

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

INDUCTEV, INC.,)
) Case IPR2023-00140
Petitioner,)
)
v.) U.S. Patent
) No. 8,466,654
WITRICITY CORPORATION,)
)
Patent Owner.)
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REMOTE PROCEEDINGS OF THE
VIDEOTAPED DEPOSITION OF MARK ALLEN, PH.D.
WEDNESDAY, SEPTEMBER 11, 2024

REPORTED BY NANCY J. MARTIN
CSR. NO. 9504, RMR, RPR
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1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 BEFORE THE PATENT TRIAL AND APPEAL BOARD 3 4 INDUCTEV, INC.,)) Case IPR2023-00140 5 Petitioner,)) 6 v.) U.S. Patent) No. 8,466,654 7 WITRICITY CORPORATION,)) 8 Patent Owner.) -----) 9 10 --- 11 Wednesday, September 11, 2024 12 --- 13 Remote Videotaped Deposition of MARK ALLEN, 14 PH.D., beginning at 2:11 p.m., before Nancy J. Martin, 15 a Registered Merit Reporter, Certified Shorthand 16 Reporter. All parties appeared remotely. 17 18 19 20 21 22 23 24 25	1 I N D E X 2 TESTIMONY OF MARK ALLEN, PH.D. PAGE 3 BY MR. CORBETT 5 4 5 E X H I B I T S 6 7 NUMBER DESCRIPTION PAGE 8 9 Exhibit 1 U.S. Patent US 8,466,654 B2 7 10 11 Exhibit 2 Electronic Patent 8 12 Application Fee Transmittal 13 Exhibit 3 DECLARATION OF DR. MARK 9 14 ALLEN IN SUPPORT 15 OF/PETITION FOR INTER 16 PARTES REVIEW/OF U.S. 17 PATENT NO. 8,466,654 18 Exhibit 4 Curriculum Vitae of Mark G. 9 19 Allen, Ph.D. 20 21 Exhibit 5 U.S. Patent 5,617,003 11 22 23 Exhibit 6 DESIGN CONSIDERATIONS 41 24 FOR/INDUCTIVELY COUPL ED 25 POWER/TRANSFER SYSTEMS/By/Chwei-Sen Wang
Page 3	Page 5
1 A P P E A R A N C E S : 2 3 RYAN CORBETT, ESQ. 4 LANCE A. LAWSON, ESQ. 5 ANDY SPENCE, ESQ. 6 BURR & FORMAN LLP 7 201 North Franklin Street 8 Suite 3200 9 Tampa, Florida 33602 10 rcorbett@burr.com 11 Counsel for Patent Owner 12 13 DAVID ZUCKER, ESQ. 14 LATHAM & WATKINS, LLP 15 505 Montgomery Street 16 Suite 2000 17 San Francisco, California 94111 18 david.zucker@lw.com 19 Counsel for Petitioner 20 21 ALSO PRESENT: 22 GEORGE LIBBARES, TECH CONCIERGE 23 24 25	1 PHILADELPHIA, PENNSYLVANIA, 2 WEDNESDAY, SEPTEMBER 11, 2024; 2:11 P.M. 3 - - - 4 MARK ALLEN, PH.D., 5 having been sworn/affirmed, 6 was examined and testified as follows: 7 8 EXAMINATION 9 BY MR. CORBETT: 10 Q. Good afternoon, Dr. Allen. Good to see you 11 again. 12 A. Yes. Thank you. 13 Q. I know you've been deposed before, but I'll 14 go through a couple ground rules just to make sure 15 we're on the same page. 16 I'll be asking you a series of questions, and 17 if there's a question that I ask that doesn't make any 18 sense -- it will probably happen at some point 19 today -- I'd just ask for you to ask for 20 clarification. 21 Is that fair? 22 A. Yes. 23 Q. Okay. If I ask a question and you don't ask 24 for clarification, I'll assume that you understood the 25 question.

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1 Is that fair? 2 A. Sure. 3 Q. The court reporter will be taking -- taking 4 down the testimony and the questions today. So please 5 remember to give verbal answers. She can't record 6 nods of the head. 7 Is there any reason you can't give accurate 8 and complete testimony? Are you taking any 9 medications, for example, that might impair your 10 ability to -- to testify today? 11 A. No. 12 Q. I'll try to take breaks about every hour, but 13 if you need a break before then, just let me know. 14 I'm happy to take it. I'd just ask that if there's a 15 pending question, that we complete the answer to that 16 question before we break. 17 A. Okay. 18 Q. What did you do to prepare for today's 19 deposition? 20 MR. ZUCKER: Mark, I'll just caution you not 21 to reveal the substance of any communications with 22 your counsel. 23 THE WITNESS: So I reviewed my declaration 24 that I submitted on this '654 patent. I spent some 25 time yesterday with counsel, sort of going through it	1 THE WITNESS: Yes, I see it. 2 MR. CORBETT: I'm trying to get it to appear 3 on my end. I apologize. My Exhibit Share is acting 4 up here. 5 (Pause.) 6 BY MR. CORBETT: 7 Q. Exhibit 1 here, that's the '654 patent you 8 reviewed in connection with this IPR; correct? 9 A. Yes. 10 MR. CORBETT: Let me mark another exhibit, if 11 it will let me. Actually, let's go off the record for 12 a minute. I'm having a technical issue here on my 13 end. 14 (A recess was taken from 2:17 p.m. 15 to 2:20 p.m.) 16 MR. CORBETT: Okay. Apologies for the 17 technical issue there, Dr. Allen. 18 In the Marked Exhibits folder you should see 19 a few additional exhibits. Exhibit 1002, that's 20 the -- or sorry. Exhibit 2 is Exhibit 1002 in the 21 IPR, which is the file history of the '654 patent. 22 (Deposition Exhibit 2 was marked for 23 identification.) 24 BY MR. CORBETT: 25 Q. Did you review the file history in preparing
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1 to get it loaded back sort of into the front of my 2 mind. And then I looked over it just a little bit 3 this morning before we got started. 4 BY MR. CORBETT: 5 Q. Did you talk to anyone, other than your 6 counsel, in preparation for today's deposition? 7 A. No. 8 Q. Other than documents that your counsel had 9 you review, did you review any documents on your own 10 in preparation for today? 11 A. I don't think so. This happened some time 12 ago. I'm 99 percent sure the answer is no. 13 Q. And what is your current employer? 14 A. I'm a professor and chair of the electrical 15 and systems engineering department at the University 16 of Pennsylvania. 17 Q. About how long have you been in that role? 18 A. So I've been at the university for 11 years, 19 and I've been in the department chair role for a 20 little less than a year. 21 MR. CORBETT: If you look in the Marked 22 Exhibits folder, there should be Exhibit 1000 -- or 23 I'm sorry. 0001. 24 (Deposition Exhibit 1 was marked for 25 identification.)	1 your opinion? 2 A. Yes, I did look at it. 3 MR. CORBETT: Okay. And Exhibit 3 is 4 Exhibit 1003 from the IPR. 5 (Deposition Exhibit 3 was marked for 6 identification.) 7 BY MR. CORBETT: 8 Q. That's your declaration that you submitted in 9 this IPR; correct? 10 A. Yes, that's correct. 11 (Deposition Exhibit 4 was marked for 12 identification.) 13 BY MR. CORBETT: 14 Q. And Exhibit 4, that's your CV that was 15 attached to your declaration; correct? 16 A. Yes, that is correct. 17 Q. Okay. In your -- if you could go to your 18 declaration, Exhibit 3. 19 (Pause.) 20 BY MR. CORBETT: 21 Q. On Page 11 of your declaration, Exhibit 3, 22 there's a "Summary of Opinions" section. 23 Do you see that? 24 A. I do. 25 Q. Okay. So it's your opinion that Odachi

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1 anticipates Claims 13 and 15 of the '654 patent; 2 correct? 3 A. That it teaches them, yes. 4 Q. Okay. So when you say, "teaches," is it your 5 opinion that the Claims 13 and 15 are anticipated by 6 Odachi? 7 A. So what I mean by that is that Odachi has all 8 the elements -- describes all the elements in 9 Claims 13 and 15. 10 Q. Okay. So you're not relying on obviousness 11 for Odachi to render invalid Claims 13 and 15; 12 correct? 13 MR. ZUCKER: Objection. Form. 14 Mischaracterizes the document. 15 THE WITNESS: I believe that there is a 16 section -- I'd have to find it. I believe there's a 17 section in my report where I talk about even if one 18 were to not agree that Odachi teaches Claims 13 and 15 19 all by itself, a POSA would have understood it. I'd 20 have to find the exact section. 21 BY MR. CORBETT: 22 Q. Okay. In Page 11 of your Exhibit 3, your 23 declaration, Item 1b, it says that "Odachi in 24 combination with Wang renders obvious Claims 1, 7 and 25 18."	1 MR. CORBETT: I'm waiting for it to load on 2 my end here. 3 (Pause.) 4 BY MR. CORBETT: 5 Q. If you can go back to your declaration and 6 flip to Page 44 of your declaration, and let me know 7 when you're there. 8 A. Yes, I have it. 9 Q. Okay. And this is the part of your 10 declaration where you explain your opinion that Odachi 11 discloses all the elements of Claims 13 and 15; 12 correct? 13 A. Right. 14 Q. Okay. At the bottom of Page 44, that's 15 the -- you address the first claim element other than 16 the preamble of Claim 13, and that is "guiding a 17 receiving antenna of a vehicle to a first alignment 18 position relative to a transmitting antenna." 19 Do you see that? 20 A. Yes. 21 Q. Okay. And what is your opinion on how Odachi 22 discloses that first element? 23 MR. ZUCKER: Objection. Form. 24 THE WITNESS: So I do describe that in 25 subsequent paragraphs in the report. The vehicle is
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1 Do you see that? 2 A. I do. 3 Q. Okay. And then the third ground is -- it's 4 your opinion that "Odachi, in combination with Wang 5 and Partovi, render obvious claims 4" and "6"; 6 correct? 7 A. 4 through 6, yes. 8 Q. I'm sorry. 4 through 6, yes. Thank you. 9 And then the last ground of invalidity in 10 your opinion is "Ross, in combination with Wang, 11 renders obvious claims 8 through 10, 12 to 14, 16, and 12 19"; correct? 13 A. Ross in combination with Wang renders it 14 obvious, yes. 15 MR. CORBETT: Okay. If you could open 16 Exhibit 5, which is Exhibit 1005 from the IPR, that's 17 the Odachi reference. 18 (Deposition Exhibit 5 was marked for 19 identification.) 20 MR. CORBETT: Let me know when you have that 21 open. 22 THE WITNESS: Yes. It's open. I'm sorry. I 23 have the wrong thing. Let me try again. 24 (Pause.) 25 THE WITNESS: Yes. Now it is open.	1 positioned by means of blocks that are used to guide 2 the tires, and since the receiving antenna is on the 3 vehicle, the receiving antenna is also positioned that 4 way. 5 BY MR. CORBETT: 6 Q. Okay. So the -- in the claim, there's a 7 first alignment position that's recited. 8 Is it your opinion that the receiving antenna 9 is in the first alignment position when the -- the 10 car's wheels come into contact with the stops that 11 are -- I think it's Reference No. 130 there on 12 Page 45? 13 A. I think the first alignment position would be 14 when the car wheels are aligned to the stops and the 15 transmitting antenna has come out of its box, which I 16 think I label as 230 in Paragraph 104. 17 Q. Okay. So the first -- in the claim, the 18 first alignment position is describing the position of 19 the receiving antenna; correct? 20 A. Right. So the position of the receiving 21 antenna is determined when the car is lined up with 22 the blocks. The relative position between the 23 receiving antenna and the transmit antenna is defined 24 when the transmit antenna is positioned. 25 Q. If you turn to Page 48, there's a

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1 Paragraph 108. Towards the end of that Paragraph 108 2 you reference an "operative home position." 3 Do you see that? 4 A. I do. 5 Q. Is that describing that initial position of 6 the transmitting antenna? 7 A. So the operative home position of the 8 transmit antenna is when it has swung out of its 9 enclosure, I guess we could say. 10 Q. Okay. If you turn another page to Page 50, 11 there's a picture of Figure 14 from Odachi. 12 Do you see that? 13 A. I do. 14 Q. Okay. And the -- there's a Step S105 that's 15 labeled "Pre-charging operation." 16 Do you see that? 17 A. I do. 18 Q. What's your opinion as to what's occurring in 19 that step S105? 20 MR. ZUCKER: Objection. Form. 21 THE WITNESS: So I describe in my report, in 22 Paragraph 114, what's happening during that step. So 23 there's -- as part of those operations, we open the 24 door of the chargers and the positioning mode signal 25 swing out the support arm to its operative home	1 the -- kind of the left to right direction of the arm 2 43d; correct? 3 A. I believe so. It would be the convention to 4 call X equals zero the starting position. 5 Q. Okay. So at the left side of the X axis in 6 Figure 4 there on Page 53 of your declaration, that's 7 the -- that is the -- what you call the "operative 8 home position"; is that right? 9 A. I believe that is correct. 10 Q. Okay. So as the -- as the arm 43d moves 11 leftward, I guess it's a little bit backwards in this 12 figure. You're moving to the right in Figure 4, the 13 IRMS stays constant for a bit and then starts to drop; 14 correct? 15 A. Yes. That's what Figure 4 shows. 16 Q. Okay. And then what is designated by the -- 17 on the Y axis there, I subzero? 18 A. So I believe I subzero is a threshold current 19 that you can set. I think Odachi refers to it as a 20 predetermined reference value, and below that on 21 current you're starting to enter the regime of better 22 coupling. 23 Q. Okay. And then there's a -- there's a label 24 here on Figure 4 X1, X Sub 1 that corresponds to the 25 X position at which IRMS crosses I subzero; correct?
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1 position. 2 BY MR. CORBETT: 3 Q. Okay. And then in Step S106 the support arm, 4 which is reference 43d, there's a picture of -- from 5 Odachi back on Page 46 of your declaration. 6 In Step S106, the arm 43d begins moving from 7 right to left; is that right? 8 A. Or leftward, yes. 9 Q. Okay. Leftward, right. And the support arm 10 43d has the transmitting antenna attached to it; is 11 that right? 12 A. Yes. 13 Q. Okay. On Page 53 of your declaration, 14 there's a picture of Figure 4 from Odachi. 15 Do you see that? 16 A. I do. 17 Q. Okay. And there's a graph that's shown in 18 Figure 4, and on the Y axis is something called 19 "IRMS," and on the X axis is -- it's just labeled "X." 20 Is it your understanding that IRMS is the current that 21 is in the transmitting antenna? 22 A. Yes. That is a way that you can determine 23 how much the transmit antenna is being loaded as a 24 function of position. 25 Q. Okay. And then along the X axis, that is	1 A. Yes. 2 Q. Okay. And then when the IRMS reaches its low 3 point, there's a label called "XA." 4 Do you see that? 5 A. I do. 6 Q. Is it your understanding that XA is the 7 position at which the coupling is at its -- let me 8 start over. 9 Is it your opinion that the XA position, that 10 the coupling between the transmitting antenna and the 11 receiving antenna is its strongest? 12 A. As long as the system is operating as 13 designed, yes, that should be what happens. 14 Q. Okay. In a real world perspective, that 15 means the two -- the two coils are aligned, one on top 16 of the other; is that right? 17 A. They're aligned as best as they can be. 18 Q. Okay. And then as the arm continues, the 19 IRMS continues to increase until you hit a position X2 20 at which the IRMS crosses back over I subzero; 21 correct? 22 A. Correct. 23 Q. In Figure 4, towards the bottom there's a 24 second graph, just above where X1 and XA and X2 are, 25 there's two H's and an L.

Page 18 1 Do you understand what those are 2 representing? 3 A. So my understanding is that that distance 4 between the two H's or the distance between X1 and X2 5 is the region of -- where the coils are entering 6 better alignment, and I think H -- if I remember 7 correctly, H is the high value of IRMS when you were 8 just entering that region, and L is the minimum value. 9 Q. Okay. And the L value indicates the maximum 10 coupling; correct? 11 A. Yes. 12 Q. Okay. If you turn the page -- I guess it's 13 two pages, to Page 55, there's a Figure 5, and it 14 looks sort of inversion -- inverted version of 15 Figure 4 and it's -- it has VRMS on the Y axis. 16 Do you see that? 17 A. I do, yes. 18 Q. And is it your understanding that VRMS is the 19 voltage and the receiving antenna? 20 A. Yes. VRMS is the voltage that's induced in 21 the receiving antenna during this positioning 22 activity. 23 Q. Okay. And just like in Figure 4, does XA in 24 Figure 5 represent the X position at which coupling is 25 the strongest?	Page 20 1 determined. 2 Can you provide an example of how that -- 3 what you had in mind? 4 A. So one example would be if, for example, the 5 motor that's moving the arm -- let me go back and see 6 what that is labeled. The motor that's moving 43d in 7 Figure 11 is a stepper motor, and so the controller 8 could count the steps as the motor moves along the X 9 axis and then find it knows the step at the two edge 10 positions, low points if it's IRMS or the high points 11 of VRMS, and then it does a calculation which step is 12 in between those two steps and then moves the device 13 to that point. 14 Q. Are you aware of any ways in which XA could 15 be determined -- let me strike that. 16 Does Odachi disclose any ways in which XA 17 could be determined without using X1 and X2? 18 MR. ZUCKER: Objection. Form. 19 THE WITNESS: I guess I don't know if there 20 are other sections of Odachi where that is discussed. 21 So I don't know. 22 BY MR. CORBETT: 23 Q. In finding this XA position, is the value of 24 VRMS at the operative home position used? 25 MR. ZUCKER: Objection. Form.
Page 19 1 A. Yes. Assuming all is working well, yes. 2 Q. Okay. Odachi explains two ways of 3 determining this XA position; is that right? 4 MR. ZUCKER: Objection. Form. Foundation. 5 THE WITNESS: So I'm aware of at least two 6 ways, the two ways we discussed. One is measuring the 7 current in the transmit coil. The other is measuring 8 the voltage in a receive coil. 9 BY MR. CORBETT: 10 Q. Okay. If you look at Paragraph 121 of your 11 declaration, it says, "After X1 and X2 are determined 12 (regardless of whether by measuring IRMS or VRMS) 13 Odachi's controller calculates the midpoint between X1 14 and X2." 15 Do you see that? 16 A. I do. 17 Q. Do you understand how Odachi's controller 18 calculates that midpoint? 19 A. So I can think of many different ways that 20 one could implement that calculation. I do not know 21 which Odachi may have implemented. 22 Q. Okay. So in calculating -- actually, let me 23 strike that and start over. 24 You mentioned that you could -- you could 25 envision a couple ways how the position XA is	Page 21 1 THE WITNESS: So I think that we always need 2 to start from somewhere, and so we start with a 3 measurement of VRMS from the operative home position 4 and then track how it changes as the arm moves. 5 BY MR. CORBETT: 6 Q. Okay. And so going back to Page 55 of your 7 declaration, the VRMS at the operative home position, 8 it's shown as zero here in Figure 5; is that right? 9 A. So Figure 5 shows it as zero. I would 10 imagine that what it actually would be would depend on 11 the details of the implementation of how the parking 12 spot and the charger were implemented. 13 Q. Okay. And in the -- in Paragraph 121 of your 14 declaration, you talk about how Odachi uses X1 and X2 15 and determines the midpoint of X1 and X2; is that 16 correct? 17 A. That -- it does that, yes. 18 Q. Okay. Is the -- is the VRMS value at the 19 operative home position used in that process of 20 calculating the mid-point between X1 and X2? 21 MR. ZUCKER: Objection. Form. 22 THE WITNESS: So I think the value of VRMS at 23 the home position is necessary in order to determine 24 the starting position of where you are starting to 25 search.

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1 If you had a -- and so it's necessary. If 2 you had a situation, for example, where a particular 3 car had its coil nearer to the operative home 4 position, then yes, you would need to know it. If you 5 had a car where it was further, then it might be less 6 necessary. 7 BY MR. CORBETT: 8 Q. And I want to make sure I understood your 9 last answer there. 10 So you said when a particular car has its 11 coil nearer to the operative home position, then yes, 12 you would need to know it. I may be misparaphrasing 13 there. I'm not trying to put words in your mouth. 14 I'm just trying to understand. 15 What did you mean by where the coil is nearer 16 to the operative home position you would need to know 17 the VRMS value at that point? 18 A. So, for example, suppose that -- if I were to 19 go back to Figure 5 of Odachi, suppose that X equals 20 zero for that particular make or model of car that has 21 the coil in its position, that X equals zero were 22 within the boundary of X1 and X2, then you might need 23 to know it. 24 Q. Okay. I guess going to a slightly different 25 example, if the operative home position is -- as is	1 And so you still need some measurement of 2 what's happening from the operative home position so 3 you have a starting place so that you can compare 4 where you are relative to V zero, or in case of IRMS, 5 I zero. 6 Q. So after XA is determined, the arm is moved 7 to that XA position; correct? 8 A. Yes. 9 Q. Okay. And then is it your understanding that 10 a similar process is repeated in the Y axis? I think 11 it's Paragraph 123 of your -- 12 A. Paragraph 123, yes. 13 Q. So once the X and Y positions are determined, 14 what happens next in Odachi before charging occurs? 15 A. So our goal is to get maximum coupling 16 between the coils. So at this point, there's a Z 17 motor that can move the coil upwards along the Z axis. 18 Q. Okay. And does moving the primary coil 19 closer to the receiving coil improve the coupling 20 between the two coils? 21 A. It should, yes. 22 Q. Okay. And if you go to Exhibit 5 in -- 23 that's the Odachi reference and you scroll to 24 Figure 12 of the Odachi reference -- let me know when 25 you're there.
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1 shown in Figure 5, it's all the way to the left of the 2 X axis; is that right? 3 A. I believe the operative home position is X 4 equals zero, yes, all the way to the left. 5 Q. In Figure 5? 6 A. In Figure 5. 7 Q. Okay. So then as you move the arm, X1 is 8 determined when VRMS increases to the point where it's 9 equal to V not; correct? 10 A. Yes. 11 Q. And to determine that X1 position, is the 12 VRMS value at the operative home position used at all? 13 MR. ZUCKER: Objection. Form. 14 THE WITNESS: So in the specific case where V 15 zero is set significantly higher than VRMS measured at 16 X equals zero, you still need a place to start, but 17 it's less necessary. 18 BY MR. CORBETT: 19 Q. What do you mean when you say, "you still 20 need a place to start"? 21 A. Well, it's unlikely that VRMS would truly be 22 identically zero. In order for it to truly be 23 identically zero, you would have to be -- well, I 24 won't say infinitely, but you'd have to be much 25 further than a parking space away.	1 A. Yes, I see it. 2 Q. Okay. So in Figure 12, the component shown 3 as No. 3 here, that's the -- I guess 3 and 4 combine 4 to make up the secondary coil or the receiving coil 5 that's on the vehicle; correct? 6 MR. ZUCKER: Objection. Form. 7 THE WITNESS: I'm just verifying the 8 description of Figure 12. I believe that is correct, 9 but I just want to make sure. 10 (The witness reviewed material.) 11 THE WITNESS: So what's labeled as 230 is the 12 primary inductive coupler. So based on that, the -- 13 you asked about 3 and 4; is that right? 14 BY MR. CORBETT: 15 Q. That's right. 16 A. Yeah. So 3, I think, is the secondary coil. 17 Q. And that's the one on the vehicle; right? 18 A. Yeah. 19 Q. Okay. You mentioned element 230 that's shown 20 here in Figure 12, and there's two subcomponents that 21 make up 230, 31 and 32. 22 Do you see those? 23 A. I do. 24 Q. Okay. What are 31 and 32? 25 A. So, again, I will refer back to Odachi. 31

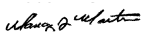
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1 is a core which is -- which has sort of a shape of the 2 letter E that goes kind of into the page, and 32 is a 3 coil that's wound around the center projection of the 4 E. 5 Q. Okay. And sticking with Figure 12 there, 6 No. 3 -- the component that's labeled No. 3, is that 7 the core of the secondary coil? 8 MR. ZUCKER: Objection. Form. Foundation. 9 THE WITNESS: So it's a little hard to see 10 what 3 is pointing to. It looks like it's pointing to 11 the coil. 12 (Indiscernible crosstalk.) 13 THE WITNESS: As I look at -- go ahead. I'm 14 sorry. 15 BY MR. CORBETT: 16 Q. When you say, "the coil," I was just going to 17 ask you to clarify what you're referring to. 18 A. The secondary coil, the receive coil. 19 Q. If you look at Column 9 of Odachi, it starts 20 around Line 47, 48, it references "secondary core 3" 21 and a "secondary coil 4." 22 Do you see that? 23 A. I do. But I can't tell -- until I believe 24 that's what Odachi means, it's a little hard to tell 25 if the -- what the 3 is pointing to in Figure 12.	1 Q. If you flip to Figure 1, there's a different 2 view, and it also uses Reference Nos. 3 and 4. Does 3 that help you at all differentiate between the two? 4 A. So in this Figure 1 -- I'm squinting at it, 5 sorry. It looks like 4 is the counterpart of what's 6 in -- is the counterpart of 32 in Figure 12 is the 7 conductor, and 3 is the counterpart of 31, which is 8 the core. And that's how I would expect such a device 9 to operate. 10 Q. Okay. 11 A. It's just that 4 in Figure 12 is pointing to 12 the entire upper element. It's not pointing to where 13 I would expect the conductor to be. 14 Q. Right. So going back to Figure 12, is it 15 your understanding there's basically two components, 16 there's this flat piece that the length of which is 17 designated as L1. 18 Would you agree with that? 19 A. Yes. Absolutely. 20 Q. Okay. So is that piece that has a length of 21 L1, is that the core 3, secondary core 3? 22 A. That should be the core. 23 Q. Okay. And then there's a second component 24 that, for lack of a better word, kind of looks like a 25 skinny tube sort of that kind of wraps around the
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1 That was my confusion. 2 Q. Okay. So in view of what's described here in 3 Column 9, where it calls the "secondary core 3" and 4 the "secondary coil 4," in Figure 12, can you 5 differentiate between which one's the core and which 6 one is the coil on the secondary side? 7 A. So I think calling the secondary -- so coil 8 may be -- and this is the confusion. I think it's 9 being used in two different ways here. One is the 10 electrical conductor that is used as part of the 11 receive element, and the other is the receive element 12 itself. 13 And I think that when Odachi is referring to 14 4 as the secondary coil, it looks to me like he's 15 talking about the entire receive element. 16 Does that make sense? 17 Q. Well, what do you mean when you say, "the 18 entire receive element"? 19 A. So much like the primary element has a core 20 and a coil, the secondary receive element must also 21 have a core and a coil. 22 In the primary element, the core and the coil 23 are pointed out separately as elements 31 and 32. 24 That same sort of separate identification doesn't seem 25 to be in the receive element.	1 core. I'm probably not doing a great job describing 2 that verbally, but is that the secondary coil? 3 A. That's what I would expect to be the 4 conducting part of the secondary receive element. We 5 can call it "the secondary coil." 6 Q. Got it. Got it. Okay. 7 So it seems like maybe the arrow on 4 and the 8 line on No. 3 are not drawn as precise as they could 9 be. Okay. 10 So once the -- once the primary coil and the 11 secondary coil are lined up in the X and Y direction, 12 there's this Z axis motor that lifts the primary core 13 and coil upwards; correct? 14 A. Yes. 15 Q. Okay. And is it your opinion that the 16 primary core is raised up until it comes into contact 17 with the secondary core? 18 MR. ZUCKER: Objection. Form. 19 THE WITNESS: So I think that's one way to do 20 it, and it might be a very good way to do it. I seem 21 to recall Odachi also saying that you don't have to 22 bring them in contact, and I could much imagine if you 23 had some receptacle that was slightly geometrically 24 different or what have you on your car, it would be 25 good to have this operate without them needing to be

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1 in contact. 2 But certainly the closer they are, assuming 3 all other geometries are similar, the greater the 4 couplings should be. 5 BY MR. CORBETT: 6 Q. Going back to that portion of Column 9 that 7 we were talking about a moment ago, it's right around 8 Line 48 to 50, it says, "After this alignment position 9 is attained, the elevator 42d is moved upward until 10 the primary core 31 is brought into contact with the 11 secondary core 3 and the primary coil 32 placed within 12 the cavity 4a defined by the secondary coil 4." 13 Do you see that? 14 A. I recall it. Could you point me again to 15 where we are in the Odachi patent? 16 Q. Sure. Column 9, line -- starts in Line 47. 17 A. Yes, I see it now. Thank you. 18 Q. So do you understand that to mean that the 19 primary core is contacting the secondary core? 20 MR. ZUCKER: Objection. Form. 21 THE WITNESS: In this particular description 22 it says that it is indeed brought into contact. The 23 primary core is brought into contact with the 24 secondary core. 25 BY MR. CORBETT:	1 transfer that power prior to the end of all of the XYZ 2 alignment if you -- if you wanted to do that. 3 Q. But does Odachi actually disclose that the 4 charging occurs at that point while the primary coil 5 is still being moved in the X axis? 6 MR. ZUCKER: Objection. Form. 7 THE WITNESS: So I don't think Odachi is 8 saying that one would want to charge the vehicle while 9 the arm is moving, but I think power is being 10 transferred when the arm is not in the optimal 11 position, and there are a number of reasons why you 12 might want to do that without the arm being in 13 contact. 14 BY MR. CORBETT: 15 Q. What are some of the reasons? 16 A. Well, probably the most obvious one would be 17 to prevent wear between the two elements of the 18 charging system. 19 Q. You said, "prevent wear." Is that because 20 you're starting charging before they come into 21 contact? 22 A. No. I'm imagining that if I have a charging 23 station and it's seeing car after car after car and it 24 has to contact car after car after car, that it 25 will -- that element will get worn down with time,
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1 Q. Okay. And in your declaration, do you point 2 to any disclosure in Odachi that discloses or suggests 3 that the primary coil -- sorry -- primary core does 4 not need to be in contact with the secondary core? 5 A. So certainly during all of the time when the 6 positioning is going on, that is the case, and I think 7 I talk in -- on my declaration in Paragraph 137 8 several places in Odachi where the couplers need only 9 be close to each other. 10 Q. Right. And so you reference there in 11 Paragraph 137, are you referring to the part where you 12 cite to Column 6, Lines 1 through 7 of Odachi? 13 A. I think there are several sites, but that is 14 one of them, yes. 15 Q. Okay. If you flip to that cite, 6, Lines 1 16 through 7, it's talking about a "carriage 9 being 17 moved rightward." 18 What is that carriage 9 referring to? 19 A. So if I look at Figure 1 of Odachi, the 20 carriage 9 is moving the transmit antenna in the X 21 direction. 22 Q. And while it's moving that transmit antenna 23 in the X direction, charging of the secondary coil has 24 not yet begun; is that right? 25 A. Power is being transferred. You could	1 whereas if it's not in contact, it won't. 2 Q. Okay. Going back to Paragraph 137 of your 3 declaration where we were talking about examples from 4 Odachi where the couplers need only be close to each 5 other and not in contact, you cite to Column 4, 6 Lines 41 through 47 of Odachi. 7 Do you see that? 8 A. I do. 9 Q. Okay. If we could go to Column 4 of Odachi, 10 Line 41, and you quote in your Paragraph 137 parts of 11 this section of Column 4 where he says, "In such a 12 position of the primary inductive coupler and the 13 secondary inductive receptacle, an electric current 14 flows in the primary coil to induce a secondary 15 current in the secondary coil 2." 16 Do you see that in Column 4? 17 A. I'm sorry. I was looking at the report. 18 Q. I'm sorry. Yeah, I was reading from 19 Column 4, Lines 41 to 44. 20 A. Yes, I see it. 21 Q. Okay. And just above there in Column 4, it 22 says, "For battery charging" -- I'm around Line 34, 23 the start of that paragraph. 24 A. I see it. 25 Q. Okay. "For battery charging, the movable

Page 34 1 primary inductive device 6, which will be referred to 2 as a primary inductive charge coupler or the like 3 hereinafter, is positioned in abutment relation to the 4 stationary secondary inductive device 2." 5 Is it your understanding that in that example 6 the primary coupler and the secondary inductive device 7 are in physical contact with each other? 8 MR. ZUCKER: Objection. Form. 9 THE WITNESS: So it's a bit murky. 10 "Abutment" would imply very close; right? It could 11 imply contact, but a little bit later in the 12 paragraph, on Line 39 of Column 4, they talk about 13 "substantially in line with each other," implying that 14 they don't have to be exactly in line with each other 15 in order to transfer power. 16 BY MR. CORBETT: 17 Q. Could the -- could the primary coupler and 18 the secondary coupler be in physical abutment or 19 actually touching even if they are not perfectly in 20 line with each other? 21 A. I could imagine a scenario where that could 22 be true. I could also imagine one where I want to 23 give myself significant "slack" so that I can charge 24 even if I do not get exactly in contact. 25 Q. Okay. Just to go back to that Line 30, I	Page 36 1 And I wanted to get an understanding of when 2 you said, "a gap between them," what you're referring 3 to. 4 A. So if I go back to Paragraph 135, it does 5 not -- or it seems to me that there is a gap between 6 the primary inductive element and the secondary 7 inductive element. I believe my Paragraph 135 is a 8 Figure 12 representation. 9 Q. Right. In your last answer you just said 10 inductive -- "primary inductive element," and I think 11 it was "secondary inductive element." 12 When you say, "inductive element," what 13 specifically are you referring to in Figure 12 here in 14 your -- that's on Page 61 in your declaration? 15 A. So, again, we have to try to point at things, 16 but it would be 31, 32, and other connected things 17 that are not labeled. 18 Q. These "other connected things" you mentioned, 19 are you saying they are shown here in Figure 12? 20 A. There's something on the bottom of what I'll 21 call 31. I'm assuming that that could be the portion 22 of the support for 31. So the primary -- if that's 23 true, then the primary inductive element would be 31 24 and 32. 25 Q. Okay. And the secondary inductive element
Page 35 1 think it's -6 onto -7 where it says it's positioned -- 2 "the primary inductive charge coupler is positioned in 3 abutment relation to the stationary secondary 4 Inductive device 2." 5 It's your opinion that that doesn't 6 necessarily mean they're in physical contact; correct? 7 A. So "abutment" to me means that they are 8 either in physical contact or they're very, very 9 close. 10 MR. CORBETT: We've been going for a little 11 bit now. Why don't we take a quick break. 12 MR. ZUCKER: Sounds great. 13 (A recess was taken from 3:20 p.m. 14 to 3:31 p.m.) 15 BY MR. CORBETT: 16 Q. Dr. Allen, before the break we were talking 17 about the primary and secondary cores in Odachi and 18 whether or not they're in abutment when charging 19 occurs, and we had talked about Paragraph 137 of your 20 declaration. 21 If you go to Paragraph 137 of your 22 declaration -- it's actually on to the top of Page 23 63 -- you reference at the first line Figure 12, and 24 in parenthesis it says, "(showing coupled coils with 25 gap between them)."	Page 37 1 would be the combination of 3 and 4; is that right? 2 A. 3 and 4, and I guess 4a. No, 4a is the 3 recess, I think, if I remember correctly. 3 and 4. 4 Q. Okay. 5 A. I think we had that discussion already. 6 Q. Right. And when we were talking about 7 Column 9 earlier -- this was back at Lines 47 to 51 -- 8 it says that the primary core, 31, is brought into 9 contact with the secondary core 3. 10 And so in that example in Odachi, when that 11 happens, is it your understanding that there is a 12 space between the primary coil and the secondary coil? 13 A. So in that example, there would not be a 14 space other than the -- after the elevation occurred, 15 other than the -- any space that would be there 16 because of, say, manufacturing irregularities or what 17 have you. 18 But I believe the intention in that Column 9, 19 Line 45 and following, is to move the primary core 31 20 until it is brought into contact with the secondary 21 core. So the cores, in that example, would touch. 22 Q. Okay. In that example when the cores are 23 touching, the coils would not be touching then; is 24 that right? 25 A. Ideally, that would -- would be what a person

Page 38 1 of ordinary skill would understand, yes. 2 Q. Okay. And in Figure 12 here the -- is it 3 your understanding that the primary coil 32 would fit 4 within that cavity 4a that's within the secondary 5 coil 4? 6 A. Yes. So that they would not -- the coils 7 would not touch. 8 Q. Got it. Okay. 9 In Paragraph 137 of your declaration you also 10 cite to Column 8, Lines 40 to 54 of Odachi, and the 11 quote you have from those lines is "A space is formed 12 between the primary and secondary coils." Is that the 13 space that -- are you referring to the space that we 14 were just talking about there in that example where 15 the cores are touching? 16 MR. ZUCKER: Objection. Form. 17 THE WITNESS: I believe this is a different 18 situation where the coils have -- or the elements have 19 different shape. I believe it says one of the 20 dimensions of the cavity is different than the other. 21 BY MR. CORBETT: 22 Q. If we go to Column 8, Line 40 to 54, it 23 references Figure 12, and it says, "the primary coil 24 32 is formed in an oval shape, but smaller than the 25 cavity 4a of the secondary coil so that the former	Page 40 1 A. No. I was thinking about the width of 2 element 31 being wider to accommodate more error in 3 position. 4 Q. I see. Okay. 5 On Page 59 of your declaration you address 6 the -- your second ground of invalidity here where 7 it's Claims 1, 7, and 18 are Unpatentable Over Odachi 8 and Wang." 9 And is it your opinion that Odachi does not 10 disclose one of the elements of Claim 1? 11 A. So I believe Odachi does not discuss its 12 system as a resonant system. 13 Q. Okay. And you're referring to, on Page 65 of 14 your declaration, Paragraph 141, you quote the -- one 15 of the elements of Claim 1, and where it says, "a 16 transmitting antenna including an inductive element 17 and a capacitor, said transmitting antenna being 18 resonant at a first frequency." 19 Is that what you're referring to as Odachi 20 not disclosing that capacitor? 21 A. Yes. 22 Q. Okay. And so you're relying on Wang for 23 disclosing the capacitor being coupled with the 24 inductive element to create a resonant circuit; is 25 that right?
Page 39 1 coil may be accommodated within the cavity." 2 So is this example talking about the same 3 example we were talking about earlier where the cores 4 are brought into contact but there is still a space 5 between the coils? 6 MR. ZUCKER: Objection. Form. Foundation. 7 THE WITNESS: So I read this as the -- a way 8 to give some slack to the positioning circuit so that 9 it would not have to be in perfect alignment and 10 perfect contact. But it could also be read the way 11 that he described it. 12 For example, if there are no width dimensions 13 labeled in Figure 12, but if the width of the primary 14 coil were substantially larger than the width of the 15 secondary coil to give you more room to adjust the 16 position, then when you move the Z axis up, there 17 would be a gap between the -- a gap between the cores, 18 in addition to a gap between the coils. 19 So I was trying to think about both of those 20 cases. 21 BY MR. CORBETT: 22 Q. Okay. And in that example that you just 23 gave, that's if the width of the primary coil 32 is 24 wide enough where it would -- are you saying it's wide 25 enough where it would contact the secondary coil 4?	Page 41 1 A. Right. Wang teaches all about resonant 2 coupling. 3 Q. Okay. What is the -- what does Wang say is 4 the purpose of resonant coupling? 5 MR. ZUCKER: Objection. Form. 6 THE WITNESS: So Wang is a very long 7 document, but in short, it says that using resonants 8 can enhance the transfer of power from a primary to a 9 secondary element. 10 BY MR. CORBETT: 11 Q. If you -- 12 MR. CORBETT: Actually, let me go ahead and 13 introduce Wang here. 14 (Deposition Exhibit 6 was marked for 15 identification.) 16 BY MR. CORBETT: 17 Q. Okay. You're able to see it, Dr. Allen? 18 A. I am. 19 Q. On Page 1 of the Wang reference -- it's 20 Page 1, but you got to flip a number of pages to get 21 to it. It starts on Chapter 1. If you could let me 22 know when you're there. 23 A. Yes. I'm on Page 1. 24 Q. Okay. And it references -- there's an 25 acronym there at the very beginning -- "(ICPT)," and

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1 it says in the first line that stands for inductively 2 coupled power transfer systems that utilize 3 electromagnetic fields to transfer electric power from 4 a stationary primary source to one or more movable 5 secondary loads without contact. 6 Do you see that? 7 A. I do. 8 Q. What is that referring to, where it says, 9 "without contact"? What's your opinion? 10 MR. ZUCKER: Objection. Form. 11 THE WITNESS: So the "contact" would refer to 12 between the stationary primary source and the one or 13 more movable secondary loads in this context. 14 BY MR. CORBETT: 15 Q. In your declaration, do you point to any 16 instances in Wang where Wang discusses ICPT systems in 17 which the primary source and the secondary source are 18 in contact? 19 MR. ZUCKER: Objection. Form. 20 THE WITNESS: I cannot think of any off the 21 top of my head. I can think of a real world example. 22 If I lay my iPhone on top of a wireless inductive 23 charger, those are in contact. 24 BY MR. CORBETT: 25 Q. Would the use of a capacitor provide the same	1 Do you mean directly plugged into each other? 2 BY MR. CORBETT: 3 Q. Well, no, not plugged into each other. What 4 I mean is there's an air gap. They're not physically 5 touching. 6 A. Okay. I think I -- I think I understand your 7 question. 8 So if I have two coils that are close to each 9 other, not physically touching, would making them 10 resonant by adding a capacitor improve, say, the 11 efficiency of that power transfer. Is that your 12 question? 13 Q. Correct. Yes. 14 MR. ZUCKER: Object to form. 15 Sorry. Go ahead, Mark. 16 (Discussion held off the record.) 17 MR. CORBETT: Okay. Let's start over. 18 Q. So if you've got two coils that are not in 19 contact, how does making them resonant by adding a 20 capacitor improve coupling? 21 A. So "coupling" is a very precise term. I'm 22 going to interpret that question as how does it 23 improve transfer of energy from one coil to the other. 24 Is that fair? 25 Q. Yeah. Let's go with that interpretation.
Page 43	Page 45
1 benefits in an example in which the primary and 2 secondary coils were in contact as compared to if they 3 were not in contact? 4 A. I'm not sure I understand your question. 5 Sorry. Please, go ahead. 6 Q. Sure. 7 Maybe I can kind of break it down into 8 smaller steps. 9 So you're relying on Wang for disclosing the 10 use of a capacitor to create a resonant circuit in 11 these inductively coupled power transfer systems; 12 correct? 13 A. Yes. 14 Q. Okay. And I think I already asked you this, 15 but generally speaking, what benefit does adding a 16 capacitor to create a resonant circuit provide in that 17 context? 18 A. It helps improve the transfer of power from 19 the source to the -- to the load. 20 Q. Okay. And does making -- forming a resonant 21 circuit like that, does that create the same benefit 22 if the primary coil and secondary coil are in contact? 23 MR. ZUCKER: Objection. Form. 24 THE WITNESS: So I wonder if you could 25 explain what you mean by the coils "in contact."	1 How does adding a capacitor to make a resonant circuit 2 improve power transfer from one coil to another coil 3 when the coils are not touching? 4 A. So if I have a -- and stop me if this is the 5 wrong direction. But if I have a coil, it presents a 6 certain impedance to a source -- an AC source. That 7 impedance reduces the current that would otherwise 8 flow in that, say, primary circuit. 9 If I can cancel out that impedance with 10 another impedance, then I can increase the flow of 11 current in that primary circuit. So that would be one 12 example. 13 Q. Okay. And how does increasing the current 14 and the primary circuit improve power transfer to the 15 secondary circuit? 16 A. So the magnetic field generated by the 17 primary will depend on the strength of the current 18 flowing through the coils of that primary inductor. 19 Q. And does the benefit by creating a resonant 20 circuit, does that apply equally to a scenario in 21 which the coils are in contact with each other? 22 MR. ZUCKER: Objection. Form. 23 THE WITNESS: Again, I need to ask you is 24 this comparing to the coils being in contact means 25 that the conductors are touching?

Page 46 1 BY MR. CORBETT: 2 Q. Yes. 3 A. So in that case, you have effectively plugged 4 in your secondary to the primary. You've taken a wire 5 and you've shorted them. And so in that case, I'm not 6 sure it's advantageous to have a coil at all. 7 Q. Okay. How about in the example such as in 8 Odachi where the cores are touching but the coils are 9 not touching. What is the benefit of adding a 10 capacitor to form a resonant circuit in that context? 11 MR. ZUCKER: Objection. Form. Foundation. 12 THE WITNESS: So I'd have to think about that 13 a little bit. But in the one implementation of Odachi 14 that we talked about where the cores are touching but 15 the coils are not -- there are others, of course, but 16 in that particular one, I think it depends on the 17 magnetic permeability of the core. 18 I would probably have to sit down and do some 19 calculations to determine how efficacious it would be. 20 BY MR. CORBETT: 21 Q. And when you say, "it would be," you mean to 22 add capacitors to make it resonant; correct? 23 A. Yes. 24 Q. Okay. 25 A. It's hard for me to imagine a scenario where	Page 48 1 C E R T I F I C A T E 2 I do hereby certify that the aforesaid testimony 3 was taken before me, pursuant to notice, at the time 4 and place indicated; that said deponent was by me duly 5 sworn to tell the truth, the whole truth, and nothing 6 but the truth; that the testimony of said deponent was 7 correctly recorded in machine shorthand by me and 8 thereafter transcribed under my supervision with 9 computer-aided transcription; that the deposition is a 10 true and correct record of the testimony given by the 11 witness; and that I am neither of counsel nor kin to 12 any party in said action, nor interested in the 13 outcome thereof. 14 15  Nancy J. Martin, RMR, CSR 16 17 Dated: September 12, 2024 18 19 20 21 (The foregoing certification of this transcript does 22 not apply to any reproduction of the same by any 23 means, unless under the direct control and/or 24 supervision of the certifying shorthand reporter.) 25
Page 47 1 it would hurt, but I would need to sit down and study 2 it. 3 MR. CORBETT: Why don't we take another short 4 break. I'll review my notes, but we might be close to 5 being done. 6 MR. ZUCKER: Sure thing. Want to take 7 10 minutes, come back at 10 after? 8 MR. CORBETT: Yeah. 10 is good. 9 (A recess was taken from 4:02 p.m. 10 to 4:20 p.m.) 11 MR. CORBETT: Dr. Allen, I don't have any 12 more questions for you today. I appreciate your time. 13 THE WITNESS: Thank you. 14 MR. ZUCKER: I've got nothing for Dr. Allen. 15 Thanks so much. 16 (Witness excused.) 17 (Deposition concluded at 4:11 p.m.) 18 19 20 21 22 23 24 25	Page 49 1 David Zucker, Esq. 2 david.zucker@lw.com 3 September 13, 2024 4 RE: Inductev, Inc. v. Witricity Corporation 5 9/11/2024, Mark Allen, PhD , U.S. Patent No. 8,466,654 6 (#6905736) 7 The above-referenced transcript is available for 8 review. 9 Within the applicable timeframe, the witness should 10 read the testimony to verify its accuracy. If there are 11 any changes, the witness should note those with the 12 reason, on the attached Errata Sheet. 13 The witness should sign the Acknowledgment of 14 Deponent and Errata and return to the deposing attorney. 15 Copies should be sent to all counsel, and to Veritext at 16 cs-southeast@veritext.com. 17 Return completed errata within 30 days from 18 receipt of testimony. 19 If the witness fails to do so within the time 20 allotted, the transcript may be used as if signed. 21 22 Yours, 23 Veritext Legal Solutions 24 25