UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION)	
Petitioner,)	Case Nos. IPR2023-00634
v.)	U.S. Patent 10,627,783
APPLE INC.,)	
Patent Owner.)	
)	

DEPOSITION OF R. JAMES DUCKWORTH, Ph.D.

June 4, 2024

10:00 a.m.

Reported by: Eileen Mulvenna, CSR/RMR/CRR

DIGITAL EVIDENCE GROUP

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APPLE 2043
Masimo v. Apple
IPR2023-00734

1 REMOTE VIDEOTAPED DEPOSITION of
2 R. JAMES DUCKWORTH, Ph.D., Declarant for Patent
3 Owner in the above-titled action, held on Wednesday,
4 June 4, 2024, commencing at approximately 9:56 a.m.,
5 before Eileen Mulvenna, CSR/RMR/CRR, Certified Shorthand
6 Reporter, Registered Merit Reporter, Certified
7 Realtime Reporter, and Notary Public of the State of
8 New York.
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A P P E A R A N C E S:

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Also Present:
Billy Fahnert, Video/document technician

I N D E X

WITNESS	EXAMINATION BY	PAGE
DR. R. JAMES DUCKWORTH		
	MR. JHURANI	7

E X H I B I T S

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THE VIDEOGRAPHER: We are on the record.

This is the remote video deposition of Dr. James Duckworth in the matter of Masimo Corporation versus Apple, Inc., filed in the United States Patent and Trademark Office.

My name is Billy Fahnert. I am the video technician today. The court reporter is Eileen Mulvenna. We both represent Digital Evidence Group.

Today's date is June 4, 2024. The time is 9:56 a.m. Eastern Standard Time.

All parties have stipulated to the witnesses being sworn in remotely.

Will counsel please identify yourselves for the record, and then the witness will be sworn in.

MR. JHURANI: Sure. This is Karan Jhurani with Fish & Richardson and appearing on behalf of patent owner Apple Incorporated.

MR. EVERTON: Ben Everton from Knobbe Martens on behalf of Masimo Corporation,

1 petitioner in this case. With me I have my
2 colleague Philip Nelson.
3 * * *
4 Whereupon,
5 R. JAMES DUCKWORTH, Ph.D.,
6 a witness called for examination, having been
7 first duly sworn, was examined and testified as
8 follows:
9 * * *
10 EXAMINATION
11 BY MR. JHURANI:
12 Q. Sir, could you please state your name
13 for the record.
14 A. Reginald James Duckworth.
15 Q. Thank you.
16 Sir, I'm going to go over some ground
17 rules, but you've done this before, so it should be
18 quick.
19 You understand that you're testifying
20 under oath today; correct?
21 A. Yes.
22 Q. You understand that in today's

deposition, I'm going to ask you a series of questions?

A. Yes.

Q. If you don't understand a question, will you please let me know?

A. Yes.

Q. And if you answer the question, is it fair for me to accept that you understood the question I posed?

A. Yes.

Q. You understand that you're to give truthful, complete and accurate testimony today; correct?

A. Yes.

Q. Is there any reason, medical or otherwise, you can't give truthful, complete and accurate testimony today?

A. Nope.

Q. All right. Sir, did you prepare for today's deposition?

A. Yes.

Q. What did you do to prepare?

A. I read my supplemental declarations and the -- and the associated exhibits.

Q. And these are the supplemental declarations for the '491 and '783 patents; correct?

A. Yes, that's correct.

Q. Did you have any discussions in preparation for today's deposition?

A. I discussed my declarations with counsel for Masimo.

Q. Which counsel in particular?

A. Ben and Philip, the counselors that are on this call, and a couple of other attorneys with Masimo.

Q. Did you review anything other than your declarations and the exhibits that you cited in those supplemental declarations?

A. No.

Q. Do you have any of those materials with you today?

A. Yes. Masimo printed clean copies for me, so I have copies of my declarations here.

Q. Okay. Do you have any markings on

1 those documents?
2 A. No. These are clean -- clean, new
3 copies.
4 Q. Do you plan to use these documents
5 today?
6 A. Yes. I prefer reading from paper
7 copies. Just easier to find material.
8 Q. Sure. That's fine, sir. All I'll ask
9 is if you're referring to a material in response to
10 a question that I pose, that you identify to me what
11 document you're reviewing. And I might ask you
12 where you are in the document.
13 Is that fair?
14 A. That's fair.
15 Q. All right. Great.
16 MR. JHURANI: Real quick maybe for the
17 court reporter or the videographer, do we
18 have the exhibits that I sent over keyed up
19 that I could call out and we can pull them up
20 if needed?
21 THE VIDEOGRAPHER: Yes, I have the
22 exhibits.

MR. JHURANI: Perfect. Okay.

Let's bring up Depo Exhibit 1, which is Exhibit 2028.

Just for the record, I'll read out that this exhibit is a paper titled, "Effect of Circular Coil Dimensions on Resonant Coupling Wireless Power Transfer System," authored by Mohamad and other authors.

(Exhibit 1, No Bates numbers, Paper entitled, Effect of Circular Coil Dimensions on Resonant Coupling Wireless Power Transfer System, received and marked.)

BY MR. JHURANI:

Q. Sir, do you recognize this exhibit?

A. Yes, I do.

Q. And do you recall reviewing it in preparing your supplemental declarations?

A. Yes, I do.

Q. Let's take a look at the second paragraph under the introduction on this first page. It begins with "Currently." And I'll read the first sentence for the record.

"Currently, most of the wearable electronics are using the power source to operate."

Do you see that, sir?

A. Yes, I do.

Q. What would be examples of wearable electronics?

A. An electronic watch, for example. A device that's attached to the -- to the wearer.

Q. Okay. If we keep reading in this paragraph, the second sentence reads, "The operation requires a physical connection for powering or charging from a power source."

Do you see that sentence?

A. Yes, I do.

Q. Is this sentence referring to wired charging?

MR. EVERTON: Objection to form.

THE WITNESS: I think the paper makes it very clear what it's referring to. The operation requires a physical connection for powering or charging from a power source.

BY MR. JHURANI:

Q. What is your understanding of "physical connection" as used in this sentence, sir?

A. I wouldn't like to say anything more than how it's describing, "The operation requires a physical connection for powering or charging from a power source."

Q. And what does "a physical connection for...charging from a power source" mean to you?

A. I'd like to answer that by saying later in the paragraph, it talks about a "wireless power transfer technology offers an energy transmission of electrical power from a source to a contactless load across an air gap to provide cable and connector-free solutions."

So the way I read this paragraph, this is talking about wireless power transfer does not need a contact -- a physical contact connection between the device and the charger.

Q. Would a power transfer solution that uses a wired connection between the device and the charger require physical connection between the

1 device and the charger?
2 MR. EVERTON: Object to form.
3 THE WITNESS: If you have a wired
4 connection, which is what I believe you're
5 asking -- if you have a wired connection,
6 then you will have a physical electrical
7 contact. You'll have electrical contact in
8 the wire, and you will also have an
9 electrical set of contacts in the device.
10 BY MR. JHURANI:
11 Q. Let's look at that last sentence of
12 the paragraph, which says, "Thus, the wireless power
13 transfer technology offers -- offers an energy
14 transmission of electric power from a source to a
15 contactless load across an air gap to provide cable
16 and connector-free solutions."
17 In the context of this sentence, what
18 would a source be?
19 A. A source is something that would be
20 providing the power. So this would be a dock, for
21 example, that's got a coil. So the source would be
22 the source of the power that's being transferred to

the wearable device.

Q. What would the contactless load be?

A. Well, as it says in that sentence there, "for charging wearable electronics." So the load would be the receive coil in the wearable electronics.

Q. And what is an air gap that's referenced here in this sentence?

A. An air gap is -- is a gap between the source and the load. As opposed to a wide connection where you've got direct contact between the wired cable and the contacts, with wireless charging, you don't have that electrical -- direct electrical connection.

It says the transmission of electrical power from a source to the contactless load is across an air gap. So you have a separation between the -- the source and the load.

Q. So then the power transmission would be from a transmitting coil to a receive coil across the air gap; is that right?

MR. EVERTON: Object to form.

THE WITNESS: Is -- I'm not quite sure now what you're asking me because that's not what the -- that paragraph is saying. So are you asking me a general question now or something else?

BY MR. JHURANI:

Q. Well, I believe you said the source would include a transmitting coil; correct?

A. For wireless power transfer systems, as described, for example, in this paper, you've got -- if we look at Figure 3, for example, of the page, you've got a transmitter coil and you've got a receiver coil. And the title of that figure is "Block diagram of a wireless power transfer."

So that's -- that's what I'm describing. I didn't know whether you were asking me something different to, for example, what's shown in Figure 3 there.

Q. Sure. So let's talk about Figure 3.

Here, the wireless power transfer would be from the -- from the transmit coil to the receive coil; is that right?

A. That's what that diagram is showing, yes.

Q. Let's turn to page 5 of this exhibit. We can bring up the paragraph right before the section headed, "Conclusion."

A. Yes.

Q. Sir, I want to draw your attention to the sentence that reads, "The wireless power transfer rate is affected by the specification of transmitter and receiver coils as well as air gap distance."

Do you see that?

A. I do.

Q. Is the "air gap distance" here again referring to the distance between the coils?

A. So please ask me the question again.

Q. What is your understanding of "air gap distance" as used in this sentence?

A. That's -- my understanding is, as used in that sentence related to this paper, that's the separation of the transmitter coil from the receiver coil.

Q. So the wireless power transfer rate is affected by the separation between the transmitter and receiver coils; right?

A. Well, an example to respond to that is Figure 13 that shows the output power over distance. And you can see as the distance increases from zero centimeters to 10 centimeters, the power that's transmitted there, the output power, decreases.

And I use an example of Figure 13 in my declaration, pointing out that at 1-centimeter distance, for example, you can have about an 8-watt power transfer.

Q. Why is it that the separation between the coils -- strike that.

Why does the increasing distance between coils reduce wireless power transfer rate?

MR. EVERTON: Object to form.

THE WITNESS: Is there something you're referring to in my -- my declarations or is this a general question? Can you point me to my declaration about this?

BY MR. JHURANI:

Q. I'm asking you as an expert in this field, sir.

Why does distance between the coils affect the wireless power transfer rate?

MR. EVERTON: Object to form.

THE WITNESS: So if we look on page 2 under Section III, "inductive coupling charging works by transferring the energy across a gap using an electromagnetic field."

The magnetic flux, the electromagnetic field, spreads out. If you look again at Figure 3, for example, the magnetic flux, when it leaves the transmitter coil there, spreads out. And the farther away you place the receiver coil, the weaker that magnetic flux -- that electromagnetic field will be.

BY MR. JHURANI:

Q. Why is it that the weaker electromagnetic flux -- strike that.

What impact does the magnetic flux have on the wireless power transfer?

A. I'm confused by your question. Can you ask it again, please.

Q. Sure.

You mentioned that the farther away you place the receiver coil, the weaker that magnetic flux will be. So I'm trying to understand what impact a weaker magnetic flux would have on wireless power transfer.

A. I believe I answered that question. The weaker magnetic flux will result in weaker power transfer at the receive coil.

Q. If the coils were closer together, would there be greater magnetic flux between the two?

MR. EVERTON: Object to form.

THE WITNESS: The -- sorry. Please ask the question again.

BY MR. JHURANI:

Q. Sure.

If the transmit and receive coils were closer together, would there be greater magnetic flux between the two?

MR. EVERTON: Same objection.

THE WITNESS: The amount of magnetic flux will be determined by the characteristics of the transmitter coil.

BY MR. JHURANI:

Q. So I believe you testified that the "weaker magnetic flux will result in weaker power transfer at the receive coil."

What would cause -- what would be the outcome of a stronger magnetic flux on the receive coil?

A. So you're asking me a general question here, and it was a little bit involved, that question. Would you mind repeating it, please.

Q. Sure.

You testified that the "weaker magnetic flux will result in weaker power transfer at the receive coil."

I want to understand what would be -- what would happen to power transfer at the receive coil if you have stronger magnetic flux?

A. Again, that was quite a long question.

1 You said I testified about a weaker -- we need to
2 put these statements into -- into context. So I'm
3 confused about what specifically you're asking me
4 about. Because this is, you know, nothing -- this
5 is not statements that I've got in my declaration
6 there. So I'm trying to understand what it is that
7 you're asking and in what context that you're asking
8 this.
9 Q. We're still talking about wireless
10 charging, and I'm asking what would happen to
11 wireless -- strike that.
12 I'm asking about wireless power
13 transfer and the effect on that in the context of a
14 stronger magnetic flux as opposed to weaker flux
15 that you testified about earlier.
16 A. So --
17 MR. EVERTON: Objection to form.
18 THE WITNESS: I'm sorry, Ben.
19 So if you have stronger magnetic flux,
20 a result of a stronger electromagnetic field,
21 then if that is passing through the receive
22 coil, you will have -- if that stronger

1 magnetic flux field is passing through the
2 receive coil, then you will have stronger
3 power transfer.
4 Again, this is a very general --
5 general description that I'm providing. All
6 of the details on exactly the magnitudes
7 would be dependent on a lot of factors that
8 we don't seem to be covering here.
9 BY MR. JHURANI:
10 Q. What other factors are you talking
11 about, sir?
12 A. Well, what size of coil, what -- what
13 dimensions of the coil. A lot of factors. You
14 just -- you're just asking me generally about the
15 magnetic flux.
16 Q. Okay. Any other factors come to mind
17 that might affect wireless power transfer?
18 A. Again, in what context are we talking
19 about here?
20 Q. In the context of wireless power
21 transfer.
22 A. We can refer to -- the Mohamad paper,

for example, that we were looking at shows various coils, different number of turns, different spacing, for example.

Q. Thank you, sir.

MR. JHURANI: Let's bring up Depo Exhibit 2, which is Dr. Duckworth's declaration in the '783 patent.

(Exhibit 2, No Bates numbers, Supplemental Declaration of R. James Duckworth, Ph.D. re U.S. Patent No. 10,627,783, received and marked.)

BY MR. JHURANI:

Q. Sir, do you recognize this exhibit that's being shown here?

A. Yes, I do.

MR. JHURANI: Just for the record, the exhibit is titled, "Supplemental Declaration of R. James Duckworth, Ph.D.," and it's got the patent number listed on the face, 10,627,783.

BY MR. JHURANI:

Q. Let's turn to paragraph 332.

MR. JHURANI: And maybe we can bring that up as well.

THE WITNESS: 332, did you say?

BY MR. JHURANI:

Q. Correct.

Feel free to read that paragraph and I'll have a few questions for you when you're done.

(Document review.)

THE WITNESS: Yes, I've read that paragraph, 332.

BY MR. JHURANI:

Q. Okay. Great.

I'll draw your attention to the sentence somewhere in the middle of the paragraph that begins with, "In fact, Honda itself refers to a continuum of outcomes."

Do you see that?

MR. JHURANI: Maybe we can highlight that, too.

THE WITNESS: Yes, I found that.

BY MR. JHURANI:

Q. All right. What continuum of outcomes

are you referring to here?

A. Let me refer to Honda then that I cite there. So this is Exhibit 1006.

In fact, as the next sentence describes those, "(as [the] gap between coils increases, 'the degree of magnetic coupling weakens')" and "(as the distance between the coils decreases, the 'transmission efficiency increases in accordance with a quadratic curve')."

Q. What are the continuum of outcomes, sir?

MR. EVERTON: Object to form.

THE WITNESS: So "(as [the] gap between [the] coils increases, 'the degree of magnetic coupling weakens')" and "(as the distance between the coils decreases, the 'transmission efficiency increases in accordance with the quadratic curve')."

Those are the Honda statements.

BY MR. JHURANI:

Q. Let's take that first statement that you're referring to, "as the gap between coils

1 increases, the degree of magnetic coupling weakens."
2 Is that degree of magnetic coupling
3 referring to coupling between charging coils?
4 A. Honda states, in Column 2, line 39,
5 "For this reason, the gap between the primary and
6 the secondary coils is increased and the degree of
7 magnetic coupling weakens."
8 Q. So the degree of magnetic coupling is
9 between two coils; correct?
10 A. Well, we're specifically talking about
11 Honda, where it talks about the gap between the
12 primary and the secondary coils.
13 Q. So the degree of magnetic coupling in
14 that context is between the primary and secondary
15 coils; correct?
16 A. That's what Honda states. "For this
17 reason, the gap between the primary and the
18 secondary coils is increased and the degree of
19 magnetic coupling weakens."
20 Q. What impact does a weakening magnetic
21 coupling have on wireless power transmission?
22 A. Honda continues in that sentence,

"...substantially reducing the charging current to the secondary battery for charging."

Q. So in this context then, weakening of the magnetic coupling would weaken wireless power transmission?

A. I think I've answered that question with the Honda statement. I believe that's very clear. "For this reason, the gap between the primary and secondary coils is increased and the degree of magnetic coupling weakens, substantially reducing the charging current to the secondary battery for charging."

Q. Let's look at the next sentence -- or the next citation in paragraph 332 where you state, "(as the distance between the coils decreases, the 'transmission efficiency increases in accordance with a quadratic curve')."

Do you see that?

A. I do, yes.

Q. What is "transmission efficiency" referring to in this context?

A. So in Honda, Column 13, lines 13, "As

seen from Figure 14, as the sectional distance d decreases, the transmission efficiency increases in accordance with a [quadratic] curve."

Q. So is the "transmission efficiency" referring to the efficiency of wireless power transmission?

A. So the "transmission efficiency" is the efficiency of the wireless power shown in Figure 14 as the distance decreases between the two coils.

Q. As the gap between the coils decreases, there would be stronger magnetic coupling between the coils; correct?

MR. EVERTON: Object to form.

THE WITNESS: Referring back to my declaration, "In fact" -- "In fact, Honda itself refers to continuum of outcomes," and "(as [the] gap between the coils increases, 'the degree of magnetic coupling weakens')."

As the gap between the coil decreases, then the degree of magnetic coupling would strengthen.

BY MR. JHURANI:

Q. Is -- so is magnetic coupling needed for wireless transfer to happen between coils?

A. Well, we're looking back at the Mohamad paper. That's Exhibit 2028. Figure 3 very clearly shows the wireless power transfer showing the magnetic flux passing between the transmitter coil and the receiver coil.

Q. Right.

So then magnetic coupling would need to be present between the coils -- strike that.

Magnetic coupling of the coils would be needed to perform wireless transfer; correct?

MR. EVERTON: Object to form.

THE WITNESS: I believe I've answered that question. Let me just repeat it.

So Figure 3 in Mohamad shows a block diagram of wireless power transfer showing the magnetic flux that passes between the transmitter coil and the receiver coil for wireless power transfer.

BY MR. JHURANI:

Q. Sorry, sir. I don't understand what you're trying to draw from Figure 3. So I'll ask again and maybe you can help me understand in the context of Figure 3, of Mohamad.

Magnetic coupling of the coils would be needed to perform wireless transfer; yes or no?

MR. EVERTON: Object to form.

THE WITNESS: I was pointing you to Figure 3 because that's a great diagram showing, as it describes, a block diagram of wireless power transfer. Really can't be any simpler or clearer than that.

For wireless power transfer, you have your transmitter coil creates the electromagnetic field. Then the magnetic flux is what allows the power -- wireless power transfer to take place, so...

BY MR. JHURANI:

Q. Could wireless power transfer occur without magnetic coupling of the coils?

A. Again, as Mohamad points out, we

1 looked at that sentence earlier, "inductive coupling
2 charging works by transferring the energy across a
3 gap using an electromagnetic field."
4 Without that electromagnetic field,
5 without the magnetic flux, there would be no
6 wireless power transfer.
7 Q. All right, sir. Let's introduce for
8 the record -- I believe you've already referred to
9 it, but let's bring up Depo Exhibit 15, which is the
10 Honda reference.
11 MR. JHURANI: And I'll just say this
12 for the record, what we have as Depo
13 Exhibit 15 is Masimo Exhibit 1006, which is
14 U.S. Patent 6,265,789 to Honda and other
15 inventors.
16 (Exhibit 15, No Bates numbers, U.S
17 Patent No. 6,265,789, received and marked.)
18 BY MR. JHURANI:
19 Q. Sir, you've reviewed this exhibit;
20 correct?
21 A. Yes.
22 Q. Let's turn, sir, to Column 6 of Honda,

1 beginning at line 4. And line 4 begins Honda's
2 description of Figure 1. And it states, "Figure 1
3 is a plan view showing the construction of the
4 station and the electronic watch according to this
5 embodiment."
6 Do you see that?
7 A. Yes, I do.
8 Q. I believe this figure's description,
9 as shown in Column 6, refers to the watch as
10 "electronic watch 200."
11 Do you see that?
12 A. The next sentence says, "As shown,
13 electronic watch 200."
14 Q. Right. Thank you.
15 And then continuing down in this
16 column, around line 21 and 22, it says, "Figure 2 is
17 a sectional view shown in Figure 1, taken along line
18 A A."
19 MR. JHURANI: Maybe we can put up
20 Figure 2 on the same page, if possible.
21 BY MR. JHURANI:
22 Q. What is Figure 2 depicting here, sir?

MR. EVERTON: Object to form.

THE WITNESS: Well, Honda describes it as Figure 2 is a sectional view shown in Figure 1, taken along the line A A.

BY MR. JHURANI:

Q. And what devices are shown in Figure 2?

A. Well, I could read what Honda says there. "As shown, a watch-side coil 210 for the data transmission and the battery charging is arranged in a case back 212 of the watch body 201 and is covered with a cover glass 211."

I can continue if you'd like.

Q. The watch-side coil is in the electronic watch 200, as shown here; correct?

A. I think I just read that. "As shown, a watch-side coil 210."

Is that what you were referring to?

Q. Where is the watch-side coil 210? What device is it in?

A. Well, as Honda describes it and as clearly shown in Figure 2, "As shown, a watch-side

1 coil 210...is arranged in the case back 212 of the
2 watch body 201."
3 So it's in the watch body 201.
4 Q. And the watch body 201 is in the
5 electronic watch 200; correct?
6 A. In the previous paragraph that we were
7 looking at, it describes, "As shown, electronic
8 watch 200."
9 Q. And when the electronic watch 200 is
10 placed in the station, its coil would magnetically
11 couple with the station-side coil, correct?
12 A. If we go down in that same column, 6,
13 around about line 36, "When the electronic watch 200
14 is placed onto the station 100, the station-side
15 coil 110 and the watch-side coil 210 are physically
16 out of contact with each other, but magnetically
17 coupled with each other."
18 Q. The station-side has a component
19 labeled 111. That's the cover glass 111; correct?
20 A. Yes. Honda describes, in the previous
21 paragraph, "the watch-side coil 210 is covered with
22 a cover glass 111."

Q. Similarly, the watch -- electronic watch 200 has a cover glass 211; correct?

A. "Covered with a cover glass 211," Honda states.

Q. And when the electronic watch 200 is placed into the station 100, those two cover glasses would be directly adjacent to each other; correct?

MR. EVERTON: Object to form.

THE WITNESS: That's what I described in the previous paragraph from Honda. "When the electronic watch 200 is placed onto the station 100, the station-side coil 110 and the watch-side coil 210 are physically out of contact with each other, but magnetically coupled with each other because the surfaces of coil winding of both coils are generally in parallel to each other."

MR. JHURANI: Let's turn to Depo Exhibit 14.

(Exhibit 14, No Bates numbers, International Application with Publication No. WO 2005/092182, received and marked.)

MR. JHURANI: And Depo Exhibit 14 is an international application with Publication No. WO 2005/092182, and it's titled, "Biological Information Measuring Device" with inventors including Kotanagi.

BY MR. JHURANI:

Q. Sir, do you recall this exhibit?

A. Yes, Counselor. And can I ask that we've been going for about an hour. Can we take a short break?

Q. Sure thing. How long do you need?

A. Say ten minutes. Maybe reconvene at -- what time is it -- 11 o'clock my time.

MR. JHURANI: Sounds good.

THE VIDEOGRAPHER: Going off the record. The time is 10:52.

(Recess from the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 11 a.m.

BY MR. JHURANI:

Q. Let's turn, sir -- I think before the break, we introduced Depo Exhibit 14, which is the

Kotanagi reference.

MR. JHURANI: And if we can just bring it up.

BY MR. JHURANI:

Q. Sir, do you recognize this exhibit?

A. Yes, I do.

Q. Let's turn to paragraph 76 of this reference. So the first line I'll read.

"For example, as illustrated in Figure 8, the protruding part 4 may be formed so that the outer periphery is circular."

Do you see that, sir?

A. I do.

Q. So this description of paragraph 76 is in the context of Figure 8 of Kotanagi; correct?

A. That's what Kotanagi states in 76, "For example, as illustrated in Figure 8."

Q. And the protruding part 4 in Figure 8 is formed so that its outer periphery is circular; correct?

A. Kotanagi describes it as "the protruding part 4 may be formed so that the outer

1 periphery is circular."
2 Q. Let's turn to paragraph 77. I think
3 it bleeds over to the next page, too.
4 MR. JHURANI: If it's not too much of
5 a bother, can we put Figure 8 on this screen
6 as well?
7 THE VIDEOGRAPHER: I can't pull up
8 three pages at the same time, which is what
9 it would require me to do.
10 MR. JHURANI: Okay. We'll hold off on
11 that.
12 BY MR. JHURANI:
13 Q. 77, sir -- paragraph 77,
14 Dr. Duckworth, is also in the context of Figure 8;
15 correct?
16 MR. EVERTON: Object to form.
17 THE WITNESS: All I can say is that
18 Kotanagi describes paragraph 76, "For
19 example, as illustrated in Figure 8, the
20 protruding part 4 may be formed." And then
21 in paragraph 77, Kotanagi says, "By forming
22 the protruding part...into a circle."

BY MR. JHURANI:

Q. So is paragraph 77, sir, talking about Kotanagi's Figure 8?

A. In paragraph 77, a few sentences in, he says, "Therefore, as illustrated in Figure 8."

Q. So, yes, paragraph 77 is talking about Figure 8 of Kotanagi?

A. As I just -- yeah, described halfway through -- Kotanagi says, halfway through paragraph 77, "Therefore, as illustrated in Figure 8."

Q. The last sentence of this paragraph, 77, reads, "Accordingly, the adherence of the biological sensor part 8 can be improved."

Do you see that?

A. Yes, I do.

Q. What is the "biological sensor part 8"?

A. In Figure 8, I don't see a part labeled 8.

Q. So do you have an understanding of what "biological sensor part 8" is in the context of

1 Kotanagi?
2 A. All I can do is read what Kotanagi
3 states there. And I just explained I could not see
4 a part 8 in Figure 8.
5 Q. In the context of Figure -- in the
6 context of Kotanagi, do you have an understanding of
7 what the "biological sensor part 8" is?
8 A. So earlier on, for example, in
9 paragraph 64, it refers to "the biological sensor
10 part 8," which is shown in, for example, Figure --
11 Figure 2.
12 Q. And with that understanding, sir, what
13 is the "biological sensor part 8"?
14 A. I'm looking for the first description
15 in Kotanagi to refer to the "biological sensor
16 part 8."
17 So I believe paragraph 54 says, "As a
18 result, the biological sensor part 8 disposed on the
19 lower surface of the protruding part 4."
20 Then paragraph 64, which I was
21 referring to earlier, it says, "That is, it detects
22 that the biological sensor part 8 including the

LED 5 and the PD 6 is indeed in contact with the living body surface B."

Q. Then turning back to paragraph 77, how does the -- how is the adherence of the biological sensor part 8 improved?

MR. EVERTON: Object to form.

THE WITNESS: Can you ask the question again, Counselor, please.

BY MR. JHURANI:

Q. Sure.

The last sentence, just to reorient us in paragraph 77, says, "Accordingly, the adherence of the biological sensor part 8 can be improved."

Do you see that?

A. I do, yes.

Q. How is the adherence of the biological sensor part 8 improved in the context of this paragraph?

A. So the previous sentence in Kotanagi describes, "it is possible to accommodate changes in the thickness of the wrist, which makes it possible to enhance adherence without creating a gap between

1 the lower surface 4a of the protruding Part 4 and
2 the living body surface B."
3 Q. Okay. And how does that sentence
4 inform the adherence of the biological sensor part 8
5 being improved?
6 A. Well, I think Kotanagi makes it very
7 clear with the sentence I just read, "which makes it
8 possible to enhance adherence without creating a
9 gap."
10 Q. "Without creating a gap between the
11 lower surface 4a of the protruding part...and the
12 living body surface"; is that what you're referring
13 to?
14 A. So the sentence says, yes. "Makes it
15 possible to enhance adherence without creating a gap
16 between the lower surface 4a of the protruding
17 part 4 and the living body surface B."
18 Q. How does that inform adherence of
19 biological sensor part 8, which is not referenced in
20 the previous sentence?
21 MR. EVERTON: Object to form.
22 THE WITNESS: The biological sensor

consists of the LED and the PD, when we looked back at the earlier paragraphs there. So as Kotanagi states in 77, it "makes it possible to enhance adherence without creating a gap between the lower surface 4a of the protruding part 4 and the living body surface B."

BY MR. JHURANI:

Q. How does the enhanced adherence of the lower surface 4 of the protruding part affect adherence of the biological sensor part 8?

MR. EVERTON: Object to form.

THE WITNESS: I really can't say more than Kotanagi is stating there. It enhances adherence without creating a gap.

BY MR. JHURANI:

Q. Where is the biological sensor part 8 in relation to the lower surface 4a of the protruding part 4?

A. Can you ask your question again, please, Counselor.

Q. Where is the biological sensor part 8

in relation to the lower surface 4a of the protruding part?

A. If we refer back to, for example, Figure 7 and the description of the biological sensor part 8, "including the LED 5 and the PD 6 is indeed in contact with the living body surface B." And so...

Q. What paragraph are you reading from, sir?

A. That was the one we were looking at earlier, paragraph 64.

Q. So -- thank you. Thank you for that.

So where is the biological sensor part 8 in relation to the lower surface 4a of the protruding part?

A. Where -- where specifically are you looking at now?

Q. I'm just asking -- I'm asking the same question. I didn't see the answer in paragraph 64.

So I'm asking again, where is the biological sensor part 8 in relation to the lower surface 4a of the protruding part?

MR. EVERTON: Objection to form.

THE WITNESS: So paragraph 64 starts with the sentence, "When the living body surface B and the lower surface 4a of the protruding part 4 are in close contact."

So there it describes the lower surface 4a of the protruding part 4.

BY MR. JHURANI:

Q. Where, sir -- sorry. Are you done answering?

A. Yes, uh-huh.

Q. So thank you.

I understand the first sentence of paragraph 64 describes the lower surface 4a of the protruding part 4.

Now my question is, where is the biological sensor part 8 in relation to the lower surface 4a of the protruding part 4?

MR. EVERTON: Objection to form.

THE WITNESS: So paragraph 46, "A biological sensor part 8, which includes an LED [and] a photodetector," and then

1 continues and then it says, "Is disposed" --
2 excuse me -- "is disposed on the lower
3 surface 4a of the protruding part 4."
4 BY MR. JHURANI:
5 Q. So the biological sensor part 8 is
6 disposed on the lower surface 4a of the protruding
7 part?
8 A. So I'm just checking paragraph 46
9 again. It starts with, "A biological sensor
10 part 8," and the sentence -- that same sentence ends
11 with "is disposed on the lower surface 4a of the
12 protruding part 4."
13 MR. JHURANI: Now let's go back to
14 paragraph 77. And maybe the next -- yeah,
15 there you go.
16 BY MR. JHURANI:
17 Q. So with that understanding, can you
18 explain how the adherence of the biological sensor
19 part 8 is improved in the context of paragraph 77?
20 A. Well, first of all, this is a
21 different embodiment. So in paragraph 75, "For
22 example, in the embodiment described above, the

1 shape of the protruding part 4 was a keyhole-like
2 shape," and then it says, "but the protruding part
3 is not limited to this shape and may be any shape."
4 And then paragraph 76, "For example,
5 as illustrated in Figure 8, the protruding part 4
6 may be formed so that the outer periphery is
7 circular."
8 So we're taking about a different
9 embodiment in Figure 8. And the best way I can
10 answer your question is what Kotanagi states in
11 paragraph 77, which says, "It is possible to
12 accommodate changes in the thickness of the wrist,
13 which makes it possible to enhance adherence without
14 creating a gap between the lower surface 4a of the
15 protruding part 4 and the living body surface B."
16 Q. So how is that -- how does that
17 improve the adherence of the biological sensor
18 part 8?
19 MR. EVERTON: Objection to form.
20 THE WITNESS: I really can't provide
21 any more information, Counselor, than I
22 already have. In paragraph 46, we saw that

Kotanagi describes "A biological sensor part 8...is disposed on the lower surface 4a of the protruding part 4."

And then in paragraph 77, he says, "makes it possible to enhance adherence without creating a gap between the lower surface 4a of the protruding part 4."

BY MR. JHURANI:

Q. Thank you.

Let's bring up your declaration for the '491 patent, which is Depo Exhibit 3.

(Exhibit 3, No Bates numbers, Supplemental Declaration of R. James Duckworth, Ph.D. re U.S. Patent No. 10,942,491, received and marked.)

MR. JHURANI: Just for the record, Depo Exhibit 3 is the Supplemental Declaration of R. James Duckworth, Ph.D. bearing the patent number on the face 10,942,491.

BY MR. JHURANI:

Q. Sir, do you recognize Depo Exhibit 3?

A. Yes, I do.

Q. And this is a supplemental declaration that you submitted for the IPR proceeding involving the '491 patent?

A. That's correct.

MR. JHURANI: Let's bring up paragraph 411, please. If we can highlight -- and this one goes into the second page. If you can highlight the sentence that reads, "Specifically the existing electrodes would detect skin contact to trigger the ECG measurement and the added electrodes would perform the ECG measurement."

BY MR. JHURANI:

Q. Do you see that sentence, sir?

A. Yes. I've got that, yes.

Q. I'd like to understand this.

Is it your view that the existing electrodes are used to trigger the ECG measurement?

A. I want to make sure that I'm answering this in the correct context here. So earlier in

that same paragraph, I say that, "Similarly, Kotanagi discloses using its electrodes to detect skin contact as a threshold before detecting pulse rate. A POSITA would have known how to use both Kotanagi's existing electrodes and added electrodes as taught by Choi to obtain an EKG [sic]. [So] specifically, the existing electrodes would detect skin contact to trigger the EKG measurement and the added electrodes would perform the EKG measurement."

Is that your question, Counselor?

Q. That's helpful. Thank you, sir.

Would the existing electrodes, as described here, also perform the EKG measurement?

A. In this my declaration, starting with paragraph 409, I'm describing "Alternatively, if a POSITA wanted to configure a watch [to] measure EKG [sic] on two surfaces, a POSITA would have found it obvious to add one or more additional electrodes (as taught by Choi) to Kotanagi to obtain an EKG."

So the existing electrodes would detect skin contact, and then the added electrodes would perform the EKG measurement, as I describe in

this section.

Q. So in this section, the existing electrodes would not be used to perform EKG measurements; is that right?

A. In this section, I am adding one or more electrodes to detect EKG. So the existing electrodes are just used to detect -- let me just make sure.

(Document review.)

THE WITNESS: Yes, so I think the sentence you started with "Specifically, the existing electrodes would detect skin contact," and then "the added electrodes would perform the EKG measurement."

BY MR. JHURANI:

Q. Okay. So for this section, the existing electrodes would not be used to perform EKG measurement; is that right?

A. That's correct. The added electrodes will perform the EKG measurement.

Q. Okay. Let's turn to paragraph 400 of this declaration.

1 Middle of the paragraph here, sir, you
2 say, "Kotanagi repeatedly describes the contact
3 detection electrodes as part of the 'biological
4 sensor'."
5 Do you see that?
6 A. Yes, I do. Excuse me.
7 Q. And for this sentence, you cite to
8 Exhibit 1005, which is Kotanagi, I believe; correct?
9 A. Yes, that's correct.
10 Q. And in the cited portions, Kotanagi
11 actually uses the phrase "biological sensor part";
12 correct?
13 A. Yes, that's correct.
14 Q. So then is it correct that the contact
15 detection electrodes are part of Kotanagi's
16 biological sensor part?
17 MR. EVERTON: Object to form.
18 THE WITNESS: Can you ask your
19 question again, please, Counselor.
20 BY MR. JHURANI:
21 Q. Sure.
22 With the understanding that

"biological sensor" as you refer to here, is "biological sensor part 8" or just "biological sensor part" in Kotanagi, my question is this: The contact detection electrodes are part of Kotanagi's biological sensor part; correct?

A. They're part of the biological sensor, but -- the electrodes are separate contact, but they're part of the biological sensor because when they detect skin contact, then they trigger the -- the optical sensor measurement.

Q. Okay. And that's why the contact detection electrodes are part of the biological sensor part; right?

A. I didn't say that, no.

Q. Are the contact -- does Kotanagi use the phrase just "biological sensor" or is it always "biological sensor part"?

MR. EVERTON: Object to form.

THE WITNESS: Can you ask your question again, please, Counselor.

BY MR. JHURANI:

Q. Sure.

1 So the contact detection electrodes
2 are part of Kotanagi's biological sensor part;
3 correct?
4 MR. EVERTON: Objection to form.
5 THE WITNESS: So paragraph 46 of
6 Kotanagi says, "A biological sensor part 8,
7 which includes an LED...photodetector...and a
8 contact detection means 7 for detecting
9 whether the LED 5 and PD 6 are in contact
10 with a living body surface B."
11 So the electrodes are 7 are the
12 contact detection means made up of 7a and 7b,
13 the pair of electrodes.
14 BY MR. JHURANI:
15 Q. And the contact detection electrodes
16 are part of the biological sensor part; correct?
17 A. As I just read in paragraph 46, "A
18 biological sensor part 8, which includes," and it
19 continues, "and a contact detection means 7," which
20 are the pair of electrodes.
21 Q. Got it. We can set that aside, sir.
22 Thank you.

A. Okay.

Q. Sir, in your experience in this field, have you ever modeled or simulated wireless power transmission between wireless charging coils?

MR. EVERTON: Objection to form.

THE WITNESS: Have I ever modeled, you're asking me?

BY MR. JHURANI:

Q. Correct.

A. So just so -- can you ask the question again, please.

Q. Sure.

Have you done, in your experience in this field -- strike that. Let's start over.

In your experience, have you ever modeled or simulated wireless power transmission between wireless charging coils?

A. No, I have not.

Q. Have you used a tool named COMSOL?

A. Can you spell that, please.

Q. COMSOL is spelled C-O-M-S-O-L.

A. No, I have not.

Q. Have you used a tool named Ansys, A-N-S-Y-S?

A. Many, many years ago.

Q. In what context?

A. If I remember correctly, some electromagnetic simulation. We're going back decades if I did that.

Q. Got it.

Have you used a tool named Feko, F-E-K-O?

A. No, I have not.

Q. Did you do any modeling of wireless power transmission between the charging coils as provided in your proposed Kotanagi/Honda combination?

MR. EVERTON: Objection to form.

THE WITNESS: No, I did not.

MR. JHURANI: Thank you, sir. I don't have any further questions at this time.

MR. EVERTON: Can we take a ten-minute break?

MR. JHURANI: Sure.

THE VIDEOGRAPHER: Going off the record. The time is 11:43.

(Recess from the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 11:57.

MR. EVERTON: Masimo doesn't have any questions for the witness.

THE VIDEOGRAPHER: We are going off the record. This deposition is concluded at 11:58.

(Off the record at 11:58 a.m.)

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That prior to being examined, the witness was duly sworn by me to testify to the truth, the whole truth, and nothing but the truth.

That I thereafter transcribed my said shorthand notes into typewriting and that the typewritten transcript of said deposition is a complete, true and accurate transcription of my said shorthand notes taken down at said time, and that a request has been made to review the transcript.

I further certify that I am not a relative or employee of an attorney or counsel of any of the parties, nor a relative or employee of any attorney or counsel involved in said action, nor a person financially interested in the action.

IN WITNESS WHEREOF, I have hereunto set my signature this 4th day of June, 2024.

EILEEN MULVENNA, CSR/RMR/CRR

R. James Duckworth, Ph.D., c/o
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Case: Masimo Corporation v. Apple Inc.
Date of deposition: June 4, 2024
Deponent: R. James Duckworth, Ph.D.

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