transmit power. Whether or not that is small depends
21 on, you know, how you're defining small, I guess.

22 BY MR. STEPHENS:

23 Q. Would more power be transferred at frequencies
24 closer to the resonant frequency than frequencies
25 farther from the resonant frequency?

1 A. Yeah. Generally, yes.

2 Q. All right. I'd next like to turn to Claim 1,
3 please.

4 So I'm looking at Column 28 of the '696 patent
5 at line 25.

6 A. Okay.

7 Q. And the last limitation in Claim 1, starting
8 at line 43, refers to a "driving circuit is configured
9 and operable to produce said oscillating driving voltage
10 at a transmission frequency substantially different from
11 said characteristic resonant frequency of said inductive
12 couple."

13 Do you see that?

14 A. I do.

15 Q. There are -- would you agree that there are
16 two frequencies identified in this limitation; a
17 transmission frequency and a characteristic resonant
18 frequency of the inductive couple?

19 A. Yes.

20 Q. Is there -- well, again, can you explain what
21 the difference is between the transmission frequency and
22 the characteristic resonant frequency?

23 A. Well, the characteristic resonant frequency is
24 something that we've discussed at length.

25 In terms of the frequency that's substantially

1 different from that characteristic resonant frequency,
2 we have to read that in light of the claims and the
3 specification, including the prosecution history. And
4 in my report, briefly summarized here, the applicant
5 kind of clear -- clearly defines or clarifies what
6 "substantially different" means and -- with respect to
7 these claims and the specification.

8 And they say that that means the frequency of
9 the driving voltage is selected as to lie within one of
10 the near-linear regions of a frequency amplitude graph
11 associated with the inductive couple.

12 (Court Reporter requested clarification.)

13 BY MR. STEPHENS:

14 Q. And this limitation refers to a single
15 transmission frequency, correct?

16 A. Well, I think a POSITA reading this would
17 understand that, especially in light of the rest of the
18 claims and the specification, the prosecution history,
19 that -- that you operate at one transmission frequency
20 at a time, but that transmission frequency can change.

21 Q. Would -- so the transmission frequency can
22 vary over time; is that your understanding?

23 A. That's right.

24 Q. Has the transmission frequency ever changed to
25 a frequency that is not substantially different from the

1 characteristic resonant frequency?

2 MR. NASH: Objection. Form.

3 THE WITNESS: I mean, it's my understanding
4 that's not the intent of the '696 patent, which
5 describes, you know, a control feedback scheme to
6 control the system to operate in this substantially
7 different near-linear operating regime. So I don't
8 believe it's the intent of the invention to do so.

9 BY MR. STEPHENS:

10 Q. Let's take a hypothetical system. In this
11 system, at some times, the transmission frequency is
12 substantially different from the characteristic resonant
13 frequency of the inductive couple, okay?

14 A. Okay.

15 Q. At other times, the system uses a transmission
16 frequency that's not substantially different from the
17 characteristic resonant frequency of the inductive
18 couple, okay?

19 A. Okay.

20 Q. Would that system read on Claim 1?

21 MR. NASH: Objection. Form.

22 THE WITNESS: Just give me a moment to think
23 about this, actually.

24 MR. NASH: I'm also going to object as an
25 improper hypothetical.

1 MR. STEPHENS: Again, Counsel, there is
2 limited objections that you can do in an IPR deposition.
3 I'd ask you to refrain from a speaking objection.

4 (Pause on the record.)

5 THE WITNESS: So your -- let me just make sure
6 I'm understanding and answer the right question.

7 So you're asking if -- if some hypothetical
8 system operates in the near-linear region -- region 6 or
9 8 in Figure 6b of the '696 patent -- but then also
10 operates outside of that near-linear region, you know, I
11 think in reading Claim 1 in light of the rest of the
12 claims and the specification and the prosecution
13 history, there's intent and, you know, reason why one
14 would operate the system in the near-linear region, and
15 that is to provide, you know, predictable linear control
16 techniques to control the system.

17 And so operating at any point of time outside
18 of that near-linear region would kind of be counter to
19 the reason for doing this in the first place.

20 So I think for that reason, I wouldn't
21 consider a system like that to be meeting the Claim 1
22 limitations.

23 BY MR. STEPHENS:

24 Q. Let me make sure I understand.

25 So if the system sometimes operated with a

1 transmission frequency that was substantially different
2 from --

3 (Court Reporter requested clarification.)

4 MR. STEPHENS: I'll restart the question.

5 BY MR. STEPHENS:

6 Q. If, in this hypothetical system that sometimes
7 uses a transmission frequency that is substantially
8 different from the characteristic resonant frequency and
9 that also uses transmission frequencies that are not
10 substantially different from the characteristic resonant
11 frequency, that system, in your opinion, would not read
12 on Claim 1, correct?

13 MR. NASH: Objection. Mischaracterizes
14 testimony.

15 THE WITNESS: I would say -- I mean, the
16 intent of Claim 1 is -- is, you know, to provide some
17 sort of system functionality. And if you read the scope
18 of the claims and the specification and the prosecution
19 history, the intent of the system is to remain in the
20 near-linear region for the purposes of control.

21 And if you operate outside of that near-linear
22 region, you lose the benefits that operating in that
23 region offers you, and that would fall outside of the --
24 the scope of this invention.

1 BY MR. STEPHENS:

2 Q. Okay. Does Claim 1 require any steps for
3 adjusting the transmission frequency?

4 A. In isolation, no. But, again, in the context
5 of the rest of the claims and the specification and the
6 prosecution history, a POSITA would understand the
7 reason for operating in the substantially different
8 region and would understand that that could be possible.

9 Q. But not necessary to read on Claim 1?

10 A. Claim 1, in isolation, doesn't talk about
11 changing the transmission frequency. But, again, it
12 does so in Claim 2 and throughout the specification of
13 the -- of the patent.

14 Q. All right. Let's -- I'd like to turn to the
15 Onishi reference, Exhibit 1004.

16 A. Okay.

17 Q. And let's look at Figure 4 together, please.

18 A. Okay.

19 Q. Do you have that in front of you?

20 A. Yes. I'm just rearranging my windows so I can
21 see it more clearly.

22 Q. Okay.

23 A. Okay. Here we go.

24 Q. Are you familiar with Figure 4 in Onishi?

25 A. I am.

1 Q. Did you offer opinions regarding Figure 4 of
2 Onishi in your declaration?

3 A. I did.

4 Q. And Figure 4 depicts a frequency response
5 curve, correct?

6 A. Well, it depicts -- it depicts a very
7 confusing curve, I'll say, due to the lack of labels on
8 the respective axes.

9 Q. In this curve, there's a single resonance peak
10 depicted, correct?

11 A. That's right.

12 Q. This has a fairly parabolic shape, correct?

13 A. That's right.

14 Q. And this curve depicts the frequency response
15 in the load-connected state, correct?

16 A. Yeah. Again, my reading of Onishi is, at
17 best, I feel that Onishi is very unclear about what it's
18 depicting in Figure 4. It's really not clear to me what
19 the vertical axis is and under what exact operating
20 conditions it's being represented.

21 Q. Okay. I understand all of that from your
22 declaration.

23 I think what I'm asking is: As depicted in
24 Figure 4, this curve is represent -- excuse me.

25 This curve represents a response of the system

1 in the load-connected state, correct?

2 MR. NASH: Objection. Form.

3 BY MR. STEPHENS:

4 Q. I'll strike that, too.

5 In Figure 4, you see the words "load-connected
6 state"?

7 A. I do.

8 Q. What's your understanding of the
9 load-connected state in Onishi?

10 A. Well, again, I think, at best, it's very
11 unclear. It could be one of a couple different things.
12 It could be, for example, simply just a secondary
13 inductance resonating with a load attached to it.

14 It could be the primary inductance measured
15 when there's a load attached to the secondary
16 inductance.

17 And it could be, you know, something related
18 to the inductive couple when there's a load connected to
19 it.

20 But it's very unclear to me what exactly
21 Onishi is trying to depict here.

22 Q. Do you not understand the load-connected state
23 in Onishi?

24 A. My understanding of a load-connected state is
25 that there's a load connected to the secondary

1 inductance.

2 Q. So that would be, for example, when the
3 portable telephone is placed on the charger?

4 MR. NASH: Objection. Form.

5 THE WITNESS: So Onishi, in paragraph 180,
6 says, "The resonance characteristics of the primary coil
7 L1 and the secondary coil L2 when the portable telephone
8 510 is placed on the charger 500 (cradle)(i.e., when
9 load exists with respect to the power transmission
10 device 10)" and so on and so forth.

11 So Onishi does talk about having a phone on a
12 power-charging cable. But, again, it's very unclear to
13 me, A, what Figure 4 is actually representing. Is this
14 voltage?

15 Is this power?

16 Is this impedance?

17 Is this efficiency?

18 Is this resistance?

19 Is it inductance?

20 I don't know. It's not specified in Onishi.

21 And, furthermore, it's unclear, especially due
22 to the language employed here, if this is the resonant
23 characteristics of just primary coil.

24 L1, just primary -- or just secondary coil L2,
25 or both of them in an inductive-coupled system.

1 What is, I suppose, clear is that a load
2 exists and is connected to inductor L2 in this analysis.

3 BY MR. STEPHENS:

4 Q. I think you got to it in the end.

5 My question actually wasn't about Figure 4. I
6 was simply asking: Do you understand what the
7 load-connected state is in Onishi?

8 A. Okay. Sure. Yes.

9 Q. So what is your understanding of a
10 load-connected state?

11 A. Again, when there's a load attached to the
12 secondary inductor.

13 Q. And would that occur when the telephone is
14 placed on the charger?

15 MR. NASH: Objection. Form.

16 MR. STEPHENS: I'll rephrase.

17 BY MR. STEPHENS:

18 Q. Would the system be in the load-connected
19 state when the telephone is placed on the charger for
20 charging?

21 A. If the -- let me say this very carefully.

22 The -- a load-connected state simply means
23 that there's a load attached to the secondary inductor.
24 And so when they say -- when Onishi says a portable
25 telephone, I'm not sure exactly what that means. I'm

1 assuming that means the telephone is representing both
2 the secondary inductor and some sort of load that's
3 attached to it.

4 So I suppose, yeah, in that condition, there
5 would be a load. When that telephone is placed on the
6 charger, that load is still connected, so there's
7 technically no difference with respect to if there's a
8 load connected to the secondary inductor or not, whether
9 the telephone is on the cradle or not -- on the charger
10 or not. Sorry.

11 Q. I appreciate your precise answers. I'm not
12 actually trying to pose a trick question here. I think
13 -- I'd just like to know: Would the system be in a
14 load-connected state when the telephone is placed on the
15 charger for charging?

16 MR. NASH: Objection. Form. And objection.
17 Asked and answered.

18 THE WITNESS: Yes, that could be one of
19 several different possible load-connected states.

20 BY MR. STEPHENS:

21 Q. And going back -- let's turn back to Figure 4,
22 please.

23 Do you see there are four frequencies labeled
24 in Figure 4?

25 A. That's right.

1 Q. Do you have an understanding of what those
2 four frequencies represent?

3 A. I do.

4 Q. So what is "f0"?

5 A. Here, let me just -- I'm going to just refer
6 to my declaration where I kind of go through this very
7 carefully.

8 Q. If you could let us know also which paragraphs
9 you're referring to, that would be helpful.

10 MR. NASH: Sure. Absolutely.

11 So in paragraph 116 in my expert
12 declaration -- that is Exhibit 2006 -- I talk about how
13 Onishi's discussion of this frequency is only in the
14 context of -- and I'm quoting Onishi here -- "the
15 resonant characteristics of the induction coil."

16 And so my read of Onishi is that frequency f0
17 is that -- the resonant characteristic of one of the
18 induction coils based on the language presented in
19 Onishi.

20 BY MR. STEPHENS:

21 Q. That is the resonance frequency in the
22 load-connected state, correct?

23 MR. NASH: Objection. Form.

24 THE WITNESS: As labeled on Figure 4, that
25 would be, yeah, the interpretation here, yeah.

1 BY MR. STEPHENS:

2 Q. And so that would be the resonance frequency
3 when the couple -- when the coils are coupled, correct?

4 MR. NASH: Objection. Form.

5 THE WITNESS: Again, not necessarily. Right?

6 So the load-connected state simply means that
7 there's a load attached to the secondary coil. That
8 doesn't necessarily mean the two coils are coupled
9 together.

10 And so, you know, it's possible to create a
11 curve like this, measuring the resonance peak of simply
12 the primary coil in isolation, even though there's a
13 load connected to the secondary coil that could not be
14 coupled.

15 It could be that you have a measurement of the
16 resonant frequency at the secondary coil when there's a
17 load connected to it in isolation of the primary coil,
18 or it could be that this is the resonance
19 characteristics of the inductive couple when there's a
20 load connected to the secondary coil.

21 So, again, Onishi's disclosure about this is,
22 at best, very unclear, in my opinion.

23 BY MR. STEPHENS:

24 Q. So it's, at least, possible that the frequency
25 f_0 is the resonant frequency of, in your view, a coil

1 when the inductive -- when the coils are coupled,
2 correct?

3 MR. NASH: Objection. Objection. Form.

4 THE WITNESS: That's not my -- my opinion of
5 my read of Onishi based on the language that Onishi
6 uses. It's possible, but that's, again, not my opinion
7 of Onishi.

8 BY MR. STEPHENS:

9 Q. It is the resonant frequency in the
10 load-connected state, though, correct?

11 A. Yes.

12 Q. And it is the resonant frequency when the
13 portable telephone 510 is placed on the charger 500,
14 correct?

15 MR. NASH: Objection. Form.

16 THE WITNESS: So, again, let me read part of
17 paragraph 180 back again.

18 It says, "The resonance characteristics of the
19 primary coil L1 and the secondary coil L2 when the
20 portable telephone 510 is placed on the charger 500,
21 (i.e., when a load exists with respect to the power
22 transmission device." [As read.]

23 So Onishi here is telling us that this is a
24 plot of the resonance characteristics of the induction
25 coil and application of frequencies -- sorry, let me

1 walk this back.

2 He says specifically Figure 4 is a view
3 showing the resonant characteristics of the induction
4 coil and -- of the induction coil and application of
5 frequencies.

6 And then in the subsequent sentence, he talks
7 about the characteristics of L1 and L2 when the
8 telephone is placed on the charger, and then he shows --
9 and he says, "as shown in Figure 4, for example."

10 So, again, at best, it's unclear to me exactly
11 what Figure 4 is showing because in the first sentence,
12 he says it's the resonant characteristics of the
13 induction coil. And then later he talks about two
14 different coils when the phone is put on the -- on the
15 device.

16 But, again, it -- Figure 4, it possibly could
17 have that same shape, as an example, as stated in
18 Onishi; but it's -- it's not clear if that was the
19 original intent of Figure 4. I'm just -- again, I'm
20 just not sure. Figure 4 is very unclear.

21 BY MR. STEPHENS:

22 Q. But you would agree that paragraph 180
23 confirms that Figure 4 shows a curve in the situation
24 where the portable telephone 510 is placed on the
25 charger 500, correct?

1 MR. NASH: Objection. Form. Mischaracterizes
2 testimony.

3 MR. STEPHENS: Excuse me, Counsel. This is
4 the third time, I think, I've said this.

5 There are no speaking objections. If there is
6 4k-- if that's going to continue, I think we're going to
7 have to go off the record and talk further about this.

8 BY MR. STEPHENS:

9 Q. Dr. Mercier?

10 A. So, again, the language used in Onishi is --
11 is not very clear to me. So the second sentence of
12 paragraph 180 is talking about resonant characteristics
13 of two different coils and saying that they have a
14 symmetric and broad mountain shape, and then he says,
15 "as shown in Figure 4, for example."

16 So based on reading that sentence carefully,
17 it's not clear if that means he's referencing Figure 4
18 as being the situation when the telephone is placed on
19 the charger or if he's referencing Figure 4 as simply
20 being a representative figure showing a symmetrical and
21 broad mountain shape.

22 So, again, my read of this is the first
23 sentence in which Figure 4 is introduced, and he talks
24 specifically about Figure 4. He says, "This is the
25 resonance characteristics of the induction coil."

1 And then the next sentence he talks about, I
2 guess, a different situation that may have a similar
3 shape, the symmetric and broad mountain shape, as shown
4 in Figure 4, for example. But that is not necessarily
5 what Figure 4 is representing.

6 Q. Looking back at Figure 4, there's also
7 frequencies f1, f2, and f3 labeled, correct?

8 A. That's right.

9 Q. And do you have an understanding of what f1
10 and f2 represent?

11 A. Yeah. According to Onishi, f1 and f2 are,
12 quote/unquote, normal modes of power transmission.
13 Frequency f1 is when the primary is delivering a logic 1
14 transmission to the secondary, and frequency f2 is when
15 the primary is delivering a logic 0 to the secondary.

16 Q. Why did Onishi allow for the transmission of
17 logic 1s and logic 0s from the primary to the secondary?

18 A. I'm not sure I understand the question.
19 Could you rephrase?

20 Q. Yeah.
21 What would the transmission of these primary
22 values allow the system to do in Onishi?

23 MR. NASH: Objection. Form.

24 THE WITNESS: Well, in general, inductively
25 coupled systems can leverage the inductive-coupled link

1 to communicate information from one side to the other,
2 and there's many different ways that one can do this.

3 And in Onishi, they end up using a frequency
4 modulation-based communication system.

5 BY MR. STEPHENS:

6 Q. Is it your understanding that Onishi discloses
7 both a normal power transmission mode and a power-saving
8 mode?

9 A. Yes. That is my understanding.

10 Q. Are the frequencies f_1 and f_2 used to transmit
11 1 and 0 respectively in the normal power transmission
12 mode?

13 A. Yes.

14 Q. Are the frequencies f_1 and f_2 different from
15 the resonant frequency f_0 ?

16 A. So this is a good question, and Onishi does
17 have a little bit of language that discusses this. In
18 this response, I'm going to read from paragraph 126 in
19 my declaration where I quote on the second page of this
20 paragraph from Onishi itself at paragraph 53, and let me
21 just read this quote to help answer this question.

22 Onishi says, "The transmission frequency
23 during power-saving transmission is set at a frequency
24 apart from the resonance frequency," or resonance peak,
25 "as compared with the frequency during normal power

1 transmission."

2 And so by simple logic, what this is saying is
3 frequency f_3 is parked away from the resonance
4 frequency, and frequencies f_1 and f_2 are not.

5 And so it's my opinion that frequencies f_1 and
6 f_2 are at or near the resonance frequency based on this
7 read from Onishi.

8 Q. Nonetheless, Onishi describes f_1 and f_2
9 separately from f_0 , correct?

10 MR. NASH: Objection. Form.

11 THE WITNESS: Well, as depicted in the figure,
12 you know, they're not overlapping with f_0 . That's
13 right.

14 But, again, you have to read the specification
15 of Onishi to understand the intent. Figure 4 is not a
16 drawing to scale. And, again, I'd like to point out
17 that there's no labels on the axes.

18 But, again, by reading what Onishi says, where
19 it clearly says that f_3 is apart from resonant
20 frequency, and -- as a result, unlike f_1 and f_2 , which
21 imply that they are not apart, so to me that means they
22 are, if not at the resonant frequency, very close to the
23 resonant frequency.

24 BY MR. STEPHENS:

25 Q. Does f_2 as shown in Figure 4 -- would you

1 agree that f2 is depicted closer to f3 than f0?

2 Again, as depicted in Figure 4.

3 A. And, again, I'd like to say Figure 4 is a
4 cartoon that's not drawn to scale, and so it's -- I
5 wouldn't want to discern anything about the relative
6 placement of these frequencies without reading the
7 specification where the specification kind of tells us
8 more about the relative positioning of these
9 frequencies.

10 Q. So based on your review of Onishi, you
11 actually believe that f2 is closer to f0 than f3.

12 Is that -- my understanding; is that correct?

13 MR. NASH: Objection. Form.

14 THE WITNESS: I don't think we can -- we can't
15 make a whole lot of determinations of the relative
16 positioning of f1, f2, f3.

17 And, in fact, I'd like to point out that
18 Onishi is further confusing because in paragraph 181 of
19 Onishi, he says that f1 is larger than f2, which is
20 larger than f3, which appears to be the opposite of what
21 is depicted in F -- in Figure 4.

22 So, again, Onishi, in the description of
23 Figure 4, is extremely unclear and, in some cases,
24 self-contradictory. But we only have the -- you know,
25 what's available in Onishi. And as a POSITA, I'm

1 reading this and making the -- forming the best opinions
2 that I can. And the, kind of, most clear description of
3 the relative positioning of these frequencies is that
4 sentence that I read about how f3 is apart from the
5 resonant frequency, unlike f1 and f2.

6 BY MR. STEPHENS:

7 Q. Why would Onishi -- in your experience, does
8 the literature in this field -- strike that.

9 Does Onishi disclose specific frequency values
10 for f1 and f2?

11 MR. NASH: Objection. Form.

12 THE WITNESS: I -- I'd have to review Onishi
13 more carefully in detail to answer that question
14 precisely. I don't recall him doing that, but I can --
15 I'd have to read in more detail to be sure.

16 BY MR. STEPHENS:

17 Q. Would a POSITA be capable of selecting
18 appropriate frequency values for f1 and f2?

19 MR. NASH: Objection. Form. And scope.

20 THE WITNESS: Well, I think a POSITA would
21 read Onishi and try and understand what -- what's being
22 proposed here.

23 And in reading Onishi, I think, again, it
24 would refer back to that sentence that I quoted in
25 paragraph 53 where Onishi describes and teaches, you

1 know, the relative positioning of f3 with respect to f1
2 and f2 and would make a design determination that way.

3 BY MR. STEPHENS:

4 Q. In making that design determination, what
5 factors would a POSITA consider in selecting values for
6 f1 and f2?

7 MR. NASH: Objection. Form. Scope.

8 THE WITNESS: Yeah, that's a very loaded
9 question. There's many, many factors a POSITA would
10 have to consider when designing such a system, including
11 the relative values of inductances, coupling
12 coefficients, mutual inductance, resonance frequencies,
13 load characteristics, voltage capabilities, current
14 capabilities. There's a lot for a POSITA to consider
15 when making those design determinations.

16 BY MR. STEPHENS:

17 Q. Are there factors that a POSITA would seek out
18 in selecting f1 and f2?

19 MR. NASH: Objection. Form. Scope.

20 THE WITNESS: It depends on the stated goal
21 of -- of what the designer is trying to achieve. Are
22 they trying to -- I don't know -- charge something as
23 fast as possible or as efficiently as possible, or are
24 they trying to have really good, stable control?

25 You know, there's a lot of different

1 determinations here about, you know, what -- what one
2 might be interested in doing.

3 I have something else I wanted to add. I just
4 want to think about it just a moment.

5 BY MR. STEPHENS:

6 Q. And specifically referring to the use of f1
7 and f2 for transmitting logical values 1 and 0 --

8 A. Okay.

9 Q. -- for that purpose, are there --

10 MR. NASH: Counsel, Dr. Mercier mentioned that
11 he had something to add to his last answer.

12 THE WITNESS: I'm okay. I'm okay. I'm okay.

13 BY MR. STEPHENS:

14 Q. For the purpose of transmitting 1s and 0s,
15 what factors would a POSITA seek out to optimize in
16 selecting values for f1 and f2?

17 MR. NASH: Objection. Form. Scope.

18 THE WITNESS: So I guess in answering that
19 question -- which, again, is a loaded question with --
20 with very large scope that may fall out -- that,
21 frankly, does fall outside of the scope of my
22 declaration, but I can attempt to answer it.

23 And in answering this, let me refer to some of
24 the motivation that the '696 patent has for its
25 operation. And, specifically, the '696 patent is

1 interested in operating -- or says that prior art, as
2 of, you know, the dates of invention here, tended to
3 operate at or near the resonant frequency because this
4 -- you know, you can deliver the most amount of power in
5 this condition.

6 But operating at that mode has a lot of
7 variability associated with, you know, link variation
8 and so on, and that was one of the motivations of doing
9 the '696 patent. And so that's the stated -- kind of
10 state of the prior art in '696.

11 And so as a POSITA, at the time of invention
12 here, it's my opinion that the default operating
13 position would be at or near the resonant frequency
14 because that's kind of what the prior art had normally
15 tried to do, and that's, you know, frankly, backed up by
16 what Onishi says in that a normal power transmission is
17 at or near the resonant frequency.

18 So I think a POSITA would be motivated based
19 on what's stated in Onishi and the motivation for the
20 '696 patent, which is a nice overview of state of the
21 art at the time of invention that most prior art teaches
22 operating after near resonance.

23 BY MR. STEPHENS:

24 Q. I'm not sure that answered my question.

25 I was -- for the purpose of transmitting 1s

1 and 0s, as a POSITA, what types of things would a POSITA
2 seek to optimize in selecting frequencies for the
3 transmissions of 1s and 0s?

4 MR. NASH: Objection. Form. Scope. Asked
5 and answered.

6 THE WITNESS: So, again, this falls under the
7 scope of my opinions here in -- in my declaration, but I
8 can attempt to answer it.

9 So, again, I would say a POSITA would be
10 motivated to operate at or near resonance for normal
11 power transmission. So, at minimum, I think that would
12 place f1 either at or very near to a resonant frequency.

13 And then f0 would have to be at least a little
14 bit different in order to induce a difference at the
15 output so that the secondary can receive it.

16 How a POSITA designs that is very much
17 dependent on many other system design parameters. But,
18 again, a POSITA would be motivated to, you know,
19 maximize operation or operate in the usual mode of being
20 at or near resonance during normal power transmission
21 mode, so I don't believe they would be motivated to make
22 frequency f2 too far away from that resonant peak.

23 BY MR. STEPHENS:

24 Q. Would there be any design tradeoffs between
25 selecting frequencies closer to the resonance peak and

1 frequencies farther away from the resonance peak?

2 MR. NASH: Objection. Form. Scope.

3 THE WITNESS: Yeah. I think I'm going to have
4 to say that this is outside of the scope of my
5 declaration; and I'd have to, you know, think about this
6 further to form an opinion to give you a good answer
7 beyond what I just described.

8 BY MR. STEPHENS:

9 Q. You've offered opinions as to Figure 4 in
10 Onishi, correct?

11 A. That's right.

12 Q. And you've offered opinions as to where f1 and
13 f2 would fall on Onishi's curve, correct?

14 A. Correct. Based on Onishi's own writing, yeah.

15 Q. So I'm not seeing how this is outside of the
16 scope of the opinions you've offered.

17 Did you not consider what factors a POSITA
18 would select -- would consider in selecting f1 and f2?

19 A. Well, I think the answer in my previous
20 question or the previous question was kind of what I
21 have considered when analyzing this.

22 Again, the question is: How would a POSITA
23 design frequencies f1 and f2? And a POSITA would read
24 Onishi and understand what Onishi is suggesting, which
25 is saying f1 and f2 should be near the resonance

1 frequency as that's commonly what's done in prior art as
2 well during normal power transmission. And so that
3 would give kind of a good first pass of where f1 and f2
4 should be.

5 Beyond that, you know, trying to figure out
6 exactly where those go depend on many other system
7 parameters, including the values of the inductors,
8 capacitors, quality factors, coupling coefficient,
9 voltages, system operating voltages, load requirements,
10 and so on.

11 Q. For the secondary -- I'm sorry.

12 Would the receiver in the Onishi system
13 include a frequency detector to discriminate between f1
14 and f2?

15 MR. NASH: Objection. Form. Scope. Calls
16 for speculation.

17 THE WITNESS: I mean, I can't recall exactly
18 how Onishi describes how to do demodulation. I'd have
19 to read it again more carefully.

20 A POSITA could certainly build a frequency
21 discriminator.

22 BY MR. STEPHENS:

23 Q. And would the distance between f1 and f2
24 impact the receiver's ability to distinguish between
25 logical 1s and logical 0s?

1 MR. NASH: Objection. Form. Scope. Calls
2 for speculation.

3 THE WITNESS: It depends on the resolution of
4 the frequency discriminator that's employed here.

5 BY MR. STEPHENS:

6 Q. So if the -- the frequency discriminator,
7 then, would need a higher resolution if f1 and f2 were
8 closer together?

9 MR. NASH: Objection. Form. Scope.

10 BY MR. STEPHENS:

11 Q. Is that correct, Dr. Mercier?

12 A. Yeah, that's fair to say.

13 Q. And the frequency discriminator could use a
14 lower resolution if f1 and f2 were farther apart; is
15 that correct?

16 MR. NASH: Objection -- objection. Form.
17 Scope.

18 THE WITNESS: Again, that -- that is, you
19 know -- that could be correct. It depends on, you know,
20 a POSITA, in designing the system, would look to what's
21 available in the art and the marketplace to see what
22 kind of frequency determinator discriminators are
23 available and make design decisions accordingly.

24 It may be that, you know, frequency
25 discriminators available have sufficient resolution

1 naturally to discern an f1 and f2 that are very close
2 together, or maybe there needs to be a little bit of
3 space between them. This is very dependent on what's
4 available, you know, to a POSITA to do something like
5 this.

6 So, again, these are kind of very specific
7 design questions that are difficult to answer without
8 more specific details.

9 MR. NASH: Counsel, we've been going for about
10 an hour here. So I would suggest taking a break in the
11 next little bit.

12 But if you're wrapping up questions related to
13 Onishi, if you maybe have a few more questions before
14 taking a break if you need that.

15 MR. STEPHENS: Yeah, sure. I think I'm almost
16 wrapped up with Onishi.

17 Would you be okay to go five more minutes or
18 so?

19 MR. NASH: Yeah, sure.

20 Is that okay, Dr. Mercier?

21 THE WITNESS: Yeah, that's fine.

22 BY MR. STEPHENS:

23 Q. Let's turn to Figure 1A, please, of Onishi.

24 A. Okay.

25 Q. Are you familiar with this figure?

1 A. Yes.

2 Q. And there's a portable telephone shown in this
3 figure, correct?

4 A. That's right.

5 Q. There's also a wireless charger depicted,
6 correct?

7 A. Yeah. I -- I think so. Yeah. Yeah.

8 Q. What's your understanding of what's labeled as
9 500?

10 A. So this is what Onishi refers to as the
11 charger or cradle.

12 Q. And the charger 500 includes the primary
13 inductor coil; is that correct?

14 A. Yes.

15 Q. And then the telephone includes a secondary
16 coil, correct?

17 A. Yes.

18 Q. And a lot of power can be transmitted from the
19 charger 500 to the telephone, correct?

20 A. Correct.

21 MR. NASH: Objection. Form. Calls for
22 speculation.

23 BY MR. STEPHENS:

24 Q. Onishi refers to -- I think you just
25 mentioned -- 500 as a charger or cradle, correct?

1 A. That's right.

2 Q. What is your understanding of a cradle?

3 A. Well, it's something that you could, in this
4 context, put a device, like a phone, on in order to
5 charge it.

6 Q. And so the cradle supports the telephone while
7 it's charging?

8 MR. NASH: Objection. Form.

9 THE WITNESS: Can you elaborate what you mean
10 by "supports"?

11 BY MR. STEPHENS:

12 Q. Does the telephone sit on the charger while
13 it's charging?

14 A. I see.

15 I mean, it could. Yeah. There's nothing to
16 say you couldn't put anything in between them, but yes.

17 Q. And the cradle 500 as shown in Figure 1A is
18 generally rectangularly shaped; would you agree?

19 MR. NASH: Objection. Form. Calls for
20 speculation.

21 THE WITNESS: As depicted in Figure 1A, it
22 appears to be rectangular-ish.

23 BY MR. STEPHENS:

24 Q. The telephone is also generally rectangular,
25 correct?

1 MR. NASH: Objection. Form. Calls for
2 speculation. Relevance.

3 THE WITNESS: As depicted in Figure 1A, it
4 looks like a generally rectangular phone.

5 BY MR. STEPHENS:

6 Q. Would the shape of the charger aid in
7 alignment of the telephone to the charger?

8 MR. NASH: Objection. Form. Calls for
9 speculation. Scope.

10 THE WITNESS: Yeah. I'm not sure I could say
11 that with definitiveness because, again, Figure 1A --
12 I'm not sure if this is a to-scale drawing. What's the
13 relative size of the cradle with respect to the phone
14 and dimensions?

15 I could imagine a user, you know, if the
16 cradle is much larger than the phone, not knowing where
17 to put the phone on the cradle. A user could rotate the
18 phone.

19 There's many different possibilities that a
20 user could do here. So I'm not sure if, directly as
21 depicted in Figure 1A, I would say that with certainty.

22 BY MR. STEPHENS:

23 Q. Okay. But using your common experience and as
24 shown in Figure 1A, the phone is -- you would expect
25 that at least some users would place the phone in the

1 orientation as shown in Figure 1A on the charger?

2 MR. NASH: Objection. Form. Scope. Calls
3 for speculation. Relevance.

4 THE WITNESS: Well, let me preface this by
5 saying I've seen users do very interesting things, we'll
6 say, that don't necessarily align with the original
7 intended idea of the designer. So I've seen users do
8 all sorts of interesting things.

9 But, sure. Some users would place the phone
10 on -- as depicted in 1A as shown.

11 BY MR. STEPHENS:

12 Q. And they would be guided by the shape of the
13 cradle, correct?

14 MR. NASH: Objection. Form. Scope. Calls
15 for speculation. Relevance.

16 THE WITNESS: Yeah. I -- you know, I think
17 we're trying to make very broad statements of what a
18 user may or may not do and the reasoning or their
19 thought process in doing so. So I'm not sure that I can
20 comment with such generalities.

21 BY MR. STEPHENS:

22 Q. In your experience, have you ever placed a
23 phone on a charger while it was charging?

24 A. I have.

25 Q. Okay. And when you typically do so, do you

1 place the phone in the same orientation as the charger?

2 MR. NASH: Objection. Form. Scope.

3 Relevance.

4 THE WITNESS: In my experience, most chargers
5 are not shaped like this. Many of them are circular
6 and -- and in many cases, I place my -- my phone or my
7 device on there, and it doesn't charge until I move it
8 around a little bit and so on. So I've had a great deal
9 of varying experiences with charging devices.

10 BY MR. STEPHENS:

11 Q. Do you have any experience placing a phone on
12 a rectangular charger?

13 MR. NASH: Objection. Form. Scope.

14 Relevance.

15 THE WITNESS: You know, I do. In a Tesla
16 Model 3, they have a little console with a rectangular
17 place that you can put your phone, and that's never
18 worked for me. When I place my phone in there, it just
19 doesn't seem to want to charge for whatever reason.

20 MR. STEPHENS: Why don't we go -- let's take a
21 break. I -- I think that I probably have maybe 30
22 minutes more of questioning.

23 So if you'd like to take a lunch break, we
24 could do that, or if you'd like to go through that
25 module, I can do that, as well, after a shorter break

1 here.

2 MR. NASH: I'm happy to -- Dr. Mercier, do you
3 have any preference?

4 THE WITNESS: I wouldn't mind grabbing a bite
5 to eat. Yeah. It was a rush this morning getting out
6 of the house with the kids, so I'm a little hungry.

7 MR. STEPHENS: No Problem.

8 MR. NASH: I think we can go off the record to
9 discuss this.

10 (Recess: 1:43 p.m. to 2:30 p.m.)

11 BY MR. STEPHENS:

12 Q. Dr. Mercier, did you speak with counsel about
13 the substance of your testimony over the break?

14 A. I did not.

15 Q. All right. I would like to turn to Baarman --

16 A. Okay.

17 Q. -- which is Exhibit 1008.

18 A. That's the exhibit labeled 1006 from the one
19 in the chat. Yeah.

20 Q. Correct. Yes. Baarman '392, which has been
21 marked as Exhibit 1008 in the proceeding. As you noted,
22 the file name distributed earlier had it marked as 1006.

23 And do you have Baarman in front of you now?

24 A. I do.

25 Q. Let's turn to page -- Figure 3, please.

1 A. Sorry. I'm just realigning my windows here.

2 Okay. Got it.

3 Q. Can you describe what's shown in Figure 3?

4 A. Certainly.

5 So the X axis of Figure 3 is frequency; the Y
6 axis is power transfer efficiency. And this is showing
7 a curve -- yeah, of power transfer efficiency versus
8 frequency.

9 Q. And what does the frequency on the X axis
10 represent?

11 MR. NASH: Objection to form.

12 THE WITNESS: This I would understand to be
13 the transmission frequency employed in the system.

14 BY MR. STEPHENS:

15 Q. And there are two frequencies labeled in
16 Figure 3; Frequency A and Frequency B, correct?

17 A. That's right.

18 Q. What's your understanding of what A and
19 B represent?

20 A. So Frequency B is, as described in Baarman,
21 somewhat less than the resonant frequency, and Frequency
22 A is some other frequency further away from that.

23 I think that's pretty much all we can surmise
24 from the language in Baarman.

25 Q. Inverter 10 operates between Frequency A and

1 Frequency B, correct?

2 MR. NASH: Objection. Form. Foundation.

3 THE WITNESS: So, again, in paragraph 38 of
4 Baarman, they say yes; generally, the inverter 10 is
5 operated between Frequency A and Frequency B.

6 BY MR. STEPHENS:

7 Q. Turn to paragraph 56, please.

8 A. Okay.

9 Q. And on page 5, there's a sentence in paragraph
10 56, starting at line 1 of page 5, that reads, "If, on
11 the other hand, the charger circuit 6 is operating
12 relatively far from resonance, then a change of 100 Hz
13 will not result in a substantial increase in the current
14 through the primary."

15 Do you see that?

16 A. I do.

17 Q. And so the charger circuit 6, in some cases,
18 can operate relatively far from resonance, correct?

19 MR. NASH: Objection. Form.

20 THE WITNESS: I mean, again, reading Baarman
21 directly, it says, you know, charger circuit 6 -- "If,
22 on the other hand, the charger circuit 6 is operating
23 relatively far from resonance, then a change" --
24 et cetera.

25 So, yes, it does say that.

1 Q. So the charger circuit 6 can operate between
2 Frequency B, which you indicated is somewhat less than
3 the resonance frequency and a frequency that is
4 relatively far from resonance, correct?

5 MR. NASH: Objection.

6 THE WITNESS: That's what Baarman discloses.

7 BY MR. STEPHENS:

8 Q. And between those two end points, would a
9 POSITA understand that there is at least one frequency
10 that is substantially different from the characteristic
11 resonant frequency?

12 MR. NASH: Objection. Form. Scope.

13 THE WITNESS: I mean, I guess it's hard to say
14 that with certainty. It is simply due to the lack of
15 more detailed description present in Baarman. Again,
16 Baarman refers to Frequency B as being somewhat less
17 than the resonant frequency. It doesn't really say much
18 about the location of Frequency A.

19 Baarman does disclose that the regions --
20 sorry, let me just read this more carefully.

21 Baarman describes the power transfer between
22 Frequency A and B as being piecewise linear -- piecewise
23 linearized by software lookup table. And so that's kind
24 of all Baarman says about the relative positioning of
25 these two frequencies.

1 So it's kind of hard for a POSITA to make with
2 any definitive statement, you know, where exactly
3 that -- those two frequencies -- or at least where
4 Frequency A is located.

5 BY MR. STEPHENS:

6 Q. Is it possible that the charger would operate
7 at a frequency substantially different from the
8 characteristic resonant frequency in Baarman?

9 MR. NASH: Objection. Form. Calls for
10 speculation.

11 THE WITNESS: Yeah, again, it's just hard to
12 say because I don't really know where Frequency A is.
13 Baarman doesn't give us a good map in the specification
14 on where Frequency A is, other than that the curve
15 connecting Frequencies B to A is nonlinear.

16 BY MR. STEPHENS:

17 Q. I'll ask a question here, but I'd like to
18 stipulate for the purposes of the question that -- let's
19 say Frequency A is the frequency that is relatively far
20 from resonance as described in paragraph 56.

21 Does that make sense?

22 A. Okay.

23 Q. In that case, between Frequency A and
24 Frequency B, would there be a frequency that is
25 substantially different from the resonance frequency?

1 MR. NASH: Objection. Form.

2 THE WITNESS: So again, you know, I don't
3 really know what "relatively far" means in this case.
4 It's tempting to say, "Well, that sounds like
5 substantially different," but in reading the prosecution
6 history of the '696 patent, we understand that
7 "substantially different" is more specifically referring
8 to the near-linear region of that resonant
9 characteristic curve.

10 And so that, you know, area of operation is
11 very clear; and from the '696 patent, the reason from
12 operating in that region is also very clear.

13 But, again, in Baarman, it's not so clear
14 because, okay, even if Frequency A is -- we said
15 relatively far from resonance. I just don't know what
16 that -- what that means. And the only other guiding
17 post that we have in Baarman is the fact that A and
18 B are connected through a nonlinear curve.

19 So it would be difficult to make that
20 conclusion without more details from Baarman.

21 BY MR. STEPHENS:

22 Q. But you can't rule it out?

23 A. Yeah, we can't rule it out. Baarman is just
24 not -- doesn't clearly disclose that. It's just not
25 clear.

1 MR. STEPHENS: Okay.

2 Thank you, Dr. Mercier. No further questions.

3 MR. NASH: Can we take a 10-minute break?

4 MR. STEPHENS: Sure.

5 (Recess: 2:42 p.m. to 2:55 p.m.)

6 MR. NASH: I have no further questions, as
7 well.

8 COURT REPORTER: Counsel, may I get transcript
9 requests, please?

10 MR. STEPHENS: We would like -- I think ours
11 was in the order. It has not changed. Yes.

12 MR. NASH: And then we'd like -- we'd like a
13 rough, and then I think standard delivery on the
14 transcript should be sufficient, should be fine.

15 (Whereupon the proceedings concluded at
16 2:56)

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NAME OF WITNESS: PATRICK MERCIER, Ph.D.

- 1: To clarify the record.
- 2: To conform to the facts.
- 3: To correct transcription error.

Page _____ Line _____ Reason _____

From _____ to _____

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DECLARATION UNDER PENALTY OF PERJURY

I, PATRICK MERCIER, Ph.D., do hereby certify under penalty of perjury that I have read the foregoing transcript of my deposition taken on April 23, 2025; that I have made such corrections as appear noted on the Deposition Errata Page(s), attached hereto, signed by me; that my testimony as contained herein, as corrected, is true and correct.

This Declaration is executed this _____ day of _____, 20____, at _____, California.

PATRICK MERCIER, Ph.D.

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