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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MASIMO CORPORATION,	:	Case No.:
Petitioner,	:	IPR2023-00745
v.	:	
APPLE, INC.,	:	U.S. Patent
Patent Owner.	:	10,076,257

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Deposition of THOMAS KENNY, PH.D.

Conducted Remotely

Monday, July 29, 2024

10:00 a.m.

Reported by: Matthew Goldstein, RMR, CRR

DIGITAL EVIDENCE GROUP
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Page 2

1 Deposition of THOMAS KENNY, PH.D., conducted

2 remotely:

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9 Pursuant to Notice, before Matthew Goldstein,

10 RMR, CRR, Notary Public in and for the State of

11 Maryland.

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

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1 A P P E A R A N C E S C O N T I N U E D

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1 C O N T E N T S

2 EXAMINATION OF THOMAS KENNY, PH.D. PAGE

3 By MR. EVERTON 6

4

5 E X H I B I T S

6

7 DEPOSITION EXHIBIT PAGE

8 Exhibit 1005 United States Patent 69

9 Application Publication US

10 2007/0021677 A1, Markel

11 Exhibit 1006 United States Patent No. 47

12 5,351,695, Mills, et al.

13 Exhibit 1068 United States Patent 52

Application Publication US

14 2009/0059730 A1, Lyons, et al.

15 Exhibit 1074 United States Patent 121

Application Publication US

16 2006/0142654 A1, Rytky

17 Exhibit 1075 United States Patent 4,230,127, 108

Larson

18 Exhibit 1076 United States Patent 6,434,421 121

19 B1, Taheri

20 Exhibit 2014 Second Declaration of Dr. 14

Thomas W. Kenny

21

22

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

2 Whereupon,

3 THOMAS KENNY, PH.D.,

4 being first duly sworn or affirmed to testify to

5 the truth, the whole truth, and nothing but the

6 truth, was examined and testified as follows:

7 EXAMINATION BY COUNSEL FOR THE PETITIONER

8 BY MR. EVERTON:

9 Q. Good morning.

10 A. Good morning.

11 Q. Will you please state your name for the
12 record?

13 A. Thomas Kenny.

14 Q. And you understand that this is a
15 deposition for the IPR relating to U.S. Patent
16 No. 10,076,257; is that correct?

17 A. That's correct.

18 Q. And this is IPR No. 2023-00745; correct?

19 A. That sounds correct, yes.

20 Q. In your declarations, do you refer to
21 this patent as the '257 patent?

22 A. I do, I believe.

1 Q. So is it okay if during this deposition,
2 we refer to the patent as the '257 patent?

3 A. Yes.

4 Q. Is there any reason why you can't give
5 truthful and accurate testimony today?

6 A. None.

7 Q. Are you on any medications or anything
8 else that would impact your testimony today?

9 A. No.

10 Q. So during the deposition, please let me
11 know if you don't understand any of my questions.
12 Otherwise, I will assume that you understand them.

13 Is that okay?

14 A. That's fine.

15 Q. And let me know if you ever need a
16 break. Otherwise, we will plan to take a break
17 about every hour or so.

18 Does that work?

19 A. That sounds great.

20 Q. How did you prepare for the deposition
21 today?

22 A. So that preparation included drafting of

1 my report, which is my second report in this
2 proceeding. I reviewed the report and petition
3 provided by Masimo and Mr. Oslan. I reviewed the
4 new prior art references that were offered as part
5 of that material. That's the gist of what I did
6 for this to prepare for today.

7 Q. Did you meet with anyone to prepare for
8 this deposition?

9 A. I had a couple of short meetings with
10 Patrick and Grace, the attorneys for Apple in this
11 proceeding.

12 Q. For how long did you meet with them?

13 A. Probably an hour or two at the most.

14 Q. Did you speak with anyone else about
15 this deposition?

16 A. Only casually. I'm here at our lake
17 house with my wife. She knows I'm downstairs in
18 the deposition, but nothing around any of the
19 factual matters.

20 Q. Did you speak with anyone from Apple
21 about this deposition?

22 A. No.

1 Q. Did you review any documents to prepare
2 for this deposition?

3 A. So the references I mentioned in one of
4 the earlier answers, so my own report, the new
5 references, the report from Mr. Oslan, the
6 petition, the petition from Masimo, and some of
7 the other elements of the materials that are on
8 the record.

9 Q. And you mentioned that you did review
10 your most recent declaration in this IPR; correct?

11 A. That's correct.

12 Q. In your experience, have you ever worked
13 with cardiac sensors?

14 A. My professional experience?

15 Q. Yes.

16 A. I don't believe so.

17 Q. Have you ever designed a device that has
18 cardiac sensors?

19 A. So I've designed devices that are in
20 some of the products that also might include
21 cardiac sensors, but I didn't work in particular
22 on the cardiac sensor design. I am familiar with

1 the elements of cardiac sensors from my teaching
2 and from my research indirectly.

3 Measurements of physiological signals
4 obtained by wearable or hand-held instruments are
5 part of the research and work I've done over the
6 years in my teaching, of course.

7 Q. Have you worked with sensor leads that
8 include leaf springs?

9 A. In the broadest sense, leaf springs are
10 similar to the kinds of connectors that are used
11 to attach cables to printed circuit boards and the
12 like, spring-like contacts that make electrical
13 connections and are reversible.

14 Q. And so my question was whether or not
15 you had worked with sensor leads that include
16 those types of leaf springs?

17 A. If the question has to do with cardiac
18 sensor leads, the answer would be no. If you're
19 thinking of -- or asking about sensors in general,
20 my research has included sensors which have leads
21 that are connected through spring-like connectors
22 that one might call leaf springs, but not cardiac

1 sensors, if that's the question you meant to ask.

2 Q. What was the application then for these
3 sensors that you worked on that include leaf
4 springs?

5 A. It would include almost -- well, I don't
6 know, a significant portion of all the
7 publications in my CV. My group does research on
8 sensors. Micromechanical devices, things like
9 accelerometers, gyroscopes, capacitive sensing,
10 position sensing, acoustic sensing, commercial
11 sensing.

12 Many of those instruments, at the level
13 of development in my laboratory, have sensors
14 mounted in packages with cables connecting them to
15 instruments for capturing and processing the data.
16 And those cables can include leaf spring-like
17 connectors at one or both ends.

18 Q. Were any of these leaf springs that you
19 had worked on or are familiar with prior to the
20 priority date of the '257 patent?

21 A. So I have a hard copy of that patent
22 here with me, fresh printed, no notes. I'm just

1 looking for the priority date, which looks like
2 November 5th, 2008.

3 If that's correct, then the answer to
4 your question would be yes, my research at
5 Stanford at least began in 1994.

6 Q. So is it safe to say that in the early
7 2000s, leaf springs were commonly used in sensors,
8 at least the sensors that you were familiar with?

9 A. So they're commonly used in, I'd say,
10 academic labs that are doing sort of
11 academic-level development and characterization
12 work. I think they're less and less common in
13 final products at that time.

14 Q. And why is that? Why do you say that
15 they're less and less used in final products in
16 the early 2000s?

17 A. I think by then most such products were
18 using ribbon cables or flex circuits to make
19 connections between elements inside of packages.
20 Leaf springs were less and less likely to be used
21 for at least signal connections.

22 I'd say they're probably still -- or

1 things like leaf springs are probably still used
2 for products that have replaceable batteries, just
3 as a way of providing a good electrical contact
4 using the properties of the spring.

5 But outside of that, I think if you took
6 apart your iPhone today, I'd be surprised if you
7 found any leaf springs in those products. I think
8 you'd find ribbon connectors and flexible cables
9 and flexible printed circuit boards and not leaf
10 springs.

11 Q. Do you have any experience working with
12 wrist-worn medical monitors?

13 MR. BISENIUS: Objection; outside the
14 scope.

15 THE WITNESS: So research we've done on
16 devices such as timing products and inertial
17 sensors is currently in a number of wrist-worn
18 medical sensors or medical products. I haven't
19 worked directly on those products myself.

20 BY MR. EVERTON:

21 Q. Have you ever designed a wrist-worn
22 medical monitor?

1 A. Similar to an earlier question, I've
2 designed components and elements that are included
3 in many such things today, but I haven't worked
4 for the companies on the design of the products on
5 the market today.

6 (Exhibit 2014 was presented.)

7 BY MR. EVERTON:

8 Q. I'd like to introduce Exhibit 2014.
9 This is a copy of your second declaration in this
10 '257 IPR.

11 A. I also have a hard copy of that handy
12 here.

13 Q. Okay. And you can confirm then that
14 this Exhibit 2014 is your second declaration in
15 this IPR; is that correct?

16 A. Yes.

17 Q. Are you aware of any corrections that
18 need to be made to this second declaration,
19 Exhibit 2014?

20 A. I can think of one typo. Let me see if
21 I can find it here.

22 It's in paragraph 33. About two thirds

1 of the way through, there's a sentence that says,
2 "Mr. Oslan leaps to an interpretation of this
3 additional material as being equivalent to the
4 conducting bezel recited, for example, by
5 substitute Claim 23 from the Revised Motion to
6 Amend."

7 I believe we should have written -- I
8 should have written here "Claim 24" instead of
9 "Claim 23." That's the claim that describes the
10 conducting bezel.

11 Q. Okay. Are there any other corrections
12 that you're aware of that need to be made to your
13 second declaration?

14 A. None that I can think of, no.

15 Q. Did you analyze any issues in this IPR
16 for the '257 patent that do not appear in your
17 declarations?

18 A. Well, my work in this proceeding goes
19 back over a year. There certainly are elements
20 and stages of discussion and analysis that are not
21 included in the 30 or so pages of this
22 declaration.

1 Q. Right. I was asking about all of your
2 declarations in this IPR, if there's any analysis
3 that you performed that's not included in those
4 declarations?

5 A. I think what's here represents my
6 opinions. It is not a word-for-word complete
7 transcript of everything that's crossed my mind in
8 the last year. So I think it represents the most
9 important findings and opinions.

10 But I can't say that every single thing
11 I've thought of in the last year is somehow in
12 these pages. Maybe if we find something in the
13 questions that isn't explicitly included here, I
14 might offer further opinion.

15 Q. In this IPR, have you provided a
16 construction for the claim term "enclosure"?

17 A. In this declarations?

18 Q. In this IPR. At any point in this IPR,
19 have you provided a construction for the claim
20 term "enclosure"?

21 A. I don't believe so.

22 Q. Why is that?

1 A. I wasn't asked to provide or consider an
2 explicit construction for the term "enclosure," I
3 believe.

4 Q. In this context of the '257 patent, what
5 is required for something to be an enclosure?

6 A. So you're taking me outside the scope of
7 this report, which was focused on analysis of the
8 new references and how they might be considered by
9 one of ordinary skill. I don't believe there's
10 anything in this report that discusses a
11 definition of the term "enclosure."

12 Q. But the claims that you analyzed in this
13 report include the requirement of an enclosure;
14 correct?

15 A. I see the term "enclosure" in the
16 substitute Claim 26. It says, wherein the first
17 portion of the enclosure is a bezel.

18 Q. And you analyzed these claims that
19 include a first portion of an enclosure and a
20 bezel; correct?

21 A. So the analysis and preparation I did
22 for today is reflected in the expert report I've

1 just provided a few weeks ago. It didn't include
2 a term-by-term claim analysis of these proposed
3 substitute claims, although I am aware of them.

4 So as I'm sure you're aware, there's
5 nothing in my current report that says anything
6 about a construction or a definition of an
7 "enclosure."

8 Q. Right. So if we turn in your second
9 declaration, Exhibit 2014, to paragraph 2.

10 A. Okay.

11 Q. You say here, In the June 24th, 2024
12 Petitioner's Option to Patent Owner's Revised
13 Contingent Motion to Amend, and the corresponding
14 Fourth Declaration from Mr. Oslan (Exhibit 1069),
15 prior flawed arguments related to Mills and Markel
16 are related, such as the argument that the
17 3-nanometer plated film in Mills would be
18 considered a portion of an enclosure despite the
19 absolute inability of such an infinitesimally thin
20 film to exist on its own independent of the
21 underlying electrode.

22 So what I'm asking you is, what is your

1 understanding of what an enclosure is in this
2 analysis regarding the claims of the '257 patent?

3 A. So we could look at examples of things
4 in the patent or in the prior art that would be
5 considered maybe candidates to be described as an
6 enclosure. I think I'm pretty clear on the record
7 in this report just in this one paragraph and in
8 prior report and in prior deposition that the very
9 thin film that is deposited in the Mills reference
10 as a surface coating is not -- would not be
11 considered a portion of the enclosure by a person
12 of ordinary skill, in that that film never exists
13 on its own in any form except after it's deposited
14 on the electrode and as a portion -- I think a
15 layer of that electrode, not an independent
16 element of an enclosure.

17 Q. So is there a thickness requirement for
18 the claimed enclosure in the '257 patent?

19 A. I'll take a look. And sorry, I wasn't
20 expecting to be going in directions outside of my
21 current report. But let me take a look at the
22 '257. I don't believe there's an explicit

1 statement that the enclosure must be a certain
2 thickness.

3 I could spend more time, but I'm
4 reasonably confident there's no explicit statement
5 that an enclosure must have a thickness in a range
6 of values stated in the '257.

7 I think what one of ordinary skill in
8 the art would take from the '257, particularly
9 cross-sectional illustrations, such as Figures 4A
10 and 4B, are that the enclosure has microscopic
11 thickness, you know, more than micrometers for
12 sure that must be capable of standing on its own.

13 Q. And you come to that conclusion that the
14 enclosure must be capable of standing on its own
15 based on those figures?

16 A. And the text of the specification and
17 the claims -- sorry, the text of the patent
18 specification, the text of the claims, and the way
19 I think one of ordinary skill in the art would
20 read the patent and understand the meaning of
21 these words.

22 This thin film, this 3-nanometer

1 deposited film by chemical or physical vapor
2 deposition is part of the electrode. It's not
3 intended as a structure to enclose the
4 electrode.

5 Q. And does -- in your analysis, does
6 Mills -- is the plating in Mills disclosed as
7 being 3 nanometers in thickness?

8 A. I have a copy of the Mills patent. It
9 will take me a moment to find that reference.

10 Okay. So here's -- I guess you were
11 pointing out a typo in this paragraph. The
12 plating described in Column 4, around line 35 of
13 Mills, is 3 micrometers, sorry, not nanometers.
14 That may have -- I actually might have spell
15 corrected to a nanometer.

16 Anyway, I think the correct answer here
17 is -- and what you're getting at is that the
18 so-called plated film in Mills, which is formed by
19 chemical vapor or physical vapor deposition
20 techniques is around 3 micrometers thick --

21 Q. Okay.

22 A. -- still a few percent of the thickness

1 of a human hair, not something anyone of ordinary
2 skill would consider to be an enclosure.

3 Q. And 3 micrometers is larger than
4 3 nanometers; correct?

5 A. It is, yes. Still, I think on the scale
6 of what's described in these patents, the word
7 "infinitesimally thick" is still appropriate.

8 Q. And do the Figures 4A and 4B that you
9 referred to in the '257 patent as showing the
10 thickness of the enclosure, do those figures
11 provide any scale?

12 A. There's no explicit scale bar, but I
13 think one of ordinary skill would look at the
14 radii of curvature of the edges of this in the
15 context of their experience with products similar
16 to what's shown in Figure 3, and understand that
17 the structures we're looking at are probably
18 millimeters thick, maybe several millimeters
19 thick, maybe up to a centimeter. Certainly not
20 micrometers.

21 Q. If we turn to paragraph 24 of your
22 second declaration, Exhibit 2014.

1 In the first sentence of paragraph 24,
2 you say, Indeed, such a configuration is distinct
3 from the claimed device of the '257 patent which
4 requires a conductive first portion of the
5 enclosure to allow the electrical connectivity
6 between the user contact and the first pad
7 positioned underneath the exterior surface of the
8 first portion of the enclosure such that the first
9 pad can detect a first electrical signal of the
10 user's cardiac signal via the user's skin's
11 contact with the exterior surface of the first
12 portion of the enclosure.

13 Do you see that?

14 A. Yes.

15 Q. Do the claims of the '257 patent require
16 that the first portion of the enclosure be
17 conductive?

18 So it's been a little while now. I just
19 wanted to check in to make sure you understand.

20 A. I appreciate the question. It's, again,
21 not among the materials I was preparing for
22 today's deposition. So I'm -- you're watching me

1 kind of catch up on that.

2 Could you restate the question?

3 Q. Yeah. So in paragraph 24 of your second
4 declaration, we just saw your analysis of the
5 first portion of the enclosure.

6 And my question was whether the claims
7 of the '257 patent require that the first portion
8 of the enclosure be conductive?

9 A. All right. I'm sorry for the delay.
10 Again, you've dragged me outside of what I was
11 prepared for. So I'm rereading the claim and the
12 spec.

13 Can I have that question again? You
14 don't have to read the quote, just the question at
15 the end that you asked.

16 Q. Yeah. Do the claims of the '257 patent
17 require that the first portion of the enclosure be
18 conductive?

19 A. So my opinion here -- and, again, I'm a
20 little reluctant to go there, but my reading of
21 the claim and the spec is that I believe one of
22 ordinary skill in the art would understand that

1 the electrical signal of the first of the user's
2 cardiac signal is detected via the user's skin
3 contact with the exterior surface of the first
4 portion of the enclosure and that that signal is
5 carried through a conductive structure.

6 The spec of the patent consistently
7 describes the enclosure as having conductivity.
8 It doesn't give a number, but it defines
9 various -- it describes the material as having
10 conductivity throughout.

11 And I believe one of ordinary skill in
12 the art reading the claims on the spec would say
13 that this signal is conducted from the user's skin
14 through the first portion of the enclosure to the
15 pad, which is positioned underneath the exterior
16 surface of the first portion.

17 Q. So does that first portion of the
18 enclosure need to be made of a conductive
19 material?

20 A. I think that's how someone of ordinary
21 skill would read the spec and the claims. And
22 that conductivity can be within a fairly broad

1 range, as described by different materials in the
2 specification.

3 Q. So could a thin plastic material be
4 conductive enough for this first portion of the
5 enclosure?

6 A. There are plastic materials that in
7 thicknesses in the range of the millimeters that I
8 think makes sense for the enclosure would be
9 conductive enough.

10 Q. Okay. So this first portion of the
11 enclosure doesn't necessarily have to be a certain
12 material or a conductive material, but rather the
13 end result must be such that the signal can be
14 received through that first portion; is that
15 correct?

16 A. Well, the claim says the pad is
17 configured to detect the first electrical signal
18 of the user's cardiac signal via contact with the
19 exterior surface of the first portion. So I think
20 that signal must propagate through the first
21 portion to the patent.

22 Q. But the claim doesn't require any

1 specific type of material for that first portion
2 of the enclosure?

3 A. It doesn't provide a specific material
4 such as steel or silver or anything like that,
5 that's correct.

6 Q. Are you aware of Masimo's proposed
7 ordinary meaning of "enclosure" being something
8 that encloses?

9 A. I think I've read that in one of the
10 reports.

11 Q. Do you agree with Masimo's ordinary
12 meaning of "enclosure" being something that
13 encloses?

14 A. So I can think of things that I would
15 describe as an enclosure and things that I would
16 not. The definition of an "enclosure" as
17 something that encloses is, I mean, to me circular
18 and kind of doesn't really add meaning to the word
19 "enclosure." It basically says an enclosure is an
20 enclosure. You know, that doesn't help me.

21 When I look at the particulars of what's
22 in the '257 patent, I see an enclosure is

1 referring to structures such as the cross sections
2 in Figure 4A and B that I think one of ordinary
3 skill in the art would understand to be
4 millimeters thick or thicker and capable of kind
5 of standing on their own.

6 And, further, I think a 3-micrometer
7 thin film formed by chemical or physical vapor
8 deposition would not be regarded by a person of
9 ordinary skill as part of an enclosure.

10 Q. So it's your opinion that the ordinary
11 meaning of "enclosure" being something that
12 encloses is incorrect?

13 A. To me it's insufficient and not helpful
14 to say something is what it is. That's what that
15 definition says.

16 Q. What do you think the ordinary meaning
17 of "enclosure" is?

18 A. I don't really want to create a
19 construction here on the fly. But I can look at
20 examples and I can distinguish things which a
21 person of ordinary skill would regard as an
22 enclosure, such as the structures shown in the

1 '257 patent.

2 And I think a person of ordinary skill
3 in the art would never think of a 3-micrometer
4 thin film formed by physical vapor deposition or
5 chemical vapor deposition as being an enclosure.

6 Q. But sitting here today, you can't
7 provide the ordinary meaning of the claim term
8 "enclosure"?

9 A. I prefer not to create a new
10 construction here in this deposition in an area
11 that I wasn't prepared to discuss, but I do
12 believe one of ordinary skill in the art would
13 have no trouble distinguishing the structures in
14 the '257 patent, such as those shown in Figure 4A
15 and B, from the 3-micrometer thin film shown in
16 one of the figures of the Mills patent, that being
17 a very thin film deposited by chemical or physical
18 vapor deposition.

19 Q. Is it your opinion that the claim term
20 "enclosure" requires more than just something that
21 encloses?

22 A. So I can think of, for example, a

1 nanometer-thick film surrounding a vapor bubble,
2 such as used in procedures for breaking kidney
3 stones in my current starter company. You could
4 imagine that that nanometer-thick film of lipids
5 surrounds, perhaps, but it's not structurally --
6 you know, again, I really don't want to create a
7 definition here in free space.

8 I think one of ordinary skill in the art
9 can distinguish a 3-micrometer thick metal film
10 from the structures in the '257 patent and what
11 most people would regard as a structure that
12 encloses products such as the hand-held devices
13 that we're discussing today, and that a
14 3-micrometer thin film on its own is not an
15 enclosure.

16 It barely exists on its own. If it
17 didn't have a substrate, it would disintegrate
18 immediately. It can't be created in its free
19 space on its own. It's not a separate thing. It
20 only exists as part of a multilayer electrode,
21 such as described in the Mills patent.

22 Q. So is it your opinion that an enclosure,

1 as claimed in the '257 patent, must be able to
2 stand on its own?

3 A. So in order to provide a yes-or-no
4 answer to that question, I have to think through
5 all of the possible structures that might or might
6 not stand on their own that I might consider, and
7 we don't want to sit and watch me consider all
8 such structures.

9 I do believe that a person of ordinary
10 skill would have no trouble agreeing with me that
11 the structures of the '257 patent are portions of
12 an enclosure and that a 3-micrometer thick CVD or
13 PVD-plated film, actually, just deposited film, is
14 not something that a person of ordinary skill
15 would regard as an enclosure.

16 If you want to provide a series of other
17 examples, I'm perfectly willing to consider them
18 one by one, but I don't necessarily want to draw
19 the boundary without preparation.

20 Q. Well, you mentioned that the plating in
21 Mills is too thin to stand on its own. So I'm
22 just asking you, why is that relevant, that it's

1 unable to stand on its own?

2 Is that a requirement of the enclosure,
3 that it be able to stand on its own?

4 MR. BISENIUS: Objection; outside the
5 scope.

6 THE WITNESS: I'd have to think through
7 a long list of examples of things and decide
8 whether I believe that or not. If you have a
9 couple of other maybe hypotheticals for me to
10 consider against that test, I'm happy to give that
11 some thought.

12 I am not prepared to make a -- you know,
13 I didn't do the homework to make that definitive
14 statement here today. I just know that a person
15 of ordinary skill in the art, if you attempted to
16 hand them this 3-micrometer thick film, it would
17 crumble -- it would crumble the minute it was
18 isolated from any support structure.

19 And I think a person of ordinary skill
20 in the art would not regard that a thing that
21 can't exist on its own in any form is a structure
22 that might be considered part of an enclosure.

1 BY MR. EVERTON:

2 Q. What are the requirements of this
3 enclosure that's claimed in the '257 patent?

4 A. You know, in the context of the
5 '257 patent, we're discussing a hand-held
6 electronic device that has buttons and touch
7 screens and other features and elements. I think
8 one of ordinary skill in the art would understand
9 that the enclosure has to be capable of
10 withstanding all of the interactions that go along
11 with being a hand-held device, which is that it
12 gets squeezed, it gets poked, it gets touched,
13 buttons get pressed, things get turned.

14 A 3-micrometer thick metal film formed
15 by a physical or chemical vapor deposition on its
16 own is not the element that's providing the
17 structure that handles all of those interactions.
18 Not -- in the Mills device that thin film can only
19 withstand any of that because it's plated on a
20 thicker electrode.

21 I think described in Mills is a steel
22 structure that's many orders of magnitude thicker

1 than the 3-micrometer film. And it's that
2 combination of structure that provides necessary
3 elements of an enclosure for a hand-held device.

4 Q. Do all of the portions of the enclosure
5 have the same structural requirements that you
6 were just describing?

7 A. Are you talking about the enclosure of
8 Mills or the enclosure of Markel or the enclosure
9 of the '257 or the enclosure of my cell phone, for
10 example?

11 Q. I'm talking about the enclosure of the
12 claims of the '257 and whether all the portions of
13 that enclosure claimed in the '257 patent must
14 have those same structural requirements that you
15 were just describing?

16 A. Well, just in the first claim, the first
17 portion of the enclosure experiences the user's
18 skin's contact. So that portion of the enclosure
19 has to be able to survive that interaction. And a
20 3-micrometer thick film, if you touch it, I can
21 tell you it won't survive, unless it's supported
22 by the secondary layer of that electrode, such as

1 in Mills.

2 The 3-micrometer film on its own is
3 incapable of withstanding any physical contact
4 with something such as a finger. I can actually
5 tell you that from my own personal experience.

6 Q. But in Mills, the plating is supported;
7 correct?

8 A. Yeah, as shown in Figure 3B, the film
9 14b that is formed by chemical or physical vapor
10 deposition on the underlying structure, yeah, the
11 combination of the two layers of that electrode,
12 the thin film and the thicker layer, are
13 struct- -- they have structural integrity that can
14 withstand contact with the fingers or wrist or
15 palm of the user, as described in Mills.

16 Q. Okay. So then what you're saying is the
17 requirement for the enclosure is that it -- if
18 unsupported, standing on its own must be able to
19 also withstand contact in that context; is that
20 correct?

21 A. Again, I'm reluctant to give a
22 definition for the term here without having

1 prepared for that. I do believe, as I've said a
2 few times now, that a person of ordinary skill
3 would consider the structures of the '257 patent
4 and include them in the definition of "enclosure,"
5 and that the 3-micrometer thick film formed by
6 physical vapor deposition in Mills would not be
7 regarded as a portion of an enclosure.

8 Q. And when you say that the enclosure must
9 be able to stand on its own, what do you mean by
10 that?

11 Is it that the enclosure alone and
12 unsupported by anything else must be able to
13 withstand certain forces?

14 A. I don't think it's that complicated. I
15 think these elements have to be entities that
16 exist somehow on their own. That 3-micrometer
17 thin film only exists after it's formed on a
18 substrate and can never exist without that
19 substrate supporting it. It's a layer -- it's a
20 layer of a multiple layer electrode. It's not a
21 structural element of its own.

22 Q. Do the claims of the '257 patent require

1 that the entire first portion of the enclosure be
2 made of a single material?

3 A. So the specification of the '257 patent
4 indicates that the enclosure might be made of, for
5 example, steel. Steel is itself an alloy of
6 nickel, iron, other metallic elements. It's not a
7 single elemental material. It's a mixture of
8 materials.

9 I think one of ordinary skill would
10 imagine that the portions of the enclosure that
11 we're discussing could be made of mixtures of
12 materials or of elemental materials, like silver,
13 for example. But the claim doesn't require one or
14 the other, to my reading.

15 Q. And do the claims of the '257 patent
16 require that the first portion of the enclosure be
17 made of a single part of the device and not
18 multiple parts?

19 A. I just don't have a -- I'm imagining,
20 for example, you know, it's just -- I mean, this
21 is semantics. I hate to be disagreeable here, but
22 a steel structure, such as what's formed here, is

1 perhaps made of individual parts of metal at
2 various stages in the manufacturing process. You
3 know, I don't have a good answer for you on that.

4 I think, you know, if we're finding
5 alternative ways of thinking of a 3-micrometer
6 thin film as part of a multilayer structure, the
7 thin film -- the 3-micrometer thin film is not
8 something that I think a person of ordinary skill
9 in the art would ever consider to be an enclosure
10 or a first portion of an enclosure.

11 Q. So what I'm trying to understand is
12 whether the claimed enclosure could be made up of
13 different parts that are assembled or are not the
14 same part.

15 Is that the case, that this claimed
16 enclosure could be multiple different parts that
17 are assembled together to form the entire
18 enclosure?

19 A. Sure, I think so. Figure 3 and Figure 4
20 provide illustrations of the claimed structure,
21 which includes portions that are labeled as
22 displays, bezels, et cetera.

1 Q. Right. And then the first portion of
2 the enclosure could also comprise multiple
3 different parts; correct?

4 A. I think in the manufacturing process of
5 the elements of this enclosure, there might have
6 been separate parts at various stages in the
7 process.

8 Q. And the claims of the '257 patent don't
9 require that the first portion of the enclosure be
10 a single congruous part; is that correct?

11 A. I'm sorry, what I know from the claim is
12 that the first pad is positioned underneath the
13 exterior surfacer of the first portion of the
14 enclosure. And the first pad is configured to
15 detect an electrical signal of the user's cardiac
16 signal via the user's skin's contact with the
17 exterior surface of the first portion of the
18 enclosure, and that the first pad is embedded in
19 the first portion of the enclosure.

20 I don't think there's anything in the
21 claim that tells me the first portion of the
22 enclosure must -- you know, anything about how

1 it's manufactured.

2 Q. Nor does the claim say anything about
3 what parts of the device could be included in the
4 first portion of the enclosure; correct?

5 A. It merely describes it as a portion of
6 the enclosure. It doesn't describe anything
7 further about what is included or excluded. I
8 think one of ordinary skill in the art can look at
9 the claims in the spec and the illustrations of
10 the '257 patent and see first portions.

11 For example, in Figure 4B, Element 460
12 is, I think, a distinct element that one would
13 regard being a first portion of the enclosure.

14 Q. To be clear, does the '25 -- do the '257
15 claims -- '257 patent claims require that the
16 first portion of the enclosure constitute all of
17 the enclosure?

18 A. I think the literal meaning of the
19 phrase "first portion of an enclosure" implies
20 that there are other portions not included. For
21 example, further down the claim there's a second
22 portion of the enclosure. I think those have to

1 be distinct structures. So there's at least those
2 two and more, I think.

3 Q. Do the claims of the '257 patent require
4 that the enclosure be separate from the pad?

5 A. I think the first claim describes a pad
6 embedded in a first portion of the enclosure as
7 two distinct elements. For example, in Figure 4B,
8 Item 460 being the first portion of the enclosure,
9 Figure 472 being the first pad. Those were not
10 identifying a single element with both claimed
11 functions.

12 Q. But my -- sorry, my question was a
13 little bit different.

14 It was whether the '257 patent claims
15 require that the enclosure be separate from the
16 pad?

17 A. The claim requires that the pad is
18 embedded in the enclosure.

19 Q. And does that require that the pad be
20 separate from the enclosure if it's embedded in
21 the enclosure?

22 A. So I think a month or two ago at my last

1 deposition, we spent a lot of time discussing
2 various things which might be embedded in each
3 other in various ways. I don't want to recite all
4 of those hours of questions and answers in, but I
5 think the definition of "embedded in" that I
6 relied on when we had that discussion a few months
7 ago applies here. I can find it and read it just
8 to be sure. I don't want to confuse the record.

9 So paragraph 31 of my first declaration,
10 it says, The understanding of embedded in is at
11 least partially set in or partially surrounded by
12 a material. That's -- I believe that's what the
13 claim requires.

14 Q. So there are no -- so the claims of the
15 '257 patent don't include a requirement that the
16 enclosure be separate from the pad; is that
17 correct?

18 A. What's required is that the pad is
19 embedded in a first portion of the enclosure, and
20 that means that it's partially set in or partially
21 surrounded by that first portion.

22 Q. Okay. So there is no requirement --

1 additional requirement for the enclosure being
2 separate from the pad; right?

3 A. Well, let me understand your question.
4 They're two distinct entities. There's an
5 enclosure, and there's a pad. They're not the
6 same thing. There's not one thing that is
7 providing both of those functions in the claim.
8 They're two separate things. One of them is
9 embedded in the other.

10 Maybe I'm misunderstanding your
11 question.

12 Q. So then under your understanding of the
13 claims, is there a requirement that the enclosure
14 be separate from the pad?

15 A. Do we mean separate physically or being
16 separate -- two separate things?

17 Q. Let's start with physically. Is there a
18 requirement that the enclosure be physically
19 separate from the pad in the claims?

20 A. So not touching, no contact, no physical
21 contact?

22 Q. Is that your understanding of

1 "physically separate"?

2 A. I'm asking -- you're asking the
3 question. I'm trying to understand -- I want to
4 give you the right answer. I just want to be sure
5 I understand. If you're asking is the pad
6 separate from the first portion of the enclosure,
7 is that required by the claim, my answer is there
8 is a pad and a first portion that are two distinct
9 items. They might be in contact. One is embedded
10 in the other which means that it's partially set
11 in or partially surrounded by the other.

12 You probably remember our last
13 conversation where we explored many arrangements
14 of desks and books and drawers and shelves and
15 other such things, and I think there were
16 questions and answers along these lines. I think
17 you're asking me the same question you asked me a
18 couple of months ago, but I just want to be clear.

19 Q. No, I'm not asking about "embedded in."
20 I'm asking about -- I asked you about whether the
21 claims have a requirement for the enclosure being
22 separate from the pad. And you said, is that

1 physically separate, or is it -- does it mean two
2 separate things?

3 So now I'm asking, do the claims require
4 that the enclosure be physically separate from the
5 pad?

6 A. I think claim -- so, for example,
7 Figure 4B, my understanding of the figure and the
8 way it's described is that the pad 472 is in
9 contact with the first portion of the enclosure
10 460. And that that's covered by the claims.

11 Q. Okay. So there is no requirement that
12 the enclosure be physically separate from the pad;
13 correct?

14 A. I think that's correct.

15 Q. Now, going to the other type of separate
16 that you mentioned, do the claims of the
17 '257 patent require that the enclosure be a
18 separate thing from the pad?

19 A. So paragraph 96 of my first declaration,
20 if you have that handy, after the first sentence,
21 I say, Within a single complete mapping of
22 Claim 1, the electrode of Mills cannot

1 simultaneously be both the first pad and the first
2 portion of the enclosure in which the first pad is
3 embedded in which the first pad is positioned
4 underneath, as required by the claims. A person
5 of ordinary skill in the art would recognize that
6 a single structure in Mills cannot simultaneously
7 serve as two claim structures. And further and
8 more obviously, a person of ordinary skill would
9 recognize the straightforward fact that a
10 component cannot be positioned underneath itself,
11 as required by the claims.

12 Q. So does the enclosure need to be
13 distinct from the pad?

14 A. I think the claim requires an enclosure
15 that includes a first lead comprising a first pad
16 that's embedded in a first portion of the
17 enclosure. Therefore, the pad and the first
18 portion of the enclosure are two distinct items.
19 They're distinct in the '257 patent.

20 Q. And when you say that the enclosure and
21 the pad need to be distinct, what do you mean by
22 that? What does "distinct" mean?

1 A. So, for example, Figure 4B shows 460,
2 the item which is the first portion of the
3 enclosure, and 472, the first pad. I can tell
4 which is which, and I can tell where one ends and
5 the other begins. It's two distinct items.

6 Q. And if we look at the Mills reference.

7 A. Okay.

8 Q. It's Exhibit 1006.

9 (Exhibit 1006 was presented.)

10 THE WITNESS: Uh-huh.

11 BY MR. EVERTON:

12 Q. If we look at Figure 3B.

13 A. It's actually on the same page as
14 Figure 1. There you go.

15 Q. Yeah, you mean there at the bottom.

16 So looking at 3B, what is the part there
17 labeled "14b"? Is that the plating?

18 A. Yeah, so Column 4, starting around
19 line 32, Preferably base plating -- sorry, I'll
20 start over.

21 Preferably base metal-plating
22 composition 14b is in order of preference a

1 titanium nitride, titanium carbide or a titanium
2 carbo-nitride layer approximately 3-microns thick.

3 Q. And part 14a, that corresponds to the
4 expanse; is that correct?

5 A. A base metal that's electrically
6 connected to the interior monitoring equipment.
7 And the Figure 3B is shown in greatly enlarged
8 thickness, which I take to mean that we're seeing
9 only a small portion of 14a relative to the
10 thickness of 14b.

11 Q. And in this Figure 3A -- or 3B of Mills,
12 you can see -- and what is the material that's
13 used for the plating 14b?

14 A. It could be titanium nitride, titanium
15 carbide, or titanium carbo-nitrite, approximately
16 3-microns thick. Such composition can be plated
17 by known chemical or physical vapor deposition
18 techniques.

19 Q. And what is the material used for the
20 pad part, 14a?

21 A. So it describes 14a, the electrode
22 comprised of an expanse formed of a base metal

1 such as stainless steel.

2 Q. Okay. So the pad and the plating are
3 made of different materials; correct?

4 A. The layer 14a and the layer 14b are made
5 of different materials. I don't think I would
6 describe them separately as pad and other.
7 They're together an electrode, a two-layer
8 electrode structure. You might call the whole
9 thing a pad, if you like, but I wouldn't
10 distinguish them from each other in that regard.

11 MR. BISENIUS: Ben, we've been going for
12 over an hour and a half at this point. I wonder
13 if we can take a break.

14 MR. EVERTON: Yeah. Yeah, just a couple
15 more questions and let's take a break, just to
16 finish this.

17 BY MR. EVERTON:

18 Q. So looking at Mills Figure 3B, you can
19 see where the pad 14a ends and the plating 14b
20 begins; correct?

21 A. I think that's the purpose of this
22 figure, to show a thin layer on top of a thick

1 structure.

2 Q. If an enclosure in the claims of the
3 '257 patent was physically separate from the pad,
4 could the pad still be embedded in the enclosure?

5 A. This reminds me of the question that we
6 discussed a few months ago about a book in a
7 drawer, perhaps being inside the drawer but not
8 contacting the bottom or the walls of the drawer,
9 but still partially surrounded by the drawer. And
10 that would be -- that book is embedded in the
11 drawer.

12 MR. EVERTON: Okay. I think we can take
13 a break now. Should we take, say, ten minutes?
14 Is that okay?

15 MR. BISENIUS: Sure.

16 THE WITNESS: That would be great. I
17 don't know if you've heard my dog whining a little
18 bit in the background. I think she needs a break
19 more than I do, but --

20 MR. EVERTON: Okay.

21 THE WITNESS: Ten minutes sounds great.

22 MR. EVERTON: Okay.

1 (Recess from the record.)

2 BY MR. EVERTON:

3 Q. Okay. So going back to Mills, the Mills
4 reference, which is Exhibit 1006. Yeah, Figure 3B
5 there that we were looking at. We were talking
6 about the plating 14b and the underlying pad 14a.

7 So is the plating 14b and the pad 14a,
8 are those separate parts?

9 A. I think one of ordinary skill would see
10 that 14a and 14b are two distinct layers of the
11 electrode in Mills.

12 Q. And as we were talking about, you have
13 two different meanings of "separate," physically
14 separate and two separate things.

15 So the pad 14a and plating 14b are
16 separate things; is that correct?

17 A. I think the one of ordinary skill in the
18 art reading Mills would understand that the plated
19 film, the CVD or PECVD film 14b is a distinct
20 layer of the two-layer electrode that makes up the
21 Element 14.

22 Q. So in that way, plating 14a -- or

1 plating 14b and the pad 14a are two separate
2 parts; correct?

3 A. They are two distinct layers of the
4 multilayer electrode 14 in Mills, yes.

5 Q. But they are not physically separate; is
6 that correct?

7 A. That CVD film, 14b, can only exist if
8 it's supported by the stainless steel expanse of
9 14a. On its own -- if you somehow formed it on a
10 disappearing substrate, it would disintegrate the
11 minute it was on its own. So it has to be in
12 contact.

13 Q. Now, if we can turn to Exhibit 1068.
14 This is the Lyons reference.

15 (Exhibit 1068 was presented.)

16 THE WITNESS: Okay.

17 BY MR. EVERTON:

18 Q. Did you analyze this Lyons reference as
19 part of your second declaration?

20 A. Yes, I believe the description of that
21 analysis is -- starts on paragraph 5 of my second
22 declaration.

1 Q. If we look at Figures 3 and 4 of Lyons.

2 A. Okay.

3 Q. Do you agree that Lyons identifies parts
4 122 as sensor pads?

5 A. That's what Lyons describes them as,
6 yes.

7 Q. Do you agree that Lyons identifies part
8 114 as a bezel?

9 A. Yes, I believe that's correct.

10 Q. Do you have any reason to disagree with
11 these designations in Lyons?

12 A. No, I can think of no reason to disagree
13 with the description of 114 as a bezel. 122 is a
14 capacitive electrode for detecting the presence of
15 a finger.

16 Q. And 122 is a sensor pad?

17 A. Lyons uses the word "pad," that's
18 correct. I don't think "pad" is any particular
19 special meaning in the world of electrical
20 engineering or communications or sensors. It's
21 just a word that is used in this case. 122 is an
22 electrode of a capacitive detection system that

1 can detect the presence of a finger on the surface
2 of the bezel.

3 Q. And Lyons shows sensor pad 122 under the
4 bezel 114; correct?

5 A. Yeah, so Element 122 is positioned under
6 114 in that figure, correct.

7 Q. And is the sensor pad 122 positioned on
8 the inner surface of the bezel 114?

9 A. Well, this drawing doesn't really give
10 the detailed representation of the relationship
11 between those two items. In order for the
12 electrode 122 to be used as part of a capacitive
13 sensing system as described in the patent, the
14 Lyons patent, it needs to be electrically isolated
15 from the surrounding electrodes. Otherwise, the
16 electrical capacitive signal would be shorted out
17 by conductive signals passing through the bezel.

18 Q. So you don't know, based on this
19 Figure 4 of Lyons, whether or not the sensor pad
20 122 is positioned on the inner surface of the
21 bezel 114?

22 A. So my understanding of capacitive

1 sensor, such as what's described in Lyons, is that
2 it has to be electrically isolated from a
3 structure like the bezel 114. And, therefore,
4 there must be a thin insulating layer in there.

5 Lyons really doesn't go into a detailed
6 description of the architecture of this sensor
7 beyond describing it as a capacitive sensor for
8 detecting the position and movement of the
9 fingers. So I'm relying on what one of ordinary
10 skill in the art would understand, that a
11 capacitive sensor, in order to function as such,
12 needs to be electrically isolated. And,
13 therefore, there must be some layer in there
14 that's just not shown.

15 And that's an artistic decision made in
16 Lyons, not, I think, intended to be specifically
17 meaningful or precise.

18 Q. So although Lyons doesn't show any layer
19 between the pad 122 and the bezel 114, you think
20 that there must be a layer there?

21 A. So Lyons doesn't describe the
22 Element 122 in any detail. I believe that it is a

1 metallic electrode that has to be electrically
2 isolated from the other metal structures. So it
3 might itself have a thin insulating layer formed
4 on it in its own manufacturing process, or there
5 might be a thin insulating structure between that
6 element and the bezel.

7 If there is no such electrical
8 isolation, it can't function as a capacitive
9 electrode. And I think Lyons is clear on that
10 point, although not providing details of the
11 architecture of the sensor. It clearly describes
12 it as a capacitive sensor.

13 Q. And the sensor pad 122 is sandwiched
14 between the flex circuit 120 and the bezel 114;
15 correct?

16 A. Yeah, in this figure, it's shown in
17 between 114 and 120. Again, there's not a lot of
18 precise information about the details of how it's
19 mounted or fixed in place, but that's its
20 location.

21 Q. And is the sensor pad 122 surrounded on
22 one side by bezel 114?

1 A. So you asked if it's surrounded by or
2 embedded in? I'm sorry, can you refresh my memory
3 on your question?

4 Q. Is sensor pad 122 surrounded on one side
5 by bezel 114?

6 A. So this cross section in the Figure 3
7 above it shows the Element 114 as kind of a
8 circular sloped rim with a circular surface, and
9 the Element 122 is positioned underneath it. I
10 think one of ordinary skill would agree that it's
11 partially surrounded by that structure 114.

12 Q. And looking at Figure 6 of Lyons, is
13 there curvature to the bezel 114?

14 A. I think my understanding of this figure
15 in the context of the other figures is that it's
16 curved, it's a portion of a curved surface.

17 Q. And the inner surface of the bezel 114
18 has that curved surface?

19 A. I -- again, not enough detail to say
20 with absolute certainty, but I would think one of
21 ordinary skill in the art would likely agree that
22 the undersurface of that bezel 114 is probably

1 curved just like the outer surface.

2 Q. Does the bezel 114 surround the display
3 of Lyons?

4 A. The display is Item 126, I believe?

5 I'm sorry, I asked the question. I just
6 want to be sure. The display you're referring to
7 is Item 126 or some other structure underneath?

8 Q. No, the display there shown, 126, in
9 Figure 6, does the bezel surround that display, as
10 shown in Figure 6?

11 A. I don't mean to quibble. I think the
12 display is Item 110. I'm imagining 126 is the
13 cover glass. But in the spec, the only place 126
14 is described is with respect to the circuit in a
15 different figure, and it's a Zener diode. So I
16 don't want to give an answer about 126 that can be
17 misconstrued.

18 110, I believe, is the display
19 underneath what I imagine is a cover glass in
20 Figure 4 and Figure 6.

21 Q. Okay. So does the bezel --

22 A. It doesn't [inaudible] in the patent in

1 that Item 126 isn't described anywhere with
2 respect to Figure 4 or Figure 6. The only place
3 126 is mentioned is with respect to Figure --
4 where did it go? The figure with the circuit.
5 Now I've gotten confused. I'm sorry, I was
6 looking between Lyons and Larson.

7 Let me back up. Strike all of what I
8 just said. Sorry, my fault.

9 110 is the display. 126 is a generally
10 transparent lens crystal.

11 Q. Okay. So let's start with 110.

12 Does the bezel 112 surround the
13 display 110 in Lyons?

14 A. I think if we look at Figure 4, which is
15 a cross section, 110 is a structure beneath the
16 glass, I think. Is it surrounded by the bezel?
17 It's a little hard to say.

18 You know, if you remember the questions
19 we asked about the book in the drawer back a
20 couple of months ago, if the book was inside the
21 drawer sort of near the bottom, you know, but the
22 walls surrounded it, then I regarded that as

1 embedded in. If the book was above the drawer,
2 not beneath the sides of the drawer, I would say
3 no.

4 And it's a little unclear whether that
5 Item 110 is kind of within the drawer that I'm
6 thinking of with respect to 114 or not. I don't
7 think Lyons is particularly concerned with the
8 vertical location of 110 relative to the bezel.
9 So it's not distinct one way or the other.

10 Q. So you can't tell whether or not the
11 bezel 114 surrounds the display 110 in Lyons; is
12 that correct?

13 A. It's just hard to say. It might. I
14 don't think Lyons particularly cares one way or
15 the other. If I think of the bezel structure, as
16 shown in Figures 4 and 3 and 6, it's at Item 114,
17 which goes partway down the side of the watch, but
18 not all the way down and around. There's other
19 structure below that, 108, et cetera.

20 And, again, all the questions that we
21 went through a couple of months ago about a drawer
22 and a book, if I can -- if the book is above the

1 entire structure of the drawer, it was not -- I

2 did not agree that it was embedded in.

3 Here, the entire display 110 might be
4 below the bezel entirely. It might be slightly
5 within. And, again, I don't think the artwork
6 here is intended to convey precision and location.
7 So I think the honest answer is it's hard to tell
8 and it probably doesn't matter, not to the
9 function of what's in Larson.

10 Q. How about the glass 126, does the bezel
11 114 of Lyons surround the glass 126?

12 A. I think so.

13 Q. Now, going back to -- or, yeah, looking
14 at Figure 4 here, Lyons, is this the sensor pad
15 122 positioned under the exterior surface of the
16 bezel 114?

17 A. So the capacitive sensor electrode of
18 122 is positioned underneath the bezel. I
19 disagree with calling it a pad or a first pad.
20 Certainly I disagree with calling it a first pad
21 because it doesn't meet the limitations of that
22 requirement, but it is an electrode positioned

1 under the bezel.

2 Q. Yeah, and my question is -- was whether
3 sensor pad 122 of Lyons is positioned under the
4 exterior surface of the bezel 114?

5 A. Yeah, 122 is positioned under the
6 exterior surface of 114.

7 Q. And is the sensor pad 122 located on the
8 inner surface of the bezel 114?

9 A. As I explained earlier, I think the
10 pad 122, this capacitive sensor pad, cannot be
11 electrically connected to the bezel 114. It's
12 underneath it with, I think, a layer, at least a
13 layer of insulating material between the two.

14 Q. But the Figure 4 there shows sensor
15 pad 122 positioned directly on the inner surface
16 of the bezel 114; correct?

17 A. I think one of ordinary skill in the art
18 would understand that the electrical -- the
19 electrode 122, the electrical portion of it, has
20 to be electrically isolated from the bezel in
21 order to function as a capacitive pad, capacitive
22 sensor electrode, and that, therefore, there must

1 be either a gap or some insulating material
2 between the two.

3 It's not shown in the drawing because
4 this is an artist rendering and not an engineering
5 drawing, but one of ordinary skill would
6 understand that a capacitive sensor electrode
7 needs to be electrically isolated from the rest of
8 the structures in order to sense capacitance the
9 way it's described in the patent.

10 Q. And the pad 122 of Lyons is embedded in
11 a first portion of the enclosure; correct?

12 A. I would say it's partially surrounded by
13 the bezel. So if you want to identify the bezel
14 as a first portion of the enclosure, the Item 122
15 is embedded in that in the sense that it is
16 partially surrounded by that structure.

17 Q. Okay. So if the bezel 114 is part of
18 the first portion of the enclosure, then the
19 pad 122 is embedded in that first portion of the
20 enclosure; correct?

21 A. Yes, the electrode -- the capacitive
22 sensing electrode 122 is partially surrounded by

1 the bezel structure 114. And in my understanding,
2 that means that one would consider it to be
3 embedded within.

4 Q. And if the bezel of Lyons is metal and
5 the electrode is a conductive ECG electrode, if
6 you swapped out the electrode to be a conductive
7 ECG electrode, then could the electrode pad
8 receive a cardiac signal from a finger contacting
9 the bezel?

10 A. So if the disclosure of Lyons was
11 replaced with a completely different kind of
12 sensing electrode, electronics, geometry,
13 packaging, et cetera, could it -- could an
14 electrode inside of a wearable item sense an ECG
15 signal?

16 I think generally, yes. This particular
17 electrode, the way it's positioned, the parent
18 geometry, dimensions, the way it's isolated, and
19 everything about how it's described, tells me that
20 it would not sense an ECG signal as it's currently
21 configured.

22 It would sense the capacitance changes

1 associated with the presence and absence of a
2 finger, but it's not operated, assembled. There's
3 a million reasons why this is not an EKG sensor.
4 I actually have a rather long list of all those
5 reasons in my report.

6 Q. Right. But what I'm trying to ask is if
7 a conductive ECG electrode were placed under a
8 metal bezel, like the one shown in Lyons at 114,
9 could the pad of that electrode receive a cardiac
10 signal through that metal bezel?

11 A. If you're asking me if I put the
12 electrodes from the '257 patent into Lyons, where
13 there's a metal -- a first pad positioned
14 underneath the first portion of the enclosure,
15 which is a bezel in the '257 patent, can the
16 electrode in the '257 patent detect an EKG signal,
17 yes, it can.

18 There's a long list of differences
19 between what's here in Lyons and what's in the
20 '257 patent. Just the presence of an electrode
21 under a bezel is not sufficient, even close, to
22 determining whether or not it can detect an EKG

1 signal or an ECG signal.

2 It's different electronics, different
3 geometries, different structures, operated in a
4 different way, looking for different signals. The
5 long list of distinctions in my report -- as
6 you've seen, it's not a long report. So it's easy
7 to find. It will only take a moment.

8 Starting -- whoops, hold on.

9 Starting in paragraph 17, there's a
10 whole long list of things that are distinct
11 between Mills and the '257 patent -- I'm sorry,
12 between Lyons and the '257 patent. Just the fact
13 that there is an electrode under a bezel is not
14 even the beginning of what it would take to be
15 able to sense ECG signals.

16 Q. So you mentioned that if you put an ECG
17 electrode like the one in the '257 patent under
18 the bezel 114 of Lyons, it could receive a cardiac
19 signal, the same would go for an electrode like
20 the one disclosed in Mills; correct?

21 If you put the electrode of Mills
22 underneath a metal bezel like the one shown in

1 Lyons 114, the electrode of Mills could receive a
2 cardiac signal through that metal bezel; correct?

3 A. Are we talking about a conductive
4 detection of that electrical signal or a
5 capacitance detection of electrical signals?
6 Because everything else about the system would be
7 different, including whether there would be an
8 insulating layer between the electrode and the
9 bezel.

10 Q. Yeah, so I'm referring specifically to
11 the electrode of Mills, and if that -- if the
12 electrode of Mills was placed underneath a bezel,
13 like Lyons' bezel 114, that electrode of Mills
14 could receive a cardiac signal through the bezel
15 114; correct?

16 A. So you'd have to mount it in the way
17 that's shown in the '257 patent. So it has to be
18 electrically connected to the bezel in order to
19 detect the electrical ECG signals from the user.
20 So you'd be discarding the insulating layer of
21 Lyons. You'd be discarding all of the electronics
22 of Lyons and replacing it with the electronics of

1 the '257 patent.

2 I think basically you're asking me if I
3 take all of the invention of the '257 patent and
4 replace the bezel of the '257 with the bezel of
5 Lyons, would that work? And I think the answer is
6 it could, if one took care of all the engineering
7 details.

8 Q. So a cardiac signal could be transmitted
9 through a metal bezel, like the one shown in Lyons
10 at 114?

11 A. So that's exactly the claimed invention
12 of the '257 patent. Now, in Lyons, this is a
13 capacitive sensing system for detection of the
14 proximity of fingers, and so there's design
15 choices made as part of this invention that allow
16 it to function as a capacitive object detector,
17 like the StudSensor that I described in my report.

18 There's differences between the
19 electrical arrangement, the circuits, the way
20 things are operated, the signals, how they're
21 processed. It's -- aside from just the fact that
22 there's an electrode, they're completely different

1 in almost every other regard.

2 Q. So regarding the Markel reference -- you
3 reviewed the Markel reference; correct?

4 A. Yes.

5 Q. If the bezel in Markel was metal, and
6 Markel's electrode was positioned on the inner
7 surface of that bezel, could the pad receive a
8 cardiac signal from a finger?

9 A. Can you point me to a figure in Markel
10 that has this bezel in an electrode that I can
11 sort of talk about?

12 Q. Sure. So, yeah, let's go to
13 Exhibit 1005.

14 (Exhibit 1005 was presented.)

15 BY MR. EVERTON:

16 Q. If we go to Figure 15 of Markel.
17 So Figure 15 shows a device of Markel;
18 correct?

19 A. Yes, I believe that's Figure 15 from
20 Markel.

21 Q. And it shows electrodes at 1510, 1530,
22 1531; is that correct?

1 A. Yeah, 1510 is an electrode on a border
2 portion of the device.

3 Q. And that border around the display of
4 the device in Markel is a bezel; correct?

5 A. I might call it a frame. I don't know
6 that I would call it a bezel. 1540 in this figure
7 is described.

8 Does Markel ever use the word "bezel"?
9 I don't remember if it's used as such. I would
10 call it the frame of a display.

11 Q. So it's your opinion that that frame of
12 the display in Figure 15 of Markel is not a bezel?

13 A. I can't tell from what's shown here.
14 It's pretty clear Markel isn't attempting to make
15 any such inference. It could be a bezel. It
16 might not be a bezel. I don't know. It's clearly
17 a frame around that middle section, which I'm
18 assuming is a display, although even that's not
19 labeled.

20 If you look at figures -- the prior
21 figures, the later figures, there's not really
22 much help here. Figure 12, 1222, a display device

1 which may comprise, for example, a touch screen on
2 a desktop computer.

3 Q. So if that frame shown in Figure 15 of
4 Markel were made of metal, and one of the
5 electrode pads was positioned on the inner surface
6 of that frame, could the pad receive a cardiac
7 signal from a finger?

8 A. So my understanding of this figure is
9 that these electrodes are on the surface, that
10 they're made of a conductive plastic that is
11 visually similar to the surrounding material, and
12 that those dotted lines are showing the boundary
13 of that surface electrode, not any indication that
14 this is somehow underneath a steel frame.

15 Q. Okay. But those electrodes are on the
16 inner surface. So now I'm talking about a
17 situation where the electrodes are positioned on
18 the inner surface of that frame, and the frame is
19 metal.

20 Would the electrode pads be able to
21 receive a cardiac signal from a finger?

22 A. So I can't say for sure what Markel is

1 describing here, but I think your question can be
2 applied to Figure 4 of the '257 patent, which has
3 the first pad positioned beneath the curved
4 portion of the bezel. And it's configured to
5 detect the user's cardiac signal.

6 So if you build something like what's in
7 the '257 patent, it can detect cardiac signals,
8 true. I don't know that's what Markel has built,
9 or Mills for that matter.

10 Q. Right. So cardiac signals can be
11 transmitted through conductive bezels, as shown in
12 the '257 patent and -- or any other metal bezel
13 that would be used to receive cardiac signals; is
14 that correct?

15 A. Well, I won't say yes to the whole
16 thing. There's plenty of ways you can put an
17 electrode under a metal structure and not be able
18 to sense anything from outside. But if you build
19 what's shown in the '257 patent, that structure is
20 designed to be able to detect the electrical
21 signals associated with the cardiac signal of the
22 user.

1 Q. And was the '257 patent the first
2 invention of a metal bezel that receives cardiac
3 signals through the bezel?

4 A. That's not a question I've been asked to
5 analyze. I imagine your team and Mr. Oslan had
6 that question in mind when they did their work.
7 My analysis relates to the prior art examples that
8 were -- that are on the table in this discussion,
9 so Markel, Mills, Lyons, and the rest. And I
10 believe those references, in various reasonable
11 combinations, don't anticipate the claims of the
12 '257 patent.

13 Q. Would a person of skill in the art
14 already have known before the '257 patent that an
15 ECG signal could be received through a metal frame
16 or bezel of a device?

17 A. Can I have that question again?

18 Q. Yeah. Would a person of skill in the
19 art already have known before the '257 patent that
20 an ECG signal could be received through a metal
21 frame or bezel of a device?

22 A. I don't know. That's not analysis I

1 performed. I didn't do my own independent prior
2 art search of the '257. I considered the
3 references that were provided, Markel, Mills, and
4 all the rest. And that subset of prior art, as
5 far as I can tell, I think one of ordinary skill
6 would agree, doesn't anticipate the claims of the
7 '257 patent.

8 Q. Turning to your declaration, your second
9 declaration, Exhibit 2014.

10 At paragraph 9, you say, "The use of
11 capacitive sense electrodes for detecting the
12 proximity of external objects, such as the fingers
13 of a user has been well established."

14 Do you see that?

15 A. Yes.

16 Q. And then in your declaration, you
17 discuss the StudSensor; is that right?

18 A. I do, yes.

19 Q. Is the StudSensor able to detect presses
20 or the electrical field around a fingertip?

21 A. I think paragraph 13 answers that
22 question, that the -- that these electrodes can be

1 used for capacitive sensing studs or fingers. And
2 I know from my own experience from the use of the
3 StudSensor, that if you activate the device and
4 move your fingers around, it detects them as if
5 they might be studs.

6 I say that I am sure the system in the
7 '257 patent and in Mills and Markel is incapable
8 of capacitive detection of a presence of a finger
9 or a stud and that the StudSensor, which uses
10 electrodes and methods similar to the Lyons
11 publication for capacitive sensing of the presence
12 of fingers, is incapable of detecting ECG signals.

13 Q. Are there any structural differences
14 between the watch in Lyons and the StudSensor?

15 A. Yeah, I think there's a long list, size,
16 shape, materials, et cetera. But the basic
17 principle is the capacitive presence detection
18 that can be used for detecting fingers in Lyons or
19 studs in the StudSensor.

20 Basically, the same, you have an
21 electrode inside the housing. You apply an
22 oscillating potential to the electrode and measure

1 the currents onto and off of the electrode as a
2 way of detecting its capacitance.

3 It's exactly what's in the Lyons patent
4 and it's what's in the StudSensor and it's what's
5 described in some other earlier references that I
6 mentioned in the report.

7 Q. Is the StudSensor in the same field of
8 endeavor as the '257 patent?

9 A. No, unless you interpret those endeavors
10 extremely broadly, but I think the principle of
11 capacitive detection of objects like studs and
12 fingers is well known across the art, and that a
13 person of ordinary skill, as we've defined it,
14 would appreciate that capacitive electrodes, such
15 as in Lyons or in the StudSensor, are using the
16 same principles to detect objects in more or less
17 the same way, just the presence of a finger or a
18 stud.

19 Q. So the stud finder [sic] is pertinent to
20 the same problem that's addressed in the
21 '257 patent; correct?

22 A. No, I think -- but, you know, one of

1 ordinary skill in the art, working on things
2 around the '257 patent, would have a basic
3 education in electrical engineering and maybe have
4 some exposure to different kinds of sensors and
5 would appreciate that a capacitive proximity
6 sensor is a well-known item in the underlying art.

7 And if I was interested in building an
8 invention such as Lyons, I would appreciate that a
9 capacitive proximity sensor like the stud
10 finder -- StudSensor could be used in the watch of
11 Lyons for detecting the presence of fingers around
12 the perimeter of the watch face.

13 Q. Now, turning to paragraph 23 of your
14 declaration, your second declaration.

15 Can you read into the record the last
16 sentence of paragraph 23?

17 A. So this is -- I'm quoting from Markel.

18 "Markel describes electrodes which
19 '...comprise a metallic surface supposed for user
20 contact.' Markel emphasizes the use of externally
21 positioned conductive metal or plastic for these
22 electrodes, and describes means '...to enhance the

1 conductive contact with the user.'"

2 Q. Does this suggest that the user must
3 touch the electrode in Markel?

4 A. In order to have conductive contact with
5 the user, you must have contact, so yes.

6 Q. So Markel's electrodes are touch based
7 sensors then?

8 A. I believe so. The electrodes on Markel
9 are intended to detect electrical signals from the
10 user by contact between the user's fingers and
11 those electrodes.

12 Q. But the conductive contact can be
13 through an additional conductive layer, isn't that
14 correct, and not directly with the electrode?

15 A. There could be multilayer electrodes.
16 There's nothing in Markel that suggests a need or
17 benefit to having a secondary layer. The
18 conductive electrodes in Markel, the material of
19 those electrodes is described as being
20 sufficiently conductive to capture the signals of
21 interest.

22 Q. But there could be a conductive bezel

1 between the user's finger and the electrode, and
2 that would still allow transfer of the signal to
3 the electrode; correct?

4 A. The '257 patent describes exactly what
5 you're saying. So if Markel had included
6 Figure 4B of the '257 patent and the associated
7 language, then I would say yes. But Markel, as
8 it's written, emphasizes the benefits of the
9 conductive plastic electrodes on the surface as
10 providing sufficient electrical properties to
11 operate the product. There's nothing in Markel
12 that suggests a benefit or interest in putting
13 additional layers on top of the electrodes.

14 Q. So with regard to this type of an
15 electrode and being a touch based sensor
16 electrode, what types of other conductive layers
17 could be added on top of the electrode that would
18 still allow the cardiac signal to be transferred?

19 MR. BISENIUS: Objection; outside the
20 scope.

21 THE WITNESS: Markel teaches conductive
22 plastic electrodes that are visually similar to

1 the surrounding material so that the user is
2 unaware of the presence of electrodes. And,
3 frankly, if you're going to go add metal layers on
4 top of Markel where the electrodes are, you're
5 departing from the main benefits of Markel.

6 I suppose if Markel had invented a
7 different thing, it would be different. But what
8 Markel invented is a structure that has a -- I'm
9 sorry, a conductive plastic electrode on the
10 surface, which is made of a material that is
11 visually indistinct from the surrounding plastic
12 so that the user isn't necessarily aware of the
13 presence of the electrode. That's the primary
14 invention of Markel.

15 BY MR. EVERTON:

16 Q. Right. And my question was a little
17 different. I wasn't asking about Markel
18 specifically. I was asking about these touch
19 based sensors that you were referring to, and you
20 mentioned that there could be conductive layers
21 between those sensors, the electrode and the
22 user's finger.

1 And I was just asking what could those
2 conductive layers be that could be added between
3 the electrode pad and the finger?

4 A. So the '257 provides a good example of
5 what such a layer might be. It would be the
6 stainless steel bezel that is the portion of the
7 enclosure that is above the pad, the first pad of
8 the '257.

9 Q. Are you aware of any other examples of
10 layers -- conductive layers that could be added on
11 top of an electrode to receive cardiac signals?

12 A. I could look through the '257 patent for
13 its listing of other materials that might serve
14 that function. It cites stainless steel as one
15 example. If you give me a few moments, I can --
16 perhaps aluminum, for example, other such
17 materials. Let's see here.

18 Yeah, so the '257 patent cites stainless
19 steel as one example, but other conductive
20 materials could be used. I think one of ordinary
21 skill in the art would understand in the context
22 of the '257 patent how to select the material

1 property, the geometry, the dimensions, the
2 thickness, et cetera, to achieve the appropriate
3 amount of electrical conduction from the surface
4 of that part of the enclosure to the embedded
5 first pad.

6 Q. So if we go to the Markel reference,
7 that's Exhibit 1005, to paragraph 68.

8 A. Okay.

9 Q. About one third the way down through
10 that paragraph 68, it says, "For example, such
11 electrodes may be adapted to detect cardiac
12 activity of user that is conductively coupled to
13 electrodes (e.g., by touching the electrodes)."

14 Do you see that?

15 A. Yes.

16 Q. So here, Markel says that the cardiac
17 activity of the user is conductively coupled to
18 the electrodes. And then it gives the example of
19 touching the electrodes.

20 What other types of conductively coupled
21 are you aware of, other than by touching the
22 electrodes?

1 A. I think Markel is pretty clear it's all
2 about touching the electrodes. I can't think of
3 any other -- I mean, I suppose if you were in a
4 weird frame of mind, you could wear a metal glove,
5 and the metal glove might carry the signal to the
6 electrodes. I think it's very clear what's being
7 described here is an exposed electrode that is
8 engaged by direct contact with the fingers of the
9 user.

10 Q. Could that conductively coupled
11 mentioned by Markel be referring -- also be
12 referring to other layers of conductive material
13 on top of the electrode?

14 A. There's nothing else in Markel that
15 indicates any purpose or benefit of any additional
16 layers and frankly one of the main features of
17 Markel is the fact that the electrodes are
18 visually concealed by being visually consistent
19 with the surrounding material. So adding a
20 conductive layer on top of the Markel electrodes
21 would, I think, disable one of the key features of
22 Markel.

1 Q. So is it your opinion that although
2 Markel says touching the electrode is only one
3 example of being conductively coupled, Markel did
4 not contemplate any other examples or ways of
5 conductively coupling to the electrodes?

6 A. I think that's right. The electrodes
7 are on the surface. They're visually concealed
8 but present on the outer surface of Markel. And
9 the intent is that the user, in the course of
10 using the hand-held device, is touching those
11 electrodes.

12 Q. And is it your opinion that a person of
13 skill in the art would not be aware of any other
14 ways to conductively couple the electrodes in
15 Markel, other than by touching, direct touching?

16 A. Not anything that would be practical or
17 reasonable. I mean, again, if you wanted to, you
18 could take a metal wire and hold it in your
19 fingers and touch the device of Markel with the
20 other end of the wire. I don't imagine any user
21 would ever do that, and it's not, I think,
22 reasonable for a person of ordinary skill in the

1 art to be worried about that in this case.

2 Markel clearly describes a hand-held
3 device with fingers touching or the ear or
4 touching various electrodes and capturing ECG
5 signals through that direct electrical contact
6 with the surface of those electrodes.

7 Q. And could the person of skill put the
8 electrode underneath a metal bezel, for example?

9 A. At the time of Markel, I don't know that
10 a person of skill would have been able to
11 understand and anticipate the invention of the
12 '257 patent. So I don't know. I, myself, are
13 unaware of any references that tell me a person of
14 ordinary skill would implement the '257 invention
15 at the time of the Markel patent.

16 Q. And the invention of the '257 patent
17 then is positioning an electrode underneath a
18 metal bezel?

19 A. What I can tell you is what the claims
20 of the '257 patent say. That's part of the
21 claims.

22 Q. So let's go in your declaration,

1 Exhibit 2014, to paragraph 18.

2 A. Okay.

3 Q. If you could read the third sentence in
4 paragraph 18 that starts, "A POSITA would
5 understand."

6 A. Sure.

7 A person of ordinary skill in the art
8 would understand that capacitive electrodes could
9 generally be used for detection of ECG signals,
10 and a POSITA would also understand that Markel and
11 Mills rely exclusively and explicitly on
12 conductive ECG electrodes positioned on the outer
13 surfaces of the disclosed embodiments.

14 Q. So are you saying here that a user
15 touches the electrodes of Mills in order to convey
16 a signal?

17 A. Mills, sorry.

18 Yeah, I could find quotes specifically,
19 but I think generally Mills assumes that the
20 electrodes 14 and 16 are in contact with the skin
21 of the user.

22 Q. So are Mills' electrodes touch based

1 sensors?

2 A. Mills' electrodes are for detecting ECG
3 signals from the patient or from the user, which
4 require contact, but I wouldn't think of them as
5 such sensors. They're ECG sensors. You need to
6 be in contact to activate them, but the purpose of
7 the electrodes in Mills and Markel is not just to
8 detect that the user has touched the electrodes,
9 which is the case in the Larson reference. The
10 purpose of the conductive electrodes in Mills and
11 Markel is to capture ECG signals.

12 Q. And you say here that Markel and Mills
13 rely on conductive ECG electrodes, but Markel and
14 Mills could use capacitive electrodes to detect
15 ECG signals; correct?

16 A. It would require a pretty significant
17 change in the architecture of those products, I
18 think frankly disrupting the simplicity of what's
19 in Markel and Mills. One would need to implement
20 a fabrication process that grew dielectric layers
21 of a very specialized nature onto those
22 structures, and there's issues of cost and

1 practicality that frankly I think would go against
2 that.

3 Capacitive sensing of ECG signals is
4 harder, I think, in general than conductive
5 sensing. So it takes a more sophisticated set of
6 circuitry, and you do need to implement this very
7 careful deposition process for these thin
8 dielectric layers of what's taught in Larson and
9 in the next reference right after it, which is
10 Taheri.

11 Both of those -- and Taheri, in
12 particular, spends a fair bit of its disclosure
13 describing the process of selecting a particular
14 very thin film dielectric and the required
15 properties of that thin film. I think one of
16 ordinary skill in the art would appreciate that
17 the formation of such precision,
18 high-characteristic thin films is expensive and
19 complicated, and if you don't need it, you
20 wouldn't do it.

21 Q. But it would have been an option for a
22 person of skill in the art to use capacitive

1 electrodes to detect ECG signals in Markel and
2 Mills; correct?

3 A. Yeah, the Larson reference predates
4 Markel and Mills, I believe. I could be wrong.
5 But at any rate, I think the idea of a capacitive
6 ECG electrode was established, along with all of
7 the complications and challenges associated with
8 implementing them.

9 I think Markel and Mills probably were
10 well aware that that was an option and instead
11 chose conductive electrodes for a lot of reasons,
12 which include simplicity, easier method for
13 capturing signals, better compatibility with the
14 rest of their system.

15 Q. So let's go to the Lyons reference.

16 MR. BISENIUS: Ben, while we're
17 switching references, now might be a good time for
18 lunch. We've been going for about an hour and
19 ten minutes. It's getting to be noon in the
20 Central Time Zone.

21 MR. EVERTON: Okay. Yeah, now would be
22 a good time to break, if that works for you.

1 THE WITNESS: Sure.

2 MR. EVERTON: How long would you want to
3 take for lunch?

4 THE WITNESS: I'm not hungry at the
5 moment. Ben, you're probably on the East Coast.
6 So it might be more important for you.

7 MR. EVERTON: Well, actually, I'm on the
8 West Coast. So I'm --

9 THE WITNESS: Okay. Well, then maybe
10 it's just -- I'm happy to take a short break and
11 continue.

12 MR. BISENIUS: Yeah, we can do a short
13 one then.

14 MR. EVERTON: Okay. So let's do
15 ten minutes.

16 THE WITNESS: Sure.

17 (Recess from the record.)

18 BY MR. EVERTON:

19 Q. All right. If we can turn to Lyons, the
20 Lyons reference, that's Exhibit 1068. If we turn
21 to paragraph 27.

22 A. Okay.

1 Q. You'll see there at the bottom of
2 paragraph 27, it says, "While a capacitive flex
3 sensor is shown specifically in the drawings and
4 discussed herein, it is contemplated that other
5 touch based sensor technologies (e.g., resistive,
6 et cetera) may be utilized."

7 Do you see that?

8 A. Yeah.

9 Q. And what are the other touch based
10 sensor technologies referred to by Lyons?

11 A. I think he's referring to a family of
12 devices that are called piezoresistive devices.
13 These would be structures that when you squeeze
14 them or bend them, the resistance value changes.
15 And you could conceivably put a strip of such
16 things in the place of the electrode that Lyons
17 shows as its 122 and extract a family of resistive
18 signals that would give you the same information
19 about the presence of fingers.

20 Q. And so a person of skill in the art
21 would understand that Lyons' embodiments are not
22 limited to just capacitive sensors; correct?

1 A. I think this sentence says that you
2 might contemplate some other touch based sensor.
3 So in this case, resistive element under the bezel
4 structure so that when you press down on it, the
5 force causes a change in resistance. That would
6 be one. There could be others.

7 Q. Can you tell me what some of the others
8 are, the other types of touch based sensor
9 technologies referred to here?

10 A. Well, I don't know what Lyons had in
11 mind. I fully understand the piezoresistive
12 example. That's pretty well known and has been
13 used in other consumer electronics devices for
14 detecting contact of fingers.

15 You could use an optical sensor, you
16 know, shoot out some light and detect the return
17 light as a detector presence. Your smartphone has
18 a sensor like that on it that's used to detect
19 when it is that you're holding the phone near your
20 cheek so as to deactivate the touch screen during
21 your phone call.

22 You could, I suppose, put a thermometer

1 in the device and sense maybe a temperature change
2 associated with contact with a warm human
3 fingertip. You know, there's -- there are
4 options. I think the disclosure of Lyons is
5 pretty well tailored to the description of a
6 capacitive sensor, but one could put other things
7 in there. If you're only intending to detect the
8 presence of fingers touching the watch face at
9 different locations, there's more than one way to
10 do it.

11 Q. So Lyons' embodiments are not limited to
12 just capacitive sensors; correct?

13 A. Sure, that's correct.

14 Q. If we go back to your declaration,
15 Exhibit 2014, on page 14.

16 And then, so, yeah, about a quarter of
17 the way down on page 14, you see where you say,
18 "Lyons is referring to measurements of electrical
19 properties"?

20 Could you read that sentence?

21 A. Sure. All of it?

22 Q. Sure.

1 A. A person of ordinary skill in the art
2 would understand that this single statement in
3 Lyons is referring to measurements of electrical
4 properties "...in order to determine if the watch
5 device is being worn," and not measurements of
6 electrical signals associated with the function of
7 internal organs that could be used to assess the
8 health of those organs.

9 Q. What electrical properties would Lyons'
10 sensor pad 122 use to determine if the watch is
11 being worn?

12 A. So you'd be looking for electrical
13 properties of the wrist, for example, that are
14 distinct from the absence of a wrist. So those
15 could include the capacitance, I suppose the
16 inductance, one could measure electrical
17 resistivity, one could measure temperature.

18 Q. And, generally, what are these
19 electrical properties of the human body?

20 A. Well, these are general physical
21 properties of the wrist that are distinct from the
22 absence of a wrist. So the fact that it has heat

1 capacity, it has capacitance, it might have some
2 inductance, it has a temperature, these are
3 basically just properties of the object, you know,
4 present versus absent.

5 These are not internal electrical
6 signals, such as the ECG signals that are of
7 interest in Markel, Mills, and the '257. These
8 are things that you can measure by applying
9 external electrical stimulus, such as electrical
10 fields or voltages and as a way of determining
11 that there's stuff there, only just that it's
12 there or not.

13 Q. So looking at paragraph 14 of your
14 declaration.

15 A. Okay.

16 Q. We see just under paragraph 14 is
17 Figure 4 from Lyons.

18 Do you see that?

19 A. Yes, actually, that's the figure I've
20 taken from Oslan's declaration, which is based on
21 Figure 4.

22 Q. Right. And we discussed this

1 previously, how Figure 4 shows the bezel 114 and
2 then the electrode pad 122.

3 And this Figure 4 shows the position of
4 the electrode pad 122 relative to the bezel 114;
5 correct?

6 A. Figuratively, yeah, I don't think it's
7 intended as an engineering drawing that one should
8 extract precision from, but it shows a general
9 relationship.

10 Q. Why would a person of skill in the art
11 want to position the electrode pad under the
12 bezel?

13 A. Through Lyons and see if there's
14 rationale.

15 Technically, if you're detecting a
16 capacitive signal, as Lyons describes, by applying
17 an oscillating potential and looking for current
18 signals associated with the additional capacitance
19 of a finger, the precise location isn't
20 particularly important, and it might be practical
21 to put it one layer beneath the surface just to
22 protect it from wear and tear, to make it visually

1 indistinct. There's various reasons.

2 (Cross talk.)

3 Q. And do you state --

4 (Cross talk.)

5 A. Lyons makes a comment about things being
6 stylish. Yeah, I mean, you want the watch to be
7 small, sleek, and stylish. So those, I think,
8 would be reasons to put your capacitive sense
9 electrode where it's shown in Lyons.

10 Q. And from your review of Lyons, do you
11 know why Lyons chose to put the sensor pad
12 underneath the bezel 114?

13 A. I think the idea is to detect the
14 presence of a finger. So the capacitive effect of
15 the presence of a finger is stronger the closer to
16 it you are. The idea is the person, I believe, in
17 the user interface of Lyons is going to touch that
18 rim of the display in either -- in various
19 locations, or maybe even move their finger around.
20 So it makes sense to put the sensor close to where
21 the finger is expected to be.

22 Q. Can you think of any other benefits for

1 positioning the sensor pad underneath the bezel,
2 as shown in Lyons?

3 A. I mean, there's a lot of places you
4 wouldn't put it. I wouldn't put it underneath the
5 battery, for example. Because then it would
6 mostly sense the wrist and not the fingers. So it
7 would be kind of pointless. You know, I think
8 it's in a reasonably good spot, given the
9 objectives of Lyons.

10 Q. So let's look at your declaration still,
11 page 13. And we'll look at the second bullet
12 point there.

13 A. Okay.

14 Q. So if you could read that bullet and
15 then let me know when you're done and we'll talk
16 about it.

17 (Witness peruses the exhibit.)

18 THE WITNESS: Okay.

19 BY MR. EVERTON:

20 Q. So you say here that Lyons discloses
21 electrodes that sense electrical properties of the
22 human body; correct?

1 A. That's, I think, a quote from Lyons.

2 Q. What are some examples of electrical
3 properties of the human body?

4 A. So capacitance of the tissue is one.
5 The tissue might have electrical conductivity or
6 resistivity. It might have been inductance. It
7 has a temperature that you could sense
8 electrically. It has a skin color, you could
9 sense that. These are passive properties of the
10 tissue.

11 Q. Does the human heart have electrical
12 properties?

13 A. It would have all those things,
14 capacitance, resistance, inductance, probably,
15 temperature. If you put electrodes on the heart,
16 you could sense capacitance and other such things.
17 The ECG signals from the heart propagate through
18 the tissue and are detectable on the surface.
19 That's how ECG sensors do their recording. They
20 capture a weak replica of the ECG signal from the
21 heart.

22 Q. How are the electrical properties of the

1 heart sensed and measured?

2 A. So I don't think any of the kind of
3 properties that Lyons is referring to are the
4 kinds of properties that one normally tries to
5 sense for the heart. If one senses an ECG signal
6 that comes from the heart, it's associated with
7 the electrophysical activity of the heartbeat,
8 that's the signal that arrives at the surface of
9 the skin and can be detected electrically with
10 sensitive electrodes.

11 Q. So are electrical signals used to sense
12 the electrical properties of the human body?

13 A. It depends on which properties you're
14 interested in. If you want to measure the
15 capacitance of tissue, you need to apply electric
16 fields and measure voltages and currents.

17 If you want to measure ECG signals, you
18 need an electrode and a very sensitive amplifier,
19 but you don't have to apply any signals to the
20 body in order to capture ECG signals. You just
21 need effectively a very good detection apparatus.
22 It's the primary distinction that we're discussing

1 here.

2 Q. What electrical properties could not be
3 sensed via electrical signals?

4 A. Are we talking about the electrical
5 signals that occur naturally in the body or
6 electrical signals applied from the outside?

7 Q. Either.

8 A. Well, these days we've worked out a long
9 list of different ways to measure different
10 parameters of the body, either passive electrical
11 properties or dynamic internal properties, you
12 know, and all the way from catheter-based sensing
13 to invasive sensor-based approaches all the way to
14 ECG electrodes and the like. It's a very long
15 list.

16 Q. But my question was: What electrical
17 properties could not be sensed via electrical
18 signals?

19 A. Well, if you're including signals that
20 originate inside the body, as well as signals that
21 could be applied at various locations within or
22 around the body, there's -- I can't think of

1 anything, frankly.

2 We have methods of NMR imaging,
3 CT imaging, all kinds of profiling. I mean, I --
4 you know, there's libraries filled with books on
5 the various different kinds of electrical signals
6 one might apply and extract information from
7 either from the passive characteristics of the
8 tissue or the active physiological processes
9 inside the body. As I think about it, I'm not
10 sure there's anything on the list that doesn't
11 exist yet.

12 Q. If we can turn back to the Markel
13 reference, this is Exhibit 1005. If we look at
14 paragraph 44 of Markel, the last sentence of
15 paragraph 44.

16 A. Okay.

17 Q. It says, "Also for example, an electrode
18 may be disposed on a video display device 140
19 (e.g., a border of the display or integrated into
20 a touch screen)."

21 Do you see that?

22 A. Uh-huh. Yes.

1 Q. What does Markel mean when it says

2 "integrated into a touch screen"?

3 MR. BISENIUS: Objection; outside the

4 scope.

5 THE WITNESS: So there's not much that I

6 can say. At the end of paragraph 78, I think,

7 which is referring to Figure 15 we discussed

8 earlier, it says that the display device may

9 comprise one or more electrodes on a touch screen

10 portion of the display device.

11 BY MR. EVERTON:

12 Q. So do you have an understanding of

13 what -- how a person of skill in the art would

14 understand that statement by Markel, that the

15 electrode can be integrated into a touch screen?

16 A. It just says that there might be one or

17 more electrodes on a touch screen portion of the

18 display device. So I take that to mean electrodes

19 on the surface of the display device for direct

20 electrical contact, as with all the other

21 electrodes in Markel.

22 Q. And specifically how would that be

1 constructed? What would that look like with the
2 electrode on the touch screen?

3 MR. BISENIUS: Objection; outside the
4 scope.

5 THE WITNESS: If you're asking me how I
6 would do it or how Markel describes it, Markel
7 doesn't describe it. There are examples in the
8 art that I know of of printing thin films
9 transparent electrodes on the surfaces of displays
10 like this for detecting contact. Markel doesn't
11 elaborate. So that would be my guess, but I
12 really don't know what Markel had in mind.

13 BY MR. EVERTON:

14 Q. So if we turn to Markel's Figure 4.

15 A. Okay.

16 Q. Items 410b and 420b are electrodes;
17 right?

18 A. Yeah, so it says, a first electrode may
19 be, for example, placed on the left side
20 portion 410, for example, placed on or molded into
21 region 410b. And the same for a second electrode,
22 yes.

1 Q. So electrode 410b and 420b are
2 positioned on the back side of the device; is that
3 correct?

4 A. That's my understanding from the figure.

5 Q. Both of those electrodes are on the
6 backside; correct?

7 A. I believe so.

8 Q. Are these two electrodes in Markel
9 Figure 4 adjacent?

10 A. Sorry, this was -- I haven't thought
11 about this at all. So you're asking me to form an
12 opinion about a figure, whether or not the word
13 "adjacent" would be an accurate description of
14 those two electrodes, and I appreciate that that's
15 a claim term in one of the amended claims.

16 Q. Yeah. I'm just asking if -- yeah, in
17 the context of the amended claims, if electrodes
18 410b and 420b of Figure 4 in Markel are adjacent?

19 A. Yeah, I really don't know. It's not
20 something I analyzed. Certainly there's nothing
21 about that in my report. I don't really want to
22 wade into the middle of what I'm sure is a subject

1 of a lot of argument with an off-the-cuff
2 speculation.

3 Q. Do you have an understanding of what
4 "adjacent" means in the context of the amended
5 claims in this IPR?

6 A. I could get to that, if you wanted to
7 sit for a while, while I read through this and
8 think about all of the history of what's on the
9 record. This, again, wasn't part of my analysis.
10 It's not alluded to or described anywhere in my
11 report.

12 So as I'm sitting here right now at this
13 moment, I don't really have an opinion. If you
14 want me to form an opinion, I hope you have a
15 comfortable chair because it's going to -- I need
16 to read a lot of what's here and think about where
17 things stand. So it's not -- I'd rather not, if
18 you don't mind.

19 Q. So as you sit here today, you don't have
20 an opinion on what the meaning of "adjacent" is in
21 the context of the amended claims; is that
22 correct?

1 A. I haven't done the work at this point to
2 form an opinion about that matter. I'm sure, if
3 given time and patience, we could get there, but
4 as just off-the-cuff just staring at the figure
5 first impression, I'd rather not be quoted on the
6 record as stating something that is obviously
7 relevant to the amended claim.

8 I'd want to have some time to think it
9 through. I would want to read through the
10 '257 patent again and think about adjacency. It's
11 not part of the analysis I've done.

12 Q. Is a sensor on the front side of the
13 device and another -- so let's say there's an
14 electrode on the front side of the device and
15 another electrode on the backside of the device.

16 Can those electrodes be adjacent?

17 A. You know, I'm going to -- I'll spare you
18 reciting the same answer. I just am not
19 comfortable answering that question without some
20 time to think through and read the specification
21 again. Adjacency is not a factor I had considered
22 in my prior analysis.

1 My impression is that it's important,
2 and I want to get it right before I say something
3 on the record. I'm not prepared to do that right
4 at this moment.

5 (Exhibit 1075 was presented.)

6 BY MR. EVERTON:

7 Q. So let's look at the Larson reference,
8 this is Exhibit 1075.

9 A. Okay.

10 Q. And we'll go to -- you've reviewed this
11 reference for your declaration; correct?

12 A. Yes, I did.

13 Q. And the title is "Cardiac Monitoring
14 Apparatus."

15 Do you see that?

16 A. I see that.

17 Q. Now if we go back to your declaration,
18 your second declaration, Exhibit 2014, at
19 paragraph 18.

20 About three sentences down, you say, "A
21 POSITA would understand that capacitive electrodes
22 could generally be used for detection of ECG

1 signals..."

2 Do you see that?

3 A. Yes.

4 Q. And what do you mean by this, that
5 capacitive electrodes could generally be used for
6 detection of ECG signals?

7 A. It's pretty literal, but I think a
8 person of ordinary skill in the art would be
9 familiar with the ideas and inventions of
10 capacitive ECG electrodes and appreciate the
11 success with such an electrode requires a number
12 of important details that are complicated and
13 sometimes expensive, such as the formation of
14 extremely thin film dielectrics as a way of
15 forming a capacitive element with the right
16 capacitance for this measurement. Larson actually
17 describes some of the constraints and issues
18 around that in some detail.

19 Q. What types of capacitance electrodes
20 were being used for detection of ECG signals prior
21 to the '257 patent?

22 A. So my knowledge here is just based on

1 the references that were provided, which describe
2 thin structures, very thin dielectric layers on
3 the surface of a metal film that can capacitively
4 capture the ECG signals present on the surface of
5 the tissue.

6 That signal propagation through that
7 capacitance is dependent on the capacitance having
8 a large value which can only arise if the
9 dielectric layer is extremely thin and of
10 specialized material with a high dielectric
11 constant so that the impedance associated with
12 that capacitor, at the frequency of the ECG
13 signals, would provide a low enough impedance for
14 the signal to get to the electrode.

15 Q. A person of ordinary skill in the art
16 would have considered conductive and capacitive
17 electrodes as options for detecting ECG signals;
18 correct?

19 A. I think both were known at the time, and
20 a person of ordinary skill would appreciate the
21 added issues and challenges associated with
22 capacitive electrodes. And meanwhile all

1 throughout Mills and Markel, there's quite a bit
2 of explanation of the benefits of a direct
3 conductive electrode.

4 Replacing that electrode in Mills and
5 Markel with a completely different kind of
6 electrode would bring a lot of baggage, a lot of
7 complexity. And there's nothing in Mills or
8 Markel that teach going in that direction. In
9 fact, Mills and Markel are both proponents of the
10 direct electrical contact on the ECG electrodes in
11 those patents.

12 Q. What are the benefits of using
13 capacitive electrode for detecting ECG signals?

14 A. So the Larson reference in Column 1
15 describes some of the issues associated with the
16 kinds of ECG patches that you might experience in
17 a hospital setting. As it says, the jelly used to
18 attach the electrodes can dry out causing
19 inadequate or noisy signals and so on. And these
20 are just issues associated with the direct
21 contact.

22 A capacitive electrode relies on just

1 being physically in contact with the surface of
2 the skin and not on electrical conductivity across
3 that interface and, therefore, might be more
4 reliable in some settings.

5 I think weighing against that is that
6 the capacitive detection electrodes need to be
7 manufactured using some highly specialized and
8 probably very expensive manufacturing methods, and
9 one would have to balance those against the other.

10 Mills and Markel don't have this problem
11 with a patch glued on your body for an extended
12 period of time because they rely on the grasp of
13 the user to form and maintain the electrical
14 contact during the measurement.

15 So the problem that Larson is -- sorry,
16 is it Larson? The problem that Larson is
17 addressing really isn't an issue in the product of
18 Mills or Markel, just because of the physical
19 nature of the measurement being performed.

20 Q. And these capacitive ECG electrodes were
21 known prior to the '257 patent; correct?

22 A. Certainly the Larson patent was granted

1 in 1980. I imagine -- although I didn't do the
2 search myself, but I imagine there are other
3 references along the way between 1980 and the time
4 of the Mills and Markel references.

5 Q. But the Larson reference represents the
6 state-of-the-art in 1980; correct?

7 A. I suppose. There might be better
8 disclosures with different features, but it's
9 representative of that, I believe, yes.

10 Q. Let's go in your declaration to
11 paragraph 24.

12 A. Okay.

13 Q. So just there in the second line, first
14 sentence of paragraph 24, you say, "Indeed, such a
15 configuration is distinct from the claimed device
16 of the '257 patent which requires a conductive
17 first portion of the enclosure to allow for
18 electrical connectivity between the user contact
19 and the first pad positioned underneath the
20 exterior surface of the first portion of the
21 enclosure..."

22 Do you see that?

1 A. Yes, I see that.

2 Q. Then you go on to say, "such that the
3 first pad can detect a first electrical signal of
4 the user's cardiac signal via the user's skin's
5 contact with the exterior surface of the first
6 portion of the enclosure"; is that correct?

7 A. That's correct. That's actually
8 quoting, I think, the first claim of the patent.

9 Q. Then you say, in paragraph 24, "The
10 claimed features of the '257 patent rely on
11 conductive contact through a portion of the
12 enclosure, and would not function if the contact
13 was a capacitive contact through a relatively
14 thick portion of the enclosure."

15 Do you see that?

16 A. Yes.

17 Q. Do the claims of the '257 patent require
18 that the first portion is conductive?

19 A. I think we were on this question at the
20 start of today, that the claim requires that the
21 pad be able to detect the first electrical signal
22 via the user's contact with the exterior surface

1 of the first portion of the enclosure, and that
2 throughout the '257 patent, these portions of the
3 enclosure are described as having some electrical
4 conductance or conductivity.

5 So I think that's how one of ordinary
6 skill in the art would understand this invention,
7 that it's a conductive signal pathway from the
8 skin of the user to the first pad through the
9 enclosure.

10 And partly I think that's informed by
11 the user's understanding that if it was a
12 nonconductive structure and it was relatively
13 thick, that the capacitance of that contact would
14 be too small to reliably carry that electrical
15 signal and would instead have to make ultrathin
16 dielectric layers, such as described in the Larson
17 patent.

18 Q. But the signal detection would work with
19 a capacitive contact with the first portion;
20 right?

21 A. If you followed all the rest of the
22 teaching of capacitive ECG electrodes, for

1 example, described in Larson, which require
2 micron-thick films of a high dielectric constant,
3 then you have a reasonable expectation of success.

4 You have a thick structural layer, you
5 know, many, many times -- orders of magnitude even
6 thicker than a micron of ordinary plastic
7 materials. I'd say one of ordinary skill would
8 understand that your expectation of success would
9 be extremely low.

10 Q. So does whether the first portion of the
11 enclosure allows conductivity of a signal depend
12 on the thickness of the first portion?

13 A. It would depend on the material, the
14 thickness, the geometry, all of those things
15 together.

16 Q. Let's go to your declaration at
17 paragraph 25.

18 A. Uh-huh.

19 Q. There, at the end, the last --
20 second-to-last sentence, you say, A person of
21 ordinary skill in the art would understand that an
22 electrode beneath a thick insulating layer, such

1 as in Lyons, would not detect ECG signals in the
2 same way as the electrode positioned beneath a
3 1 micrometer thick insulating layer.

4 Do you see that?

5 A. Yes.

6 Q. How thick is the insulating layer in
7 Lyons?

8 A. Lyons doesn't say anything about the
9 thickness of that layer. Remember, Lyons is not
10 attempting to detect electrical signals arising
11 from within the body arriving at the surface of
12 the skin and propagating to the electrode.

13 Lyons is applying an oscillating
14 electrical field and measuring currents and
15 voltages suitable for detecting the capacitance of
16 a finger. So there's a whole long list of
17 distinctions between these two, which I think are
18 listed a few pages earlier in my declaration.

19 Q. So Lyons doesn't require a thick
20 insulating layer?

21 A. I think from a practical standpoint,
22 there's no reason to make a micron-thick high

1 dielectric passivation layer on an electrode, such
2 as in Larson and Taheri, in order to do the
3 proximity detection that's in Lyons.

4 There would be no need to spend the
5 money and the time and the effort to form such an
6 ultrathin film. You could put in a sheet of mylar
7 or something, if you wanted to, it would work just
8 fine.

9 It's a lot like the StudSensor, where
10 you've got a millimeter or too thick layer of
11 plastic on the outside of the housing separating
12 the electrodes from the wall. The capacitive sort
13 of proximity detection or finger detection or stud
14 detection doesn't require a very large value of
15 the capacitance between the electrode and the
16 outer surface. It only requires a physical
17 arrangement that can allow electric fields to
18 propagate outwards and for currents and voltages
19 to be associated with that oscillating electric
20 field.

21 It's apples and oranges, like the last
22 sentence here. These things are really, really

1 not the same. They involve electrodes and
2 circuits, and that's kind of where it ends.
3 Everything about capacitive proximity sensing and
4 capacitive ECG sensing, it's far apart.

5 Q. But Lyons teaches that the bezel 114
6 could be made of metal; correct?

7 A. Certainly.

8 Q. And that metal would be conductive;
9 correct?

10 A. It could be.

11 Q. In paragraph 25, you discuss the sensors
12 in Lyons and Larson.

13 Do a capacitive touch sensor and a
14 capacitive ECG electrode both use a capacitor?

15 A. To the extent a capacitor is an
16 electrical structure with some insulating layer
17 between the two elements of which the capacitance
18 is being detected or of the capacitance of an
19 electrode, in the very generic sense, the first
20 sentence of the chapter of the book on
21 electronics, yes, they both use capacitance.

22 Q. And both of these sensors rely on the

1 touch of a finger?

2 A. The capacitive proximity sensors of
3 Lyons relies on the presence of the finger. You
4 get that presence when there's touching, but that
5 sensor would detect the finger even if it was
6 hovering very much slightly above the surface of
7 the electrode. The capacitive ECG sensor really
8 needs contact in order to create a system that's
9 limited only by the capacitance of that ultimate
10 thin dielectric layer. Again, apples and oranges.

11 Q. And both of these sensors measure
12 changes in the electric field provided by the
13 finger?

14 A. I'd say no.

15 Q. Which sensor does not measure changes in
16 the electric field provided by the finger?

17 A. So the capacitive ECG sensor measures
18 changes in the potential on the surface of the
19 finger, not an electric field surrounding the
20 finger or penetrating the finger. It's --
21 "potential" and "field," two different things.

22 Q. But both measure changes in the electric

1 field related to the finger; is that correct?

2 A. No, again, the same answer. One of them
3 was measuring changes in electric field due to the
4 presence or absence of the finger. The other is
5 measuring an electric potential on the surface of
6 the finger.

7 Q. Okay. So one measures electric field,
8 and the other measures electric potential?

9 A. I think that's a fair statement.

10 Q. Looking at the Taheri reference, that's
11 Exhibit 1076.

12 A. Uh-huh.

13 Q. Did you analyze this Taheri reference
14 for your declaration in this IPR?

15 A. I did.

16 (Exhibit 1076 was presented.)

17 BY MR. EVERTON:

18 Q. And if we can also pull up the Rytky
19 reference. This is Exhibit 1074.

20 (Exhibit 1074 was presented.)

21 BY MR. EVERTON:

22 Q. Did you analyze this Rytky reference,

1 Exhibit 1074?

2 A. I did.

3 Q. And going back to your declaration,
4 Exhibit 2014, at paragraph 28.

5 A. Uh-huh.

6 Q. You say here that Taheri provides some
7 of the benefits of a dry electrode, as well as
8 some of the benefits of a capacitive electrode; is
9 that right?

10 A. I think that's a fair description of
11 Taheri's description of his own invention, yes.

12 Q. Do you agree that a person of skill
13 would have seen these benefits as desirable?

14 A. Everyone would have to do a cost-benefit
15 analysis. I can make a long list of things that
16 are desirable, but I can't afford most of them. I
17 think Mills and Markel would have been aware of
18 Taheri and would have considered these options and
19 decided that it was easier and more effective to
20 operate with the electrodes that are described in
21 those two references with direct electrical
22 contact rather than trying to obtain the mixed

1 benefits of a capacitive electrode with a metal
2 film.

3 Q. Do Mills and Markel teach dry
4 electrodes?

5 A. I think Mills describes its electrode as
6 a dry electrode. I don't know, I could look,
7 whether Markel uses that language or not. But the
8 intent is that you don't -- I think both Mills and
9 Markel are anticipating a scenario where a user is
10 handling their smartphone or their watch, and if
11 they had to apply gel every time they interacted
12 with their products, it would be a significant
13 disadvantage.

14 So I think that's one of the claimed
15 features of both patents -- or one of the
16 described features of both of those disclosures.

17 Q. And the Lyons and Larson references
18 teach capacitive electrodes; correct?

19 A. Lyons teaches a capacitive proximity
20 detection electrode like the StudSensor.

21 Larson teaches a capacitive ECG
22 electrode similar to Taheri.

1 Q. Now, if we go to Exhibit 1074, the Rytky
2 reference.

3 A. Uh-huh.

4 Q. In paragraph -- let's see, sorry.
5 Sorry, let's go to your declaration,
6 actually, back to your declaration, Exhibit 2014,
7 at paragraph 32.

8 A. Uh-huh.

9 Q. So here you say that Rytky relates to,
10 quote, conductive contact.

11 Do you see that?

12 A. Yes.

13 Q. What did you mean by "conductive
14 contact"?

15 A. I mean the same kind of contact
16 described in Larson -- sorry, in the Markel and
17 Mills references, where the tissue is directly
18 contacting the electrode.

19 Q. So Rytky's conductive contact electrode
20 is similar to the conductive electrodes of Markel
21 and Mills?

22 A. In the sense that the electrical contact

1 is on the outer surface of the structure in Rytky
2 and in Markel and Mills. Rytky brings along other
3 layers of packaging to provide flex connectors and
4 other such things associated with the intent of
5 the Rytky patent, which is to produce a wearable
6 electrode that can be part of the fabric of a
7 garment.

8 So it requires flexibility and
9 electrical connections. So there's quite a bit in
10 Rytky about making what are essentially flex
11 cables out of printed metal films on polyamide
12 structures. So Rytky includes a description of
13 exposure of some portion of those metal films to
14 make electrical contact and the surrounding of
15 some portion of those films with protective
16 plastic layers, dielectric layers.

17 Q. Now, if we can turn to the Rytky
18 reference, Exhibit 1074.

19 At paragraph 44, you'll see about
20 halfway down, it says, "Thus the garment material
21 opening 212 may be a lead-in through the garment
22 material, the lead-in establishing an electric

1 contact between the electrode area 208 and the
2 surface of the user's skin. The lead-in may be
3 made of electrically conducting material such as
4 polyurethane."

5 Do you see that?

6 A. Uh-huh.

7 Q. So what type of material is provided
8 between the user's skin and the electrode area
9 208?

10 A. I think all of this relates to
11 Figure 4A. There's an opening in the garment.
12 Let's see. Where is that labeled here?

13 I guess that maybe looks more like
14 Figure 2B. There's an opening in the garment
15 layer. There's an electrode area 208 that
16 establishes electrical contact between the
17 electrode area 208 and the surface of the skin.
18 The lead-in structure 208 can be polyurethane --
19 sorry, the lead-in -- maybe -- can I have your
20 question again?

21 Q. Yeah. I was just asking what the
22 material is that's provided between the user's

1 skin and the electrode area 208? Is that

2 polyurethane?

3 A. So I don't read this as saying that

4 the -- it's a pretty weird description. So -- and

5 I'm sorry, I've lost your question.

6 Could I have the question part of this

7 again?

8 Q. Yeah. What type of material is provided

9 between the user's skin and the electrode

10 area 208?

11 A. So it says the lead-in establishes an

12 electrical contact between the electrode area and

13 the surface of the user's skin, and the opening

14 may be a lead-in, opening 212.

15 It's hard to know exactly how to parse

16 this. The lead-in goes through the garment. It

17 establishes electrical contact. So that could be

18 structure around, or it could be a thin layer on

19 the electrical contact, the electric area. All of

20 this has to be flexible and wearable so as to be

21 comfortable for the patient. There's a fair bit

22 of description in this patent about patient

1 comfort.

2 Further down it says, "Conducting
3 material may be provided between the surface of
4 the skin and the electrode area." That's at the
5 end of paragraph 46.

6 So I think what's required here is a
7 very thin layer of conductive material. I suppose
8 it could be polyurethane. That might be more
9 comfortable than an adhesive.

10 But my reading of this, when I wrote
11 this section in my report, was that it seemed like
12 an adhesive would be the right material to put
13 into that location, but a thin layer of
14 polyurethane could work, as well.

15 Q. And polyurethane is a plastic; correct?

16 A. I believe it's classified as among
17 materials described as plastics, that's correct.
18 In this case, it's an electrically conducting
19 version of polyurethane.

20 Q. Right. So conductive polyurethane would
21 be a conductive type of plastic; correct?

22 A. I think, yeah, electrically conducting

1 polyurethane is a conducting form of plastic.

2 Q. And can you tell me from where to where
3 the electrode area 208 extends in Rytky?

4 A. Which figure?

5 Q. Looking at Figures 2A and 2B.

6 A. It describes the electrode as 208, I
7 think.

8 Q. Yeah, the electrode area 208.

9 A. So there's electrical contact between
10 the area 208 and the user's skin, which I think is
11 shown by those sort of parentheses-shaped
12 structures that are just drawn onto the figure to
13 show where the electrode contact can happen.

14 Q. Okay. So it's showing electrode
15 area 208 extending from one side of the bracket to
16 the other side of the bracket?

17 A. I believe so. And I think Figure 4A is
18 showing a top view of the same. The area 208 is
19 that large rectangular area in the center.

20 Q. If we turn to paragraph 55 of Rytky.
21 There at the bottom of the page.

22 A. Uh-huh.

1 Q. It says, "The second insulation
2 layer 202 may comprise an opening corresponding to
3 the opening 212 in order to establish an electric
4 contact between the surface of the skin and
5 protective area 502."

6 A. Uh-huh. Yes.

7 Q. And then -- oh, sorry, go ahead.

8 A. No, I was just confirming what you just
9 read.

10 Q. And then at the end of that paragraph,
11 "In the latter case" -- or then it says, "The
12 electric contact may be a direct contact or an
13 indirect one. In the latter case conducting
14 material may be provided between the surface of
15 the skin and the protective area 502."

16 And what is that conducting material
17 referred to there?

18 A. It doesn't say. I presume from
19 elsewhere in the spec, it could be this conductive
20 polyethylene -- I'm sorry, polyurethane, I think.
21 Polyurethane. Also, I think one of ordinary skill
22 in the art would consider a conductive adhesive.

1 The context here is this is a flexible
2 electrode. So whatever that layer is, it needs to
3 be flexible and compliant so that you can maintain
4 contact with the surface of the skin.

5 Q. And is metal a conducting material?

6 A. It's described as a conducting material.
7 It could be a very thin metal. It could be a very
8 thin, flexible plastic. It could be a conductive
9 adhesive.

10 MR. BISENIUS: Ben, we've been going
11 over an hour again. It might be a good time for
12 another break.

13 MR. EVERTON: Sure. I have -- yeah, do
14 you want to take a -- can we just take a short
15 break?

16 THE WITNESS: Works for me.

17 (Recess from the record.)

18 MR. EVERTON: Okay. I don't have any
19 further questions at this time.

20 MR. BISENIUS: All righty.

21 THE WITNESS: That's the best news all
22 day.

1 MR. BISENIUS: All right. No questions
2 from patent owner. So we can conclude.

3 (Off the record at 2:36 p.m.)

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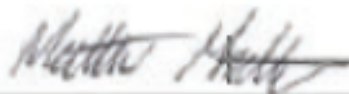
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Matthew Goldstein, RMR, CRR

1 Thomas Kenny, Ph.D., c/o
FISH & RICHARDSON P.C.

2 60 South Sixth Street, Suite 3200
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Case: Masimo Corporation v. Apple Inc.

4 Date of deposition: July 29, 2024

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