

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

_____)

ALIVECOR, INC.,

Petitioner,

Case No.

IPR2023-00950

v.

U.S. Patent

APPLE, INC.,

10,076,257

Patent Owner.

_____)

DEPOSITION OF
RONALD D. BERGER, M.D., PH.D., FHRS
July 26, 2024

10:00 a.m. Eastern Daylight Time

Reported by: Lori J. Goodin, RPR, CRR, RSA
California CSR #13959

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1 FRIDAY, JULY 26, 2024, 10:00 a.m. EDT

2 PROCEEDINGS

3 * * *

4 Whereupon,

5 RONALD BERGER, M.D., PH.D., FHRS,

6 a witness called for examination, having been

7 first duly sworn, was examined and testified as

8 follows:

9 * * *

10 EXAMINATION

11 BY MR. BISENIUS:

12 Q. We are here today regarding IPR
13 proceeding IPR2023-00950, regarding U.S. Patent
14 Number 10,076,257.

15 Is there any reason that you cannot
16 give truthful and accurate testimony today?

17 A. No.

18 Q. To ensure clarity, I will define
19 several terms that will be used throughout this
20 deposition.

21 When I use the terms "petitioner" or
22 "AliveCor," I'm referring to AliveCor Inc., the

1 petitioner in this proceeding.

2 Do you understand?

3 A. Yes.

4 Q. When I use the term "Apple" or
5 "patent owner," I am referring to Apple, Inc.

6 Do you understand?

7 A. Yes.

8 Q. When I use the term, "the '257
9 patent," I am referring to U.S. Patent
10 Number 10,076,257, titled Seamlessly Embedded
11 Heart Rate Monitor.

12 Do you understand?

13 A. Yes.

14 Q. When I use the phrase "this IPR" or
15 "this proceeding," I am referring to IPR
16 Proceeding Number IPR2023-00950 filed against
17 the '257 patent.

18 Do you understand?

19 A. Yes.

20 Q. When I use the acronym, POSITA, I am
21 referring to a person of ordinary skill in the
22 art at the time of the alleged invention.

1 Do you understand?

2 A. Yes.

3 Q. When I use the term "your
4 declaration" or "the Berger declaration," I am
5 referring to the declaration that you submitted
6 on June 26, 2024, which is Exhibit 1021 in this
7 proceeding.

8 Do you understand?

9 A. Yes.

10 Q. Can you please describe how you
11 prepared for today's deposition?

12 A. Ah --

13 MR. FERNANDO: I will just caution
14 Dr. Berger not to reveal the contents of any
15 conversations with attorneys.

16 But you can generally explain what
17 you did to prepare.

18 THE WITNESS: I reviewed my
19 declaration and the relevant prior art and
20 some of, some of the other materials that I
21 may have reviewed for my prior deposition.

22 And had some discussions with

1 counsel.

2 BY MR. BISENIUS:

3 Q. When you say you reviewed the
4 relevant prior art, can you identify which
5 specific references you reviewed?

6 A. Well, I reviewed the '257 patent. I
7 reviewed the Markel patent, Nissila, Righter,
8 Engstrom.

9 I may have reviewed some other, some
10 other patents briefly, but I can't recall.

11 Q. As part of your preparation for
12 today's deposition, did you conduct any
13 independent searches, such as searches on the
14 internet?

15 A. No.

16 Q. Okay. I would like to start out by
17 talking about the '257 patent which is
18 Exhibit 1001.

19 (Whereupon, previously marked
20 Exhibit 1001,
21 first referral.)

22 BY MR. BISENIUS:

1 Q. Can you pull that up and please turn
2 to Figure 2.

3 A. Yes.

4 Q. Figure 2 is showing a user's cardiac
5 signal; is that correct?

6 MR. FERNANDO: And I will object as
7 outside the scope.

8 THE WITNESS: I'm looking at
9 Figure 2 now and it is a schematic, a
10 stylized diagram of components of a typical
11 electrocardiographic single beat.

12 BY MR. BISENIUS:

13 Q. How many points of contact would a
14 user need to have with a cardiac signal detection
15 device for the device to be able to create the
16 depiction of the user's cardiac signal shown in
17 Figure 2?

18 A. A minimum of --

19 MR. FERNANDO: Same objection.

20 THE WITNESS: I'm sorry.

21 MR. FERNANDO: Sorry. Same
22 objection.

1 THE WITNESS: A minimum of two
2 points of contact.

3 BY MR. BISENIUS:

4 Q. Can you please briefly describe the
5 various components of the user's cardiac signal
6 shown in Figure 2?

7 MR. FERNANDO: Same objection.
8 Outside the scope.

9 THE WITNESS: It shows what is first
10 called a P wave, which is the deflection in
11 the electrocardiogram which comes about from
12 activation of the upper chambers of the
13 heart, the atria.

14 And then it shows what is called a
15 QRS complex, which is the deflection in the
16 electrocardiogram that comes about from
17 activation, or what we call depolarization,
18 of the two ventricles of the heart.

19 And then it shows a T wave, which is
20 the deflection that comes about from
21 repolarization or electrical relaxation of
22 the ventricles of the heart.

1 And then it also shows some segments
2 and intervals which are parts that we measure
3 the amount of time that it takes from one
4 event to another, since there are certain
5 standards in a normal electrocardiogram.

6 BY MR. BISENIUS:

7 Q. Does the cardiac signal shown in
8 Figure 2 indicate the heart rate of the user?

9 MR. FERNANDO: Same objection.

10 THE WITNESS: No.

11 BY MR. BISENIUS:

12 Q. I would like to talk about the
13 Engstrom reference next.

14 This is U.S. Patent Application
15 Publication Number 2008/0113650, which is
16 Exhibit 1020 in this proceeding.

17 (Whereupon, previously marked
18 Exhibit 1020,
19 first referral.)

20 THE WITNESS: Yes.

21 BY MR. BISENIUS:

22 Q. Can you please turn to Paragraphs 26

1 to 27 of Engstrom?

2 A. Okay. I have it in front of me.

3 Q. Can you please review Paragraphs 26
4 to 27 and let me know when you are finished?

5 A. Yes, I have read it.

6 Q. These paragraphs are discussing a
7 heartbeat profile; is that correct?

8 A. Yes.

9 Q. How does Engstrom's device determine
10 a user's heartbeat profile?

11 A. Well, I think there are several ways
12 that it could do that.

13 It has electrodes to sense different
14 parts of the user's skin, and I could infer that
15 there are a couple of ways of doing that.

16 One might be if there are two hands
17 connecting, one hand touching some of those
18 electrodes and the other hand touching other
19 electrodes, then it may be able to acquire an
20 electrocardiogram of the heart.

21 On the other hand, if the, if it is
22 held in a single hand, then the use of the

1 electrodes may be able to detect, for instance,
2 the pulse through plethysmography where an
3 electric current is sent across parts of the hand
4 so that it can see the pulse.

5 And then it may, from that, be able
6 to detect and infer fluctuations in heart rate
7 from that -- from those measurements.

8 And that, that may be adequate to
9 create a profile that may be, if not unique to an
10 individual, at least specific -- adequately
11 specific to a particular user.

12 Q. What information does Engstrom
13 describe as being included in the user's
14 heartbeat profile?

15 A. Are you asking me from these two
16 paragraphs?

17 Q. From Engstrom, in general.

18 A. I will have to review. If you could
19 give me a few minutes, I will see if it gives --
20 provides any additional detail.

21 I see that in Paragraph 29, there is
22 reference to another patent application about the

1 data provided by the sensors.

2 And I don't have that patent
3 application in front of me or something that I
4 have reviewed.

5 I think it is, I think it is well
6 understood in the art what sorts of data could be
7 acquired by electrodes, as I have mentioned.

8 So, that may be some of what is
9 covered in that application. I don't know.

10 Again, as I said, even without
11 detailed description in this patent, I think it
12 is well understood to a POSITA in the 2004 time
13 frame what sorts of electrical signals would be,
14 would be accessible and acquired with this sort
15 of electrode arrangement.

16 Q. Did you review this patent
17 application that is referenced in Paragraph 29 as
18 part of your analysis of Engstrom?

19 A. No.

20 Q. To your knowledge, does Engstrom
21 describe the heartbeat profile that is including
22 a PR interval or a QT interval?

1 A. No, I don't believe even this
2 particular patent is explicit about what parts of
3 either an electrocardiogram or a different
4 cardiac signal are specifically required for any
5 particular heartbeat profile.

6 Again, not having --

7 Q. I --

8 A. I am sorry. Again, not having read
9 that reference, there may be additional
10 information that is included by reference.

11 Q. I would like to move ahead to
12 Paragraph 53 to 54 of Engstrom.

13 Can you please read those two
14 paragraphs to yourself and let me know when you
15 are finished?

16 A. Okay. Read it.

17 Q. These paragraphs discuss, "Comparing
18 the realtime captured heartbeat profile against
19 the previously saved reference heartbeat
20 profile."

21 Do you see that?

22 A. Yes.

1 Q. How does Engstrom's device compare
2 the realtime captured heartbeat profile to the
3 previously saved reference heartbeat profile?

4 A. I explain that in my declaration in
5 Paragraphs 94 through 97, which I could read if
6 you want me to.

7 But it explains the parts of
8 Engstrom that are on point with how that
9 comparison and authentication are implemented.

10 Q. I won't make you read three
11 paragraphs from your declaration right now.

12 Does Engstrom describe what
13 information is extracted from the realtime
14 captured heartbeat profile to compare to the
15 previously saved reference heartbeat profile?

16 A. I think Engstrom is providing a
17 methodology for doing this for many different
18 types of heartbeat profiles and need not be
19 specific to any one type of heartbeat profile.

20 But I think one would understand
21 that at the very least one could look at a
22 sequence of intervals of beat-to-beat heartbeat

1 intervals, which again, while not necessarily
2 unique to one specific individual, there tends to
3 be some degree of specificity from, that differs
4 from one individual to another.

5 And that is a sort of pattern that
6 one could easily understand would be recorded and
7 maintained in memory, and then compared for
8 attributes, statistical attributes, the, the mean
9 and variance in heartbeat intervals.

10 I mean, there are many algorithms
11 that are well known to a POSITA that would be
12 easily implemented.

13 And I don't think it is necessary
14 for Engstrom to be recapitulating that which was
15 known to a POSITA.

16 Q. Moving forward to Paragraph 56.

17 This paragraph states, "If the
18 inputted heartbeat profile substantially matches
19 the previously saved reference heartbeat profile,
20 block 410, operating logic 240 (or more
21 specifically security function 242) enables
22 phone 100 to operate in the authenticated mode."

1 Do you see that?

2 A. Yes.

3 Q. How does Engstrom's device determine
4 if the inputted heartbeat profile substantially
5 matches the previously saved reference heartbeat
6 profile?

7 MR. FERNANDO: Objection, asked and
8 answered.

9 THE WITNESS: I think this is
10 exactly what I was getting at, in answer to
11 your prior question.

12 I think it is well, well understood
13 in the art, well known to a POSITA, that
14 there are attributes of any sort of time
15 series, any sort of acquired sequence of
16 data, where one can compare a new sequence of
17 data to a prior -- previously acquired
18 sequence of data. Be able to make a
19 comparison on how similar they are or to be
20 able to have criteria for accepting or, or
21 denying a match.

22 I think these are statistical

1 methods well understood in the art.

2 BY MR. BISENIUS:

3 Q. And I would like to turn to your
4 declaration, your most recent declaration,
5 Exhibit 1021 in this proceeding.

6 (Whereupon, previously marked
7 Exhibit 1021,
8 first referral.)

9 THE WITNESS: Yes.

10 BY MR. BISENIUS:

11 Q. And I would like to start with
12 Paragraph 54.

13 A. Okay.

14 Q. In this paragraph of your
15 declaration, you are discussing Figure 15 of
16 Markel; is that correct?

17 A. Yes.

18 Q. What do the reference numerals 1510,
19 1530, and 1531, identify in Figure 15?

20 A. I'm just going to refer to the
21 reference itself.

22

1 (Whereupon, previously marked
2 Exhibit 1005,
3 first referral.)

4 THE WITNESS: So, according to
5 Paragraph 78 in the Markel reference, those
6 are electrodes: Electrode 1510,
7 electrode 1530, and electrode 1531.

8 BY MR. BISENIUS:

9 Q. Electrodes 1510, 1530, and 1531 are
10 positioned on the exterior of the device for
11 direct contact by the user; is that correct?

12 MR. FERNANDO: Objection, outside
13 the scope.

14 THE WITNESS: I don't think that is
15 necessarily the case.

16 I think that they may well be
17 embedded. I think the electrode -- let me
18 further explain.

19 I think the electrode is -- as I
20 understand an electrode, as a POSITA would
21 understand an electrode, a electrode includes
22 the various components that include

1 everything out to what makes contact with the
2 user.

3 So, I think that could include an
4 outer membrane or an outer part of the
5 enclosure, and also more conductive
6 components that may reside just underneath
7 that outside.

8 But the electrode itself includes,
9 as far as I understand and a POSITA would
10 understand, an electrode includes all the
11 components, all of the way out to that which
12 makes contact with the user.

13 So, I would agree that an electrode
14 is making contact with the user.

15 BY MR. BISENIUS:

16 Q. Can you identify where in Markel it
17 describes this multilayered electrode that you
18 just described, having an external membrane or
19 part of the enclosure and then an additional
20 layer underneath that?

21 MR. FERNANDO: Objection, outside
22 the scope.

1 THE WITNESS: I really think that
2 is, word for word, the same question that you
3 asked me in my prior deposition.

4 Are we repeating my prior deposition
5 here?

6 BY MR. BISENIUS:

7 Q. Can you please turn to Paragraph 63
8 of your most recent declaration?

9 A. Page 63?

10 Q. Paragraph 63.

11 A. Yes.

12 Q. Here you are discussing what would
13 have motivated a POSITA to embed pads on the
14 inner surface of a bezel; is that correct?

15 A. I think that is a reasonable
16 assessment, yes.

17 Q. And at the end of this paragraph,
18 you have included an annotated version of
19 Figure 10 of Markel; is that correct?

20 A. Yes.

21 Q. The electrodes, 1020, 1022, and
22 1024, in Figure 10 are shown as being on the

1 exterior of the device; is that correct?

2 A. No. I think we covered this in my
3 prior deposition.

4 Q. Does Figure 10 depict an additional
5 pad positioned underneath any of electrodes,
6 1020, 1022, or 1024?

7 MR. FERNANDO: Objection, outside
8 the scope.

9 MR. BISENIUS: Well, we are
10 discussing here what would have motivated a
11 POSITA to embed a pad of an electrode under
12 an inner surface of a bezel. So it seems
13 this is fully within the scope of whether or
14 not Figure 10 actually shows an additional
15 pad positioned under any of these electrodes.

16 BY MR. BISENIUS:

17 Q. So, I will ask again.

18 A. Okay.

19 Q. So, Figure 10 --

20 MR. FERNANDO: Sorry, Dr. Berger,
21 just let him ask that question again.

22 THE WITNESS: Fair enough.

1 BY MR. BISENIUS:

2 Q. Does Figure 10 show an additional
3 pad positioned underneath any of the electrodes,
4 1020, 1022, or 1024?

5 MR. FERNANDO: Same objection.

6 THE WITNESS: Figure 10 is a block
7 diagram of the electronics of the device.

8 It is not a figure that shows the
9 arrangement and the physical composition of
10 any particular electrode.

11 And a POSITA would understand that
12 if a bezel is made out of a material that is
13 not as conductive as let's say silver or
14 highly conductive metal, then -- or
15 particularly as in Markel where it is made
16 out of a moderately conductive plastic, then
17 a POSITA would understand that a more
18 conductive material such as a metal pad
19 would, would need to reside underneath that
20 outer layer in order to have sufficient
21 surface area and conductivity to collect the
22 electrical current required for adequate

1 electrical contact with the user.

2 BY MR. BISENIUS:

3 Q. Is this arrangement of a pad that is
4 positioned underneath the surface of one of these
5 electrodes depicted in any of the figures in
6 Markel?

7 MR. FERNANDO: Objection. Outside
8 the scope. Asked and answered.

9 THE WITNESS: I believe it is well
10 described within Markel.

11 BY MR. BISENIUS:

12 Q. But it is not actually depicted in
13 any of the figures; is that correct?

14 MR. FERNANDO: Same objections.

15 THE WITNESS: I think it is, in
16 Markel.

17 BY MR. BISENIUS:

18 Q. You know what, can you identify it,
19 the figures that depict this arrangement?

20 A. Yes.

21 MR. FERNANDO: Same objections.

22 THE WITNESS: I think Figure 4 shows

1 electrodes that are embedded underneath the,
2 or within the outer plastic shell.

3 And I will also point to Figure 15
4 that shows electrodes where there would be,
5 again, a conductive, a more conductive
6 material embedded within or underneath the
7 outer plastic enclosure.

8 BY MR. BISENIUS:

9 Q. You mentioned Figure 4.

10 On the right side of Figure 4, the
11 portions of the device that are colored in black
12 and labeled 420b and 410b, are those portions of
13 the device on the exterior of the device or do
14 you believe that this is a depiction of the
15 interior of Markel's device?

16 MR. FERNANDO: Objection, outside
17 the scope.

18 THE WITNESS: I remember we had this
19 exact same line of questioning in my prior
20 deposition.

21 Are we repeating all of the same
22 questions from my prior deposition?

1 BY MR. BISENIUS:

2 Q. Well, you have made a number of new
3 assertions regarding the obviousness of
4 positioning pads underneath exterior portions of
5 a bezel.

6 And you referred to Figure 10. You
7 said Figure 10 didn't actually depict that. And
8 now you have identified Figure 4 as depicting
9 what would support that assertion.

10 So, I'm asking you in regard to
11 Paragraph 63 of your most recent declaration, do
12 you believe that these portions in black that are
13 labeled with reference numerals 420b and 410b are
14 depicting an external portion of Markel's device
15 or are these intended to depict an internal
16 portion of Markel?

17 MR. FERNANDO: Objection, outside
18 the scope. Asked and answered.

19 THE WITNESS: As I have explained in
20 my prior deposition, those are regions where
21 an electrode would be embedded -- where a
22 more conductive material would be embedded to

1 form the electrode.

2 And that -- and as I explained,
3 Markel teaches that an electrode pad need not
4 be in direct contact with the user. It may
5 be adapted to detect a cardiac activity of a
6 user that is conductively coupled to the
7 electrodes.

8 And that is in Markel Paragraph 35.
9 And a person of ordinary skill in the art
10 would recognize that the pad of an electrode
11 can be conductively coupled to a user through
12 an intermediate conductive material.

13 Markel teaches that conductive
14 plastic or another material may be integrated
15 into various molded components of the mobile
16 communication device.

17 BY MR. BISENIUS:

18 Q. Does Markel use the term
19 "intermediate conductive material" or a similar
20 term?

21 MR. FERNANDO: Objection, vague.

22 THE WITNESS: So, I think he

1 describes this reasonably well in
2 Paragraph 37.

3 "Electrodes may generally comprise
4 conductive material. For example, an
5 electrode may comprise a metallic surface
6 exposed to the user contact."

7 Or, "For example, an electrode may
8 be formed from conductive plastic or another
9 material that may be integrated into various
10 molded components of the mobile communication
11 device.

12 "For example, various conductive
13 plastics," and it gives examples, "may
14 provide sufficient conductivity for an
15 electrode to perform adequately, and it
16 should be recognized that the scope and
17 various aspects of the present invention
18 should not be limited by characteristics of
19 particular electrodes or electrode
20 placement."

21 In addition, a POSITA would
22 understand that if you have materials on the

1 outside that are not as conductive as a
2 highly conductive metal, like silver, then
3 the electrode is going to be composed of a
4 combination of materials.

5 This is well understood in the art
6 of designing skin electrodes.

7 MR. BISENIUS: No further questions.

8 MR. FERNANDO: Let's go off the
9 record for five minutes.

10 (Recess taken -- 10:36 a.m.)

11 (After recess -- 10:39 a.m.)

12 BY MR. FERNANDO: Petitioner has no
13 further questions for the witness. And that
14 concludes.

15 (Whereupon, signature not having been waived,
16 the deposition suspended at 10:40 a.m. EDT)

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1 CERTIFICATE OF NOTARY

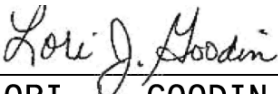
2

3 I, LORI J. GOODIN, RPR, CRR,
4 CA CSR # 13959 the Notary for this deposition, do
5 hereby certify that the witness whose testimony
6 appears in the foregoing deposition was sworn by
7 me; that I am neither counsel for, related to,
8 nor employed by any of the parties to the action
9 in which this deposition was taken; and, further, that I am
10 not a relative or employee of any attorney or
11 counsel employed by the parties hereto, or
12 financially or otherwise interested in the
13 outcome of this action.

8

9

10


LORI J. GOODIN, RPR, CLR, CRR
Notary Public in and for:

11

12 STATE OF FLORIDA, COUNTY OF SARASOTA
13 Notary Commission Number: GG987804
14 My Commission expires: May 12, 2028
15 STATE OF CALIFORNIA, CA CSR# 13959
16 My Commission expires: February 22, 2025
17 STATE OF MARYLAND, COUNTY OF ANNE ARUNDEL
18 My Commission expires: August 2, 2025
19 DISTRICT OF COLUMBIA, WASHINGTON DC
20 My Commission expires: June 1, 2026
21 STATE OF DELAWARE: COUNTY OF KENT
22 My Commission expires: September 9, 2025
STATE OF PENNSYLVANIA, COUNTY OF LEHIGH
My Commission expires: April 5, 2025

1 Ronald D. Berger, M.D., Ph.D., FHRS, c/o
Alston & Bird LLP

2 1120 South Tryon Street, Suite 300
Charlotte, North Carolina 28203

3

4 Case: AliveCor, Inc. v. Apple, Inc.

Date of deposition: July 26, 2024

5 Deponent: Ronald D. Berger, M.D., Ph.D., FHRS

6

7 Please be advised that the transcript in the above
8 referenced matter is now complete and ready for signature.

9 The deponent may come to this office to sign the transcript,
10 a copy may be purchased for the witness to review and sign,
11 or the deponent and/or counsel may waive the option of
12 signing. Please advise us of the option selected.

13 Please forward the errata sheet and the original signed
14 signature page to counsel noticing the deposition, noting the
15 applicable time period allowed for such by the governing
16 Rules of Procedure. If you have any questions, please do
17 not hesitate to call our office at (202)-232-0646.

18

19

20 Sincerely,

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3
4 SIGNATURE PAGE
Case: AliveCor, Inc. v. Apple, Inc.
5 Witness Name: Ronald D. Berger, M.D., Ph.D., FHRS
Deposition Date: July 26, 2024

6
7 I do hereby acknowledge that I have read
and examined the foregoing pages
8 of the transcript of my deposition and that:

9
10 (Check appropriate box):
() The same is a true, correct and
11 complete transcription of the answers given by
me to the questions therein recorded.
12 () Except for the changes noted in the
attached Errata Sheet, the same is a true,
13 correct and complete transcription of the
answers given by me to the questions therein
14 recorded.

15
16 _____
17 DATE WITNESS SIGNATURE

18
19
20
21 _____
22 DATE NOTARY

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3 Washington, D.C. 20036
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5

6 ERRATA SHEET

7

8 Case: AliveCor, Inc. v. Apple, Inc.

9 Witness Name: Ronald D. Berger, M.D., Ph.D., FHRS

10 Deposition Date: July 26, 2024

11 Page No. Line No. Change

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19

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Signature

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