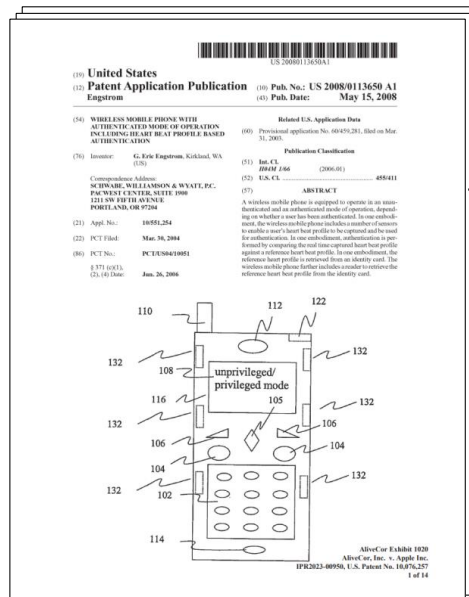


RMTA - Obviousness – Engstrom Overview

“Substitute claims 23-27 would have been obvious to a POSITA in view of *Markel* alone and/or in view of *Nissilä* (Grounds 1 and 2). In addition, substitute claims 23-27 would also have been obvious over *Markel* in view of *Nissilä* and/or *Engstrom*.”

Paper 32, 6-7



Engstrom

(19) United States
(12) Patent Application Publication
(10) Pub. No.: US 2008/0113650 A1
(43) Pub. Date: May 15, 2008

(54) WIRELESS MOBILE PHONE WITH AUTHENTICATED MODE OF OPERATION INCLUDING HEART BEAT PROFILE BASED AUTHENTICATION

(76) Inventor: G. Eric Engstrom, Kirkland, WA (US)

Related U.S. Application Data
(60) Provisional application No. 60/459,281, filed on Mar. 31, 2003.

Publication Classification
(51) Int. Cl. H04M 1/66 (2006.01)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

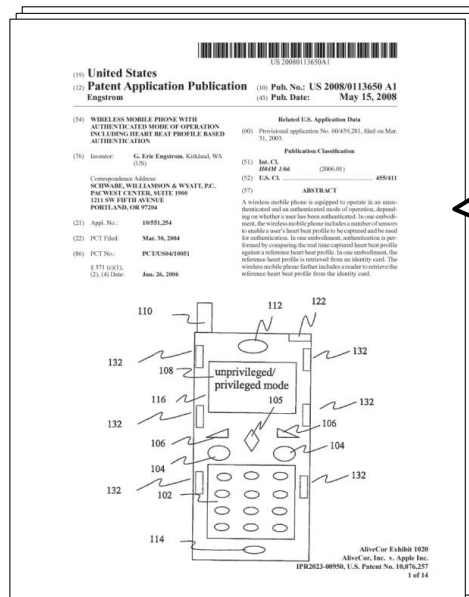
Application Number	
Filing Date	
First Named Inventor	Gloria Lin
Art Unit	
Examiner Name	
Attorney Docket Number	P7276USC1

U.S. PATENT APPLICATION PUBLICATIONS						Remove
/A.A./	4	20080113650		2008-05-15	Engstrom	

Ex. 1020, Cover (annotated) (Paper 32, 7); Ex. 1002, 106, 183 (Paper 32, 7)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 187

RMTA - Obviousness – Engstrom Overview



Engstrom

(57)

ABSTRACT

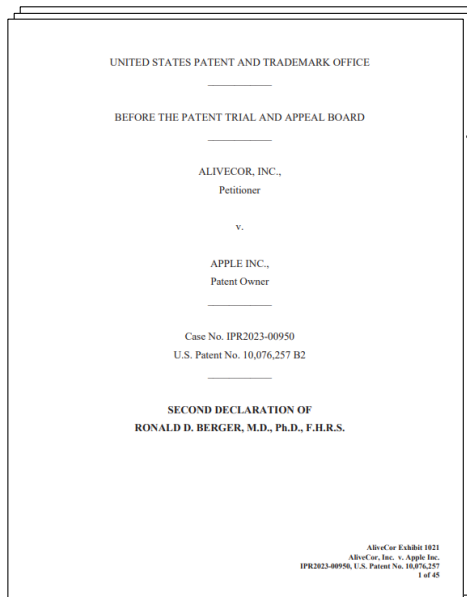
A wireless mobile phone is equipped to operate in an unauthenticated and an authenticated mode of operation, depending on whether a user has been authenticated. In one embodiment, the wireless mobile phone includes a number of sensors to enable a user's heart beat profile to be captured and be used for authentication. In one embodiment, authentication is performed by comparing the real time captured heart beat profile against a reference heart beat profile. In one embodiment, the reference heart profile is retrieved from an identity card. The wireless mobile phone further includes a reader to retrieve the reference heart beat profile from the identity card.

Ex. 1020, Abstract (Paper 32, 7)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 188

AliveCor Exhibit 1024
AliveCor, Inc. v. Apple Inc.
IPR2023-00950, U.S. Patent No. 10,076,257
188 of 249

RMTA - MtC – Markel, Nissilä, and Engstrom

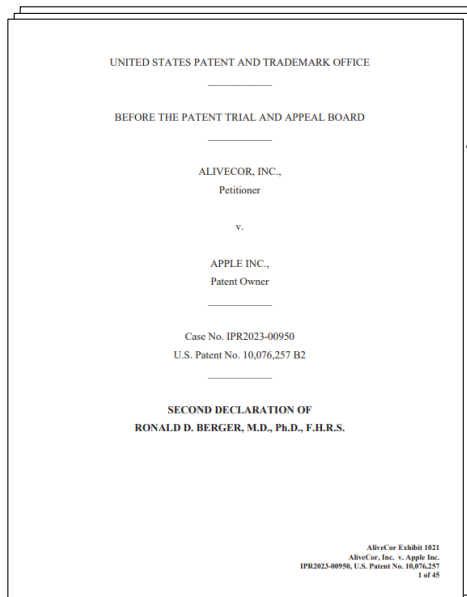


Berger Second Decl.

45. First, a POSITA would have been motivated to combine *Markel's* electronic device with *Nissilä's* electrode structure for the reasons explained in my earlier Declaration (see Ex-1003, ¶¶ 351-55).

46. Second, a POSITA would have been motivated to combine *Markel's* electronic device with *Engstrom's* electrode placement. To begin with, *Markel* and *Engstrom* are directed to the same technical field of personal heart sensors. *Markel* is directed to “mobile communication device[s] . . . with cardiovascular monitoring capability” (Ex-1005, [0004]). *Engstrom* is directed to a phone that “includes a number of sensors to enable a user’s heart beat profile to be captured” (Ex-1020, Abstract).

RMTA - MtC – Markel, Nissilä, and Engstrom



Berger Second Decl.

47. Moreover, a POSITA would have been motivated to combine the electrode placement of *Engstrom* with the mobile device of *Markel* to accomplish *Markel*'s goal of best positioning the electrodes to "contact a user during normal (or typical) use" of the device (Ex-1005, [0041]). Specifically, *Engstrom*'s device is "advantageously equipped with sensors 132 to facilitate real time capturing of heart beat profile of the user" (Ex-1020, [0026]). Indeed, *Engstrom* provides for sensors that can be used by left or right hand and includes the ability to dynamically discern between the appropriate sensors to obtain measurement (Ex. 1020, [0029]).

48. Furthermore, both *Markel* and *Engstrom* contemplate user authentication based on cardiac information. *Markel* discloses that the "cardiac information acquisition module 1710 may also, for example, be adapted to identify the user of the MCD 1700" Ex-1005, [0097]. *Engstrom* teaches that a "wireless mobile phone includes a number of sensors to enable a user's heart beat profile to be captured and be used for authentication." Ex-1020, Abstract. A POSITA would have looked to *Engstrom* to better understand how to implement user authentication based on detected heart characteristics.

RMTA - MtC – Markel, Nissilä, and Engstrom

[0004] Various aspects of the present invention provide a mobile communication device, general-purpose computer user interface device, and other electronic devices with cardiovascular monitoring capability.

• • • •

[0041] In general, one or more electrodes (or other sensors) may be positioned such that the one or more electrodes contact a user during normal (or typical) use of the MCD 100. Such normal use may, for example, comprise talking on a telephone, reading messages, perusing a phone book, typing a message, initiating a phone call, sending an email message, entering information in a notepad, etc.).

• • • •

[0097] The cardiac information acquisition module 1710 may also, for example, be adapted to identify the user of the MCD 1700. For example, such identification (or authentication) may be utilized in an exemplary scenario where a variety of users may be utilizing the MCD 1700. In such an exemplary scenario, the acquisition module 1710 may be adapted to acquire cardiac information for a plurality of different users and to segment such information according to user identity.

Markel

A wireless mobile phone is equipped to operate in an unauthenticated and an authenticated mode of operation, depending on whether a user has been authenticated. In one embodiment, the wireless mobile phone includes a number of sensors to enable a user's heart beat profile to be captured and be used for authentication. In one embodiment, authentication is performed by comparing the real time captured heart beat profile against a reference heart beat profile. In one embodiment, the reference heart profile is retrieved from an identity card. The

• • • •

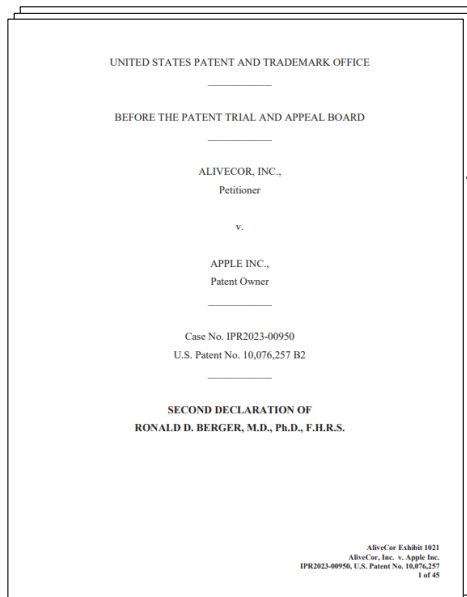
[0026] Continue to refer to FIGS. 1 and 3a-3b, for the illustrated embodiment, phone 100 is further advantageously equipped with sensors 132 to facilitate real time capturing of a heart beat profile of the user (while operating in the authenticated mode). Further, operating logic 240, or more speci-

• • • •

[0029] For the embodiment, sensors 132 are disposed along and underneath the side surfaces of phone 100. A dynamically determined subset of sensors 132 are employed to capture the heart beat profile of the user. The subset of sensors 132 to be employed is based on whether the user is holding phone 100 with his/her left or right hand, thereby coming into contacts with different ones of sensors 132. Discernment of the appro-

Engstrom

RMTA - MtC – Markel, Nissilä, and Engstrom



Berger Second Decl.

49. A POSITA would have had a reasonable expectation of success in combining the “operating logic 240” of *Engstrom* with the “cardiac acquisition module” of *Markel*, because the operating logic of *Engstrom* can be “implemented in firmware and/or hardware” (Ex-1020, [0046]) and the cardiac acquisition module of *Markel* “may be implemented in hardware, software, or a combination thereof” (Ex-1005, [0179]).

50. A POSITA would also have a reasonable expectation of success in combining *Markel* and *Engstrom* because they share relevant similarities in the structure of the disclosed communication devices. For example, both *Markel* and *Engstrom* describe a display, an audio output element, alphanumeric input buttons, “talk” and “end” buttons, and a scroll button (Ex-1005, [0042]; Ex-1020, [0034]).

RMTA - MtC – Markel, Nissilä, and Engstrom

[0042] For example, an electrode (or other sensor) may be disposed on a pushbutton of the MCD 100. As illustrated in FIG. 1, an electrode may be disposed on any, any combination of, or all of alphanumeric pushbuttons (e.g., pushbutton 138), a send button 130, an end button 132, a menu button 134, a scroll button 136 (or other cursor moving feature, for example, a touch pad, thumbwheel, track ball, eraser tip controller, etc.), a volume control button 139 (or other volume-control feature), etc. Such electrode placement may, for example, provide for electrode contact with a user while the user is pushing a particular one or more pushbuttons.

. . . .

[0179] Various aspects of the present invention were illustrated by referring to various functional modules. It should be noted that such modules may be implemented in hardware, software or a combination thereof. Additionally, various modules may share various submodules or subcomponents. For example, a first module and a second module may share a particular hardware component or software submodule. Accordingly, the scope of various aspects of the present invention should not be limited by characteristics of any particular type of module or by any arbitrary boundary between modules.

Markel

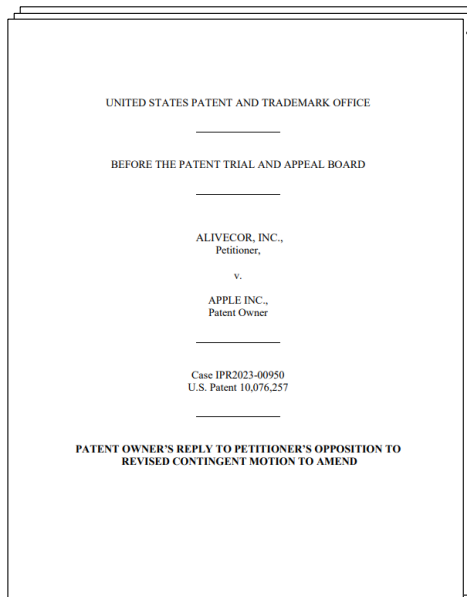
[0034] Continuing to refer to FIGS. 1 and 3a-3b, additionally, phone 100 includes conventional wireless telephony elements, including power switch 122, power 222, audio communication elements, such as ear speaker 112 and microphone 114, and non-audio communication elements, such as input key pad 102 having a number of alphanumeric input keys and display 108. Further, the non-audio input elements may further include scroll button 105, selection buttons 106, and “talk” and “end talk” buttons 104. These elements are disposed on various external surfaces of body 116.

. . . .

[0046] As to operating logic 240, including security function 242, it may be implemented in the assembly or machine instructions of processor 202, or a high level language that can be compiled into these assembly or machine languages. In alternate embodiments, all or portions of operating logic 240, including security function 242 may be implemented in firmware and/or hardware.

Engstrom

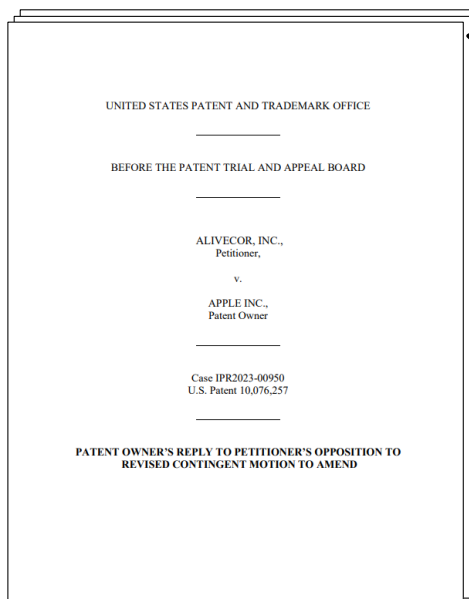
Markel, Nissilä, Engstrom – Apple's Arg. 1



Apple's RMTA Reply

AliveCor also does not sufficiently establish why a POSITA would have applied Engstrom's electrode placement to the mobile device of Markel. AliveCor asserts that Engstrom's electrode placement would "accomplish *Markel's* goal of best positioning the electrodes to 'contact a user during normal or typical use' of the device." Opp., 8. However, this assertion ignores that Markel *already achieves this goal*. More, AliveCor does not demonstrate how Engstrom's electrode placement would lead to any improved outcomes over Markel's configuration in which the electrodes are positioned to contact the user where the user would normally touch the device with, for example, their ear, cheek, or hand. EX1005, [0043]-[0044]. As such, a POSITA would not have looked to Engstrom for the placement of electrodes because Markel already achieves direct user contact.

Markel, Nissilä, Engstrom - Apple's Arg. 1 - Reply



Apple's RMTA Reply

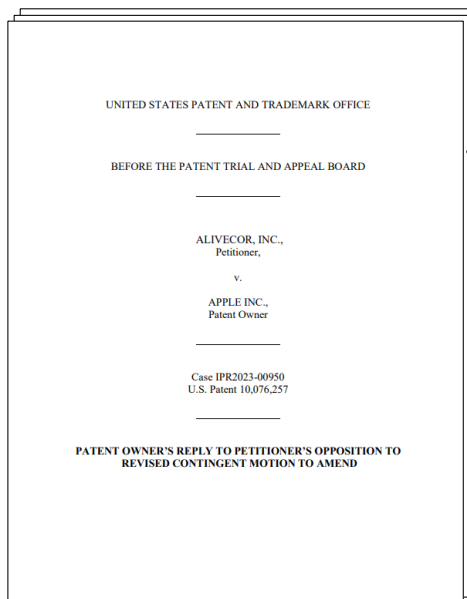
AliveCor also does not sufficiently establish why a POSITA would have applied Engstrom's electrode placement to the mobile device of Markel. AliveCor asserts that Engstrom's electrode placement would "accomplish *Markel's* goal of best positioning the electrodes to 'contact a user during normal or typical use' of the device." Opp., 8. However, **this assertion ignores that Markel *already achieves this goal***. More, AliveCor does not demonstrate how Engstrom's electrode placement would lead to any improved outcomes over Markel's configuration in which the electrodes are positioned to contact the user where the user would normally touch the device with, for example, their ear, cheek, or hand. EX1005, [0043]-[0044]. As such, a POSITA would not have looked to Engstrom for the placement of electrodes because Markel already achieves direct user contact.

L'Oreal USA, Inc. v. Olaplex, Inc.

"That a particular piece of prior art achieves a desirable goal to some extent hardly means that relevant artisans would have lacked a motivation to achieve the goal to a greater extent."

844 F. App'x 308, 319 (Fed. Cir. 2021)

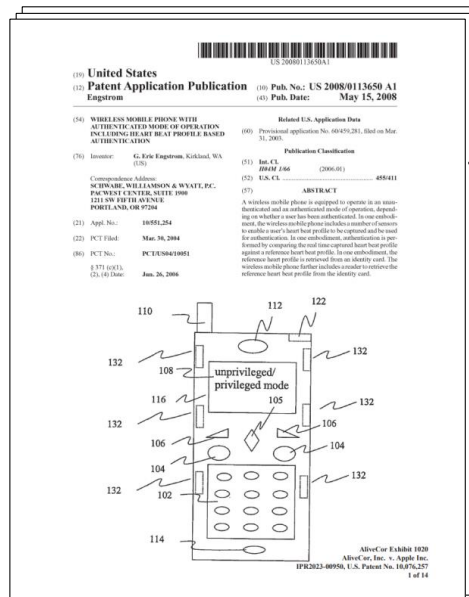
Markel, Nissilä, Engstrom – Apple's Arg. 2



Apple's RMTA Reply

More, AliveCor has provided no cause for motivation, such as evidence or analysis to indicate that Engstrom's electrode arrangement would lead to any improved performance of the resulting device. *See In re Anova Hearing Labs, Inc.*, 809, Fed. Appx. 840, 843 (Fed. Cir. 2020) (when a primary prior art reference already provides a solution to the problem solved by the challenged patent, there must be evidence as to why there would be a motivation to modify that primary reference to include an additional or redundant solution found within a secondary reference). *see also Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F. 3d 1342, 1368-69 (Fed. Cir. 2012). Similarly, AliveCor does not identify any improvement that would result from applying the electrode arrangement from the embodiment of Markel's Figure 15 to the embodiment of Markel's Figure 4.

Markel, Nissilä, Engstrom – Apple's Arg. 2 - Reply



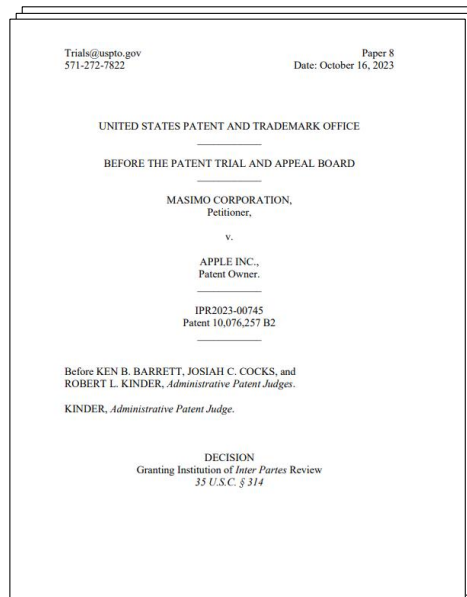
Engstrom

[0026] Continue to refer to FIGS. 1 and 3a-3b, for the illustrated embodiment, phone 100 is further advantageously equipped with sensors 132 to facilitate real time capturing of a heart beat profile of the user (while operating in the authenticated mode). Further, operating logic 240, or more specifically, security function 242, is endowed to facilitate such capture, and authenticate a user through the heart beat profile of the user (prior to operating phone 100 in the authenticated mode).

...

[0029] For the embodiment, sensors 132 are disposed along and underneath the side surfaces of phone 100. A dynamically determined subset of sensors 132 are employed to capture the heart beat profile of the user. The subset of sensors 132 to be employed is based on whether the user is holding phone 100 with his/her left or right hand, thereby coming into contacts with different ones of sensors 132. Discernment of the appropriate subsets of sensors 132, or more specifically, the sensing data outputted by sensors 132, to be used, is described in detail in parent U.S. patent application Ser. No. 09/690,679 set forth and incorporated by reference above.

Markel, Nissilä, Engstrom – Apple’s Arg. 2 - Reply



IPR2023-00745 Initial Decision

Based on the preliminary record before us, Petitioner has shown sufficiently that Markel Figure 4 appears to disclose generally the same embodiment as that in Figure 15 directed to “an exemplary computer display device.” Ex. 1005 ¶ 78. Similar to the embodiment of Figure 4 (electrodes molded into side portions), Figure 15 may have “an electrode 1510 on a border portion of the display device 1500,” or an “electrode 1530 on a first side of the display device 1500.” *Id.*

[0078] FIG. 15 is a diagram illustrating an exemplary computer display device 1500, in accordance with various aspects of the present invention. The display device 1500 may, for example, comprise an electrode 1510 on a border portion of the display device 1500. Also for example, the display device 1500 may comprise an electrode 1530 on a first side of the display device 1500 and/or an electrode 1531 on a second side of the display device 1500. Further for example, the display device 1500 may comprise one or more electrodes 1540 on a touch screen portion of the display device 1500.

RMTA – Obviousness – Claim 23

[23.a]: wherein the first portion is electrically isolated from the second portion by an electrically isolating component inserted between the first and second pads;

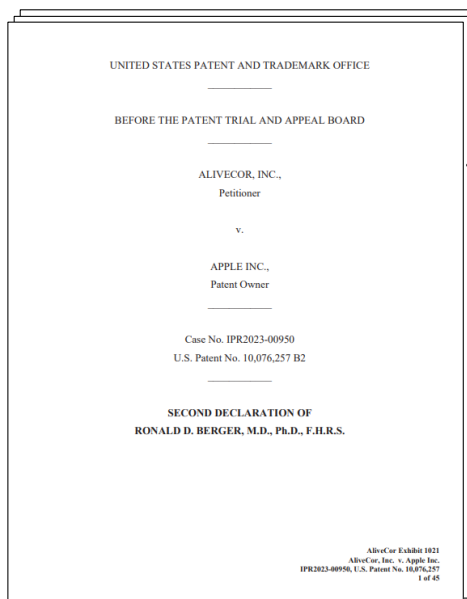


[0045] A plurality of electrodes (or other sensors) may be disposed in any of a variety of locations, non-limiting examples of dual-electrode placement will now be presented. For example, first and second electrodes may be disposed on a main body portion **110** of the MCD **100**. FIG. **4** provides a non-limiting example of such electrode placement. The mobile communication device **400** illustrated in FIG. **4** may comprise a left side portion **410** and a right side portion **420**. A first electrode may, for example, be placed on the left side portion **410** (e.g., placed on or molded into region **410b**), and a second electrode may, for example, be placed on the right side portion **420** (e.g., placed on or molded into region **420b**). In various exemplary configurations (e.g., where regions **410b** and **420b** include conductive plastic), an insulating region **415** may separate regions **410b** and **420b**.

RMTA – Obviousness – Claim 23

[Undisputed]

[23.a]: wherein the first portion is electrically isolated from the second portion by an electrically isolating component inserted between the first and second pads;



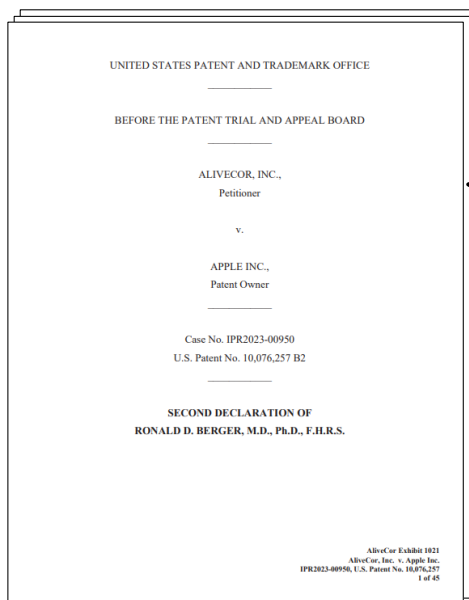
Berger Second Decl.

84. *Markel* teaches an insulating region between electrodes (Ex-1005, [0045], [0047]). Further, as discussed in my earlier Declaration, Ex-1003, a POSITA would have known that electrodes need to be electrically isolated in order to detect different cardiac signals and avoid being short circuited (Ex-1003, ¶ 175). If there is no isolating or insulating region between pads, a POSITA would understand that they are functionally the same pad. Thus, claim element [25.b] would have been obvious.

Ex. 1021, ¶ 84; see also Ex. 1023, ¶ 36 (Paper 32, 9)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 200

RMTA – Obviousness – Claim 23



Berger Second Decl.

[23.b]: wherein the exterior surface of the enclosure comprises an exterior surface of the second portion, wherein the second pad is positioned underneath the exterior surface of the second portion of the enclosure;

101. For the same reasons claim elements [1.c.i], [1.c.ii], [1.c.iii], and claim 10 are obvious in view of *Markel* alone and/or in view of *Nissilä*, claim element [28.a] is obvious. I incorporate by reference the analysis in my earlier Declaration here (Ex-1003, ¶¶ 115-140, 236-40, 356-61).

¶36). Specifically, a POSITA would have been motivated to place the second pad underneath the conductive plastic of *Markel* in order to “substantially conceal[] (or [hide])” the pad of the electrode of the user (Ex. 1003, ¶200). A POSITA would have had a reasonable expectation of success because *Markel* teaches that conductive plastic “may provide sufficient conductivity for an electrode to perform adequately” (Ex. 1003, ¶202; *see also id.*, ¶¶115-140, 196-204, 236-240, 356-361, 378-383).

RMTA – Obviousness – Claim 23

[23.b]: wherein the exterior surface of the enclosure comprises an exterior surface of the second portion, wherein the second pad is positioned underneath the exterior surface of the second portion of the enclosure;

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIVECOR, INC.,
Petitioner

v.

APPLE INC.,
Patent Owner

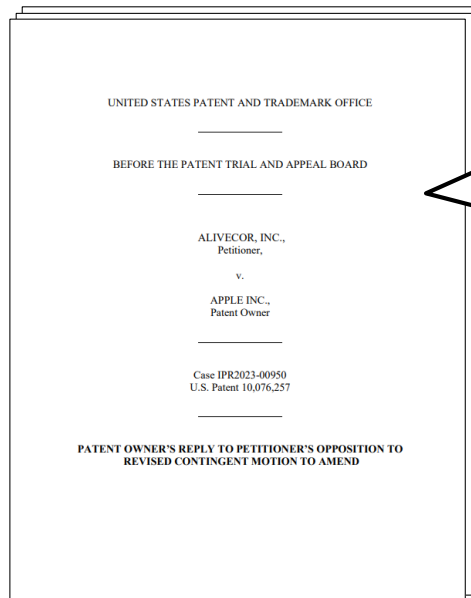
Case No. IPR2023-00950
U.S. Patent No. 10,076,257 B2

PETITIONER'S OPPOSITION TO PATENT OWNER'S
CONTINGENT MOTION TO AMEND

Opp. to Motion to Amend

A POSITA would have combined *Nissilä*'s electrode structure with *Markel*'s electronic device in order to accomplish *Markel*'s stated goal of an electrode that is substantially concealed or hidden (Pet., 69-71; Ex. 1021, ¶45, Ex. 1003, ¶¶351-355, 357, 360, 363, 366, 369, 372, 375, 379, 382, 385, 388, 391, 394). *Markel*'s hidden electrode would have been desirable because it increased aesthetics while protecting the electrode from bumps or other damage (Ex. 1003, ¶355). A POSITA would have had a reasonable expectation of success in combining *Markel* and *Nissilä* (*id.*).

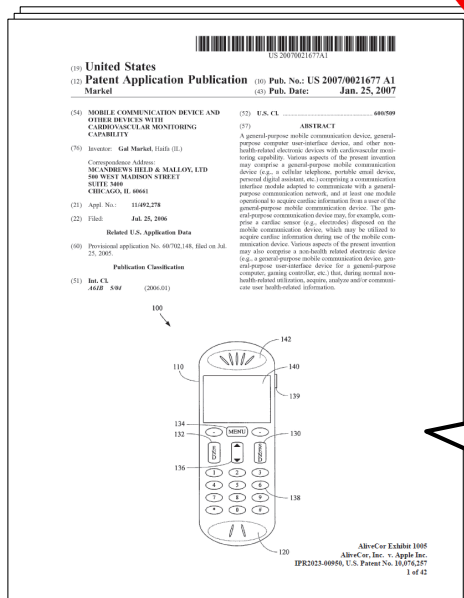
RMTA – Obviousness – Claim 23 – Apple’s Arg. 1



Apple's RMTA Reply

Markel does not disclose or suggest that its method of concealment involves placing an electrode pad *underneath* an enclosure of a device, as alleged by AliveCor (Pet., 20), because Markel's invention is instead directed to *exposing* its electrodes to *enable a user to contact them*. APPLE-2001, ¶81. To this point, Markel specifies throughout its disclosure that its electrodes are "disposed on" or "placed on" the exterior surface of the device to "provide for *user contact*" with the electrode. EX1005, [0045], [0050].

Obviousness – Claim 23 – Apple’s Arg. 1 – Reply



Markel

Markel does not disclose or suggest that its method of concealment involves placing an electrode pad *underneath* an enclosure of a device, as alleged by AliveCor (Pet., 20), because Markel's invention is instead directed to *exposing* its electrodes to *enable a user to contact them*. APPLE-2001, ¶81. To this point, Markel specifies throughout its disclosure that its electrodes are “disposed on” or “placed on” the exterior surface of the device to “provide for user contact” with the electrode. EX1005, [0045], [0050].

[0050] In a further non-limiting exemplary configuration, a first electrode may be disposed on a handheld portion of the MCD 100, and a second electrode may be disposed on (or proximate) an earpiece of the MCD 100. FIG. 6 provides a non-limiting illustration of such placement. For example, the mobile communication device 600 may comprise a main body portion 620 and an audio output portion 610 (e.g., an earpiece). A first electrode may be disposed on the main body portion 620 (e.g., *molded into the main body portion 620 or positioned on the main body portion 620*). A second electrode may be disposed on the audio output portion 610 (e.g., *molded into the audio output portion 610 or positioned on the audio output portion 610*). Such electrode placement may, for example, provide for user contact with both electrodes during the process of listening to the MCD 100.

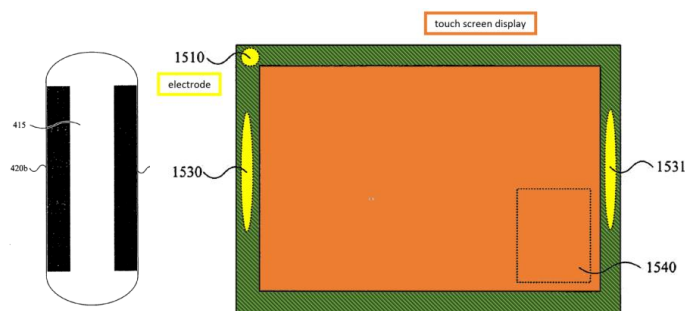
Ex. 1005, [0050] (Paper 38, 5-6)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 204

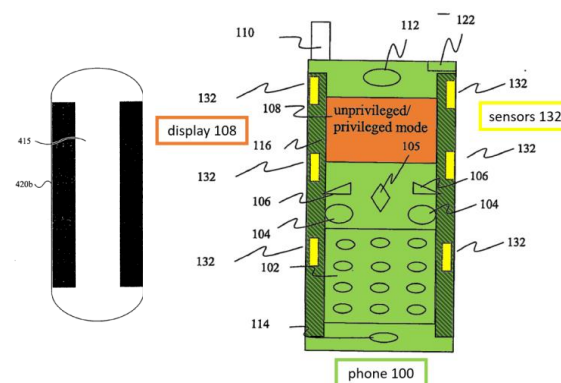
RMTA – Obviousness – Claim 23

[Undisputed]

[23.c]: wherein the first and second pads are adjacent pads.



Markel Fig. 4 and Fig. 15

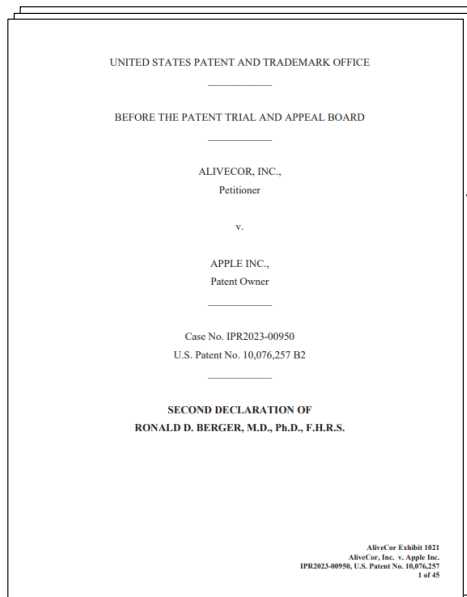


Markel Fig. 4 and Engstrom

RMTA – Obviousness – Claim 23

[Undisputed]

[23.c]: wherein the first and second pads are adjacent pads.



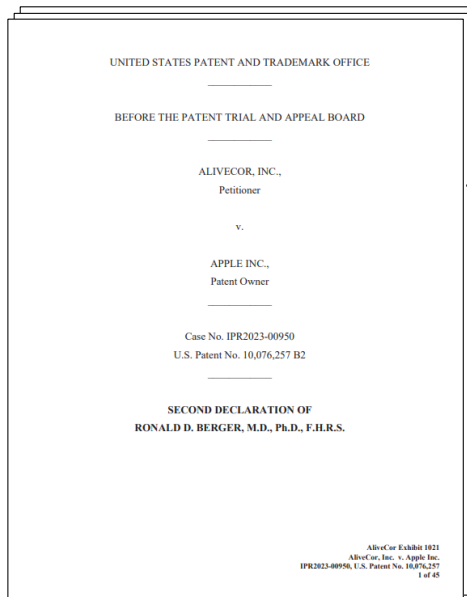
Berger Second Decl.

80. As shown in *Markel's* Figure 15, electrodes 1510 and 1530 on the left side portion comprise pads that are separated by a distance along the enclosure that is sufficient to electrically isolate the pads. As discussed in my earlier Declaration, Ex-1003, a POSITA would have known that electrodes need to be electrically isolated in order to detect different cardiac signals and avoid being short circuited (Ex-1003, ¶ 175). Thus, I understand that the electrode pads of electrodes 1510 and 1530 are adjacent. To the extent Apple argues that electrodes 1510 and 1530 are not adjacent for any reason, then the scope of the term is not reasonably certain to a POSITA (*See infra* Section X). Thus, as applied to *Markel's* Figure 4, *Markel's* Figure 15 renders obvious substitute claim element [25.a].

RMTA – Obviousness – Claim 23

[Undisputed]

[23.c]: wherein the first and second pads are adjacent pads.

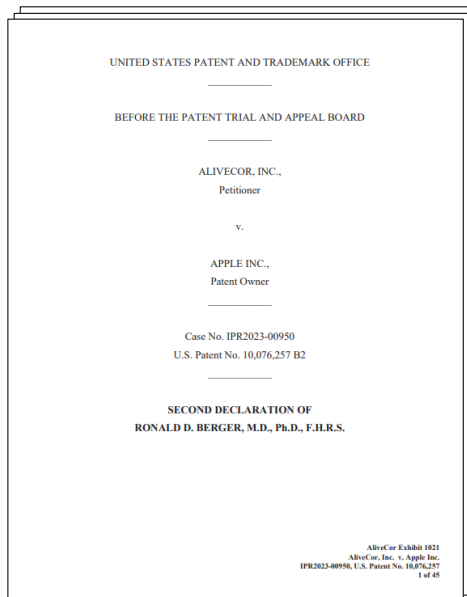


Berger Second Decl.

81. In addition, *Engstrom's* sensors 132 on the left side portion of the device are separated by a distance along the enclosure that is sufficient to electrically isolate the pads. As discussed in my earlier Declaration, Ex-1003, a POSITA would have known that electrodes need to be electrically isolated in order to detect different cardiac signals and avoid being short circuited (Ex-1003, ¶ 175). Thus, I understand that *Engstrom's* sensors 132 on the left side portion of the device are adjacent. To the extent Apple argues that electrodes 1510 and 1530 are not adjacent for any reason, then the scope of the term is not reasonably certain to a POSITA (*See infra* Section X). Thus, *Engstrom* renders obvious substitute claim element [25.a].

RMTA – Obviousness – Claim 24

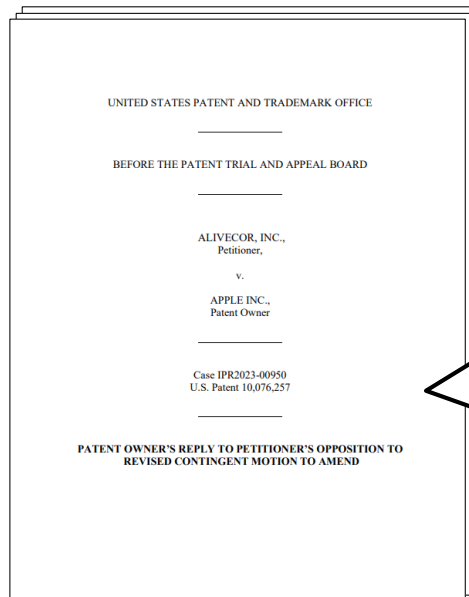
[24.a]: wherein the first pad is embedded in an inner surface of an electrically conductive metal bezel that forms a portion of an exterior surface of the electronic device; and



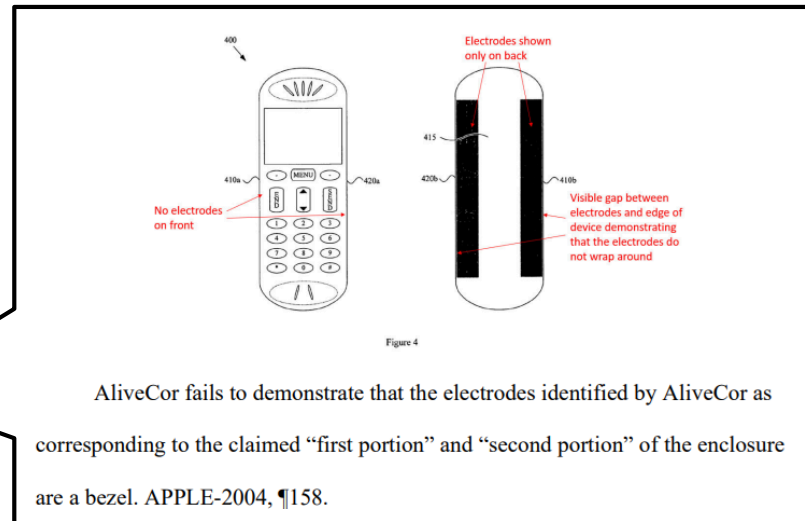
Berger Second Decl.

62. As discussed in my earlier Declaration, Ex-1003, *Markel* alone and/or in view of *Nissilä* renders obvious (1) a first pad that is embedded in a first portion of the enclosure (Ex-1003, ¶¶ 119-20, 357-58), (2) the first pad is positioned underneath the exterior surface of the first portion (Ex-1003, ¶¶ 126-40, 357-58), and (3) the first portion of the enclosure is a bezel (Ex-1003, ¶¶ 248-252). Thus, *Markel* alone and/or *Nissilä* renders obvious a first pad that is both embedded in a bezel *and* underneath the exterior surface of the bezel. Therefore, to be both embedded in and underneath the bezel, it would have been obvious to a POSITA that the first pad is embedded in an inner surface of the bezel.

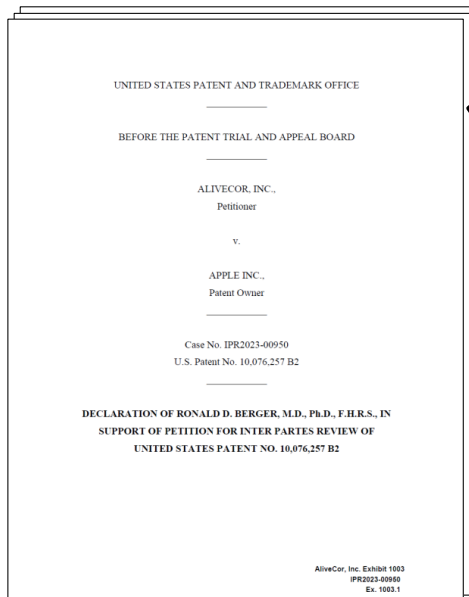
RMTA – Obviousness – Claim 24 – Apple’s Arg. 1



Apple's RMTA Reply

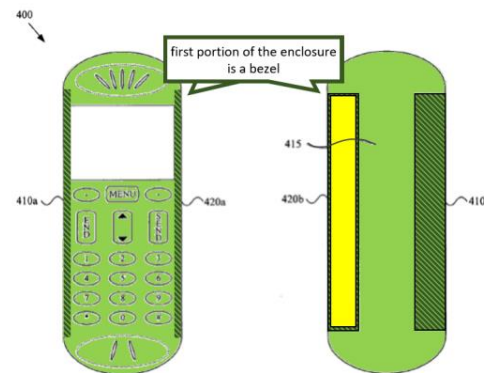


Obviousness – Claim 24 – Apple’s Arg. 1 - Reply



Berger Decl.

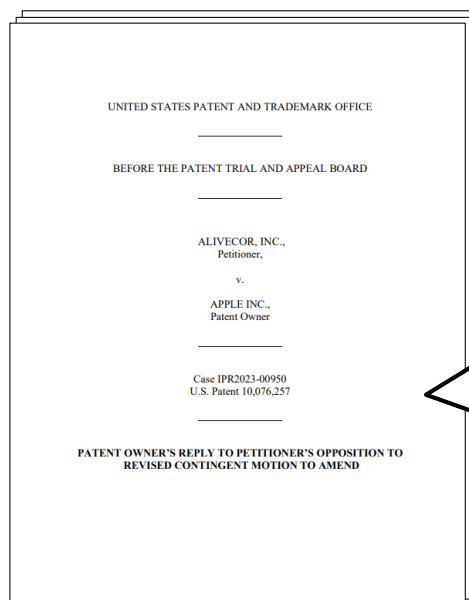
enclosure.” According to Figure 4 of *Markel*, the “side portions” (dark green, below) wrap around the front and back of the device, like a bezel. Both the front and back view of *Markel*’s electronic device have labels corresponding to the “right side portion 420” (Ex-1005, Fig. 4). As illustrated below, furthermore, the second electrode extends to the rim that encircles *Markel*’s electronic device. *Markel* also discloses that an electrode may be disposed in “a **border** of the display” (Ex-1005, [0044] (emphasis added)). From this, a person of ordinary skill in the art would have understood that the first pad of *Markel*’s “second electrode” is embedded in 420b (i.e., the “first portion of the enclosure”) which includes the “bezel.”



Ex. 1003, ¶ 251 (annotated) (Paper 38, 8-9)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 210

RMTA – Obviousness – Claim 24 – Apple’s Arg. 2

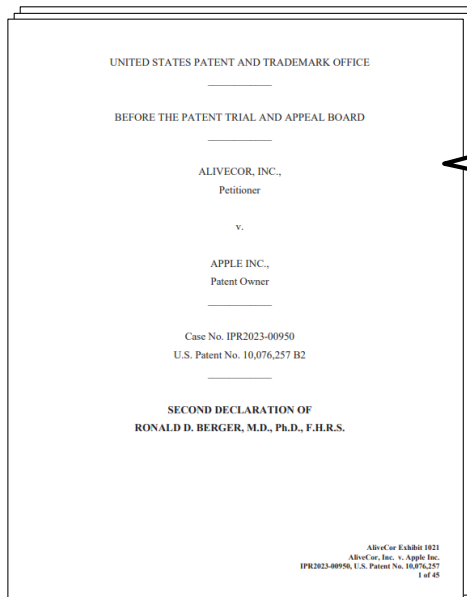


Apple's RMTA Reply

Furthermore, AliveCor has identified no prior art of record that discloses a configuration in which electrodes/pads are “embedded in an inner surface of an electrically conductive metal bezel,” as required by claim 24. Opp., 11-14; APPLE-2004, ¶158. Without identifying any relevant prior art teaching, AliveCor asserts that such a configuration would have been obvious “to simultaneously create an electrically conductive connection between the pad and the outer surface of the enclosure.” Opp., 11. However, the Petition asserts that these objectives are already achieved by Markel alone, or the original Markel-Nissilä combination and therefore, AliveCor presents no rationale for further modification. *See* Pet., 16-21, 28-29, 71-73; *Anova Hearing Labs*, 809, Fed. Appx. at 843.

Obviousness – Claim 24 – Apple’s Arg. 2 - Reply

[24.a]: wherein the first pad is embedded in an inner surface of an electrically conductive metal bezel that forms a portion of an exterior surface of the electronic device; and



Berger Second Decl.

63. As discussed in my earlier Declaration, Ex-1003, a lead comprises both the electrode and the associated wiring (see, e.g., Ex-1003, ¶ 118). A POSITA would have been motivated to embed the pad of the electrode on the inner surface of the bezel in order to simultaneously (1) create an electrically conductive connection between the pad and the outer portion of the enclosure, and (2) ensure that the pad is accessible to the components inside the enclosure, including the associated wiring necessary to complete the electrical circuit and connect the pad to the cardiac acquisition module of *Markel*.

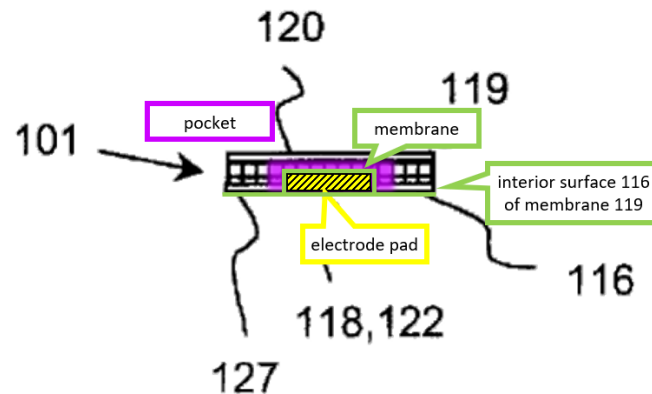
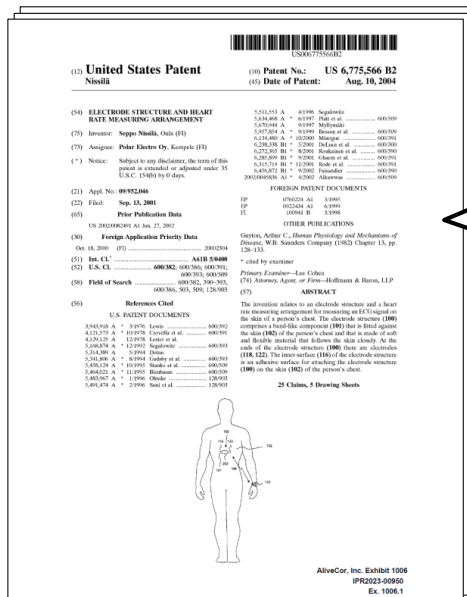
118. One of those components is a “second electrode 1022” and associated wiring (annotated above in yellow), which correspond to the claimed “first lead” of element [1.c.i]. For example, *Markel* discloses that “mobile communication device 1000” includes “a first electrode 1020 and a *second electrode 1022* (and, for example, a third or Nth electrode 1024)” (Ex-1005, [0058] (emphasis added)). *Markel* also discloses that the second electrode is “coupled” to the cardiac information acquisition module (Ex-1005, [0059]). From this, a person of ordinary skill in the art would have understood that *Markel*’s “second electrode” and associated wiring is a “first lead.”

Ex. 1021, ¶ 62-63; Ex. 1003, ¶ 118; see also Ex. 1023, ¶ 36 (Paper 32, 11)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 212

RMTA – Obviousness – Claim 24 – “Pocket”

[24.a]: wherein the first pad is embedded in an inner surface of an electrically conductive metal bezel that forms a portion of an exterior surface of the electronic device; and



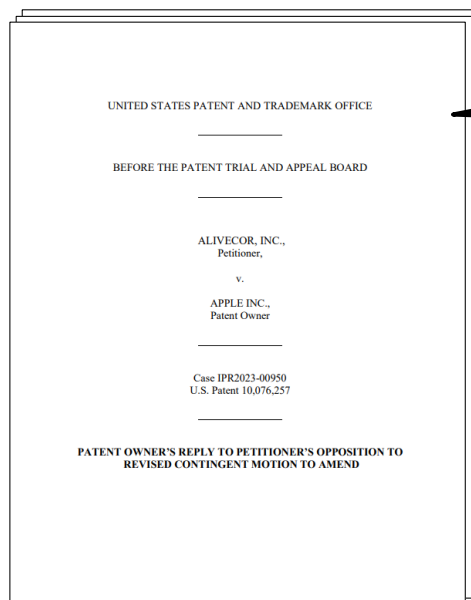
material. The electrodes 118, 122 at both ends of the electrode structure 100 can be equal or narrower in width to the band-like component 101. The membrane 119 can thus

Nissilä

Ex. 1006, 5:33-40, Fig. 5 (annotated) (Paper 32, 13)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 213

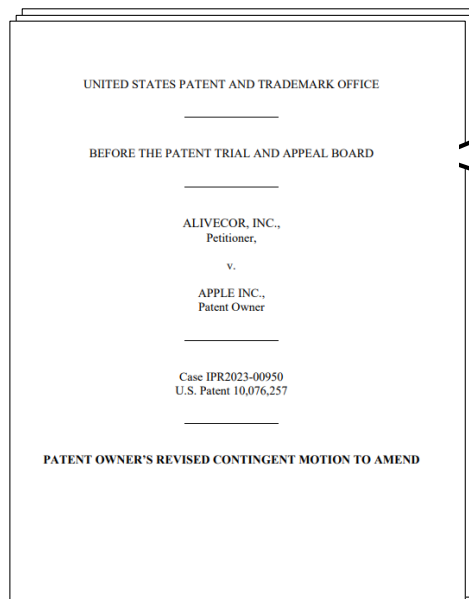
RMTA – Obviousness – Claim 24 – Apple’s Arg. 3



Apple's RMTA Reply

AliveCor incorrectly asserts that Apple is interpreting Claim 24 “to require—or at least include—a ‘pocket’ structure.” Opp., 12. Apple has made no such assertion and indeed, the term “pocket” appears nowhere in Apple’s RMTA.

Obviousness – Claim 24 – Apple’s Arg. 3 – Reply



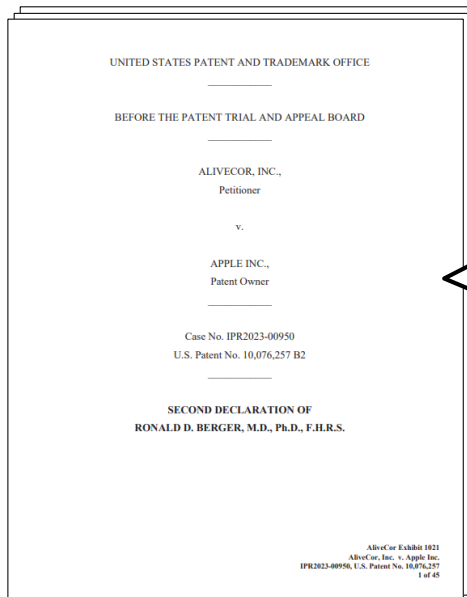
Apple's RMTA

As additional detail, the priority documents support the recitation of substitute claims 24 and 25 of the first pad being embedded in an inner surface of a bezel, stating that “the leads can...be coupled to an electrically conductive portion of the device enclosure (e.g., a metallic bezel....”⁵⁵ APPLE-2016, [0009]; APPLE-2017, [0009]; APPLE-2012, [0008]. The “bezel 310 can include...any other suitable distribution of leads.” APPLE-2016, [0042] (“...leads that can be integrated in the bezel”); APPLE-2017, [0042]; APPLE-2012, [0041]. The priority documents describe that “[l]eads 322 and 324 can be integrated in bezel 310 using any suitable approach” such as “placed within the thickness of bezel 460...but underneath the outer surface of the bezel.” APPLE-2016, [0046]-[0047], FIG. 4B; APPLE-2017, [0046]-[0047], FIG. 4B; APPLE-2012, [0045]-[0046], FIG. 4B, cl. 18 (“the first lead further comprises a pad embedded underneath the outer surface of the bezel”).

bezel 460. Alternatively, lead 472 can be placed within the thickness of bezel 460 (e.g., in a pocket within the bezel wall), but underneath the outer surface of the bezel. The short thickness of bezel 460

RMTA – Obviousness – Claim 24 – Metal Bezel

[24.a]: wherein the first pad is embedded in an inner surface of an electrically conductive metal bezel that forms a portion of an exterior surface of the electronic device; and

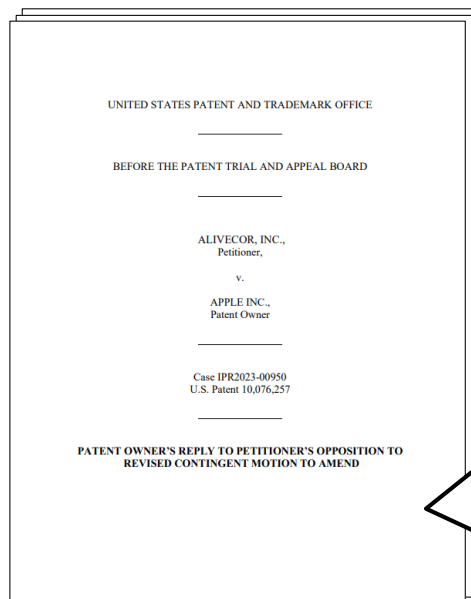


Berger Second Decl.

87. As discussed above with respect to substitute claim 23, it would have been obvious to a POSITA to embed the first pad on the inner surface of the bezel. Further, a POSITA would have found it obvious to make the bezel from a metallic conductive material because, like conductive plastic in *Markel*, conductive metal "may provide sufficient conductivity for an electrode to perform adequately" (Ex-1005, [0037]). A POSITA would also have known that metals, such as aluminum and steel, were regularly used in the construction of mobile devices. A POSITA would have constructed the bezel from metal because it can be more aesthetically pleasing than plastic and it would provide a protective barrier around the display. Thus, *Markel* renders obvious substitute claim element [26.a]

88. A POSITA would have had a reasonable expectation of success in making *Markel*'s bezel out of a metal instead of plastic in view of *Nissilä*, which teaches that the outer "membrane 119" of the electrode structure can be made of "metal, electrically conductive plastic or a similar conductive material" (Ex. 1006, 5:33-38). Thus, *Nissilä* further renders obvious claim element [26.a].

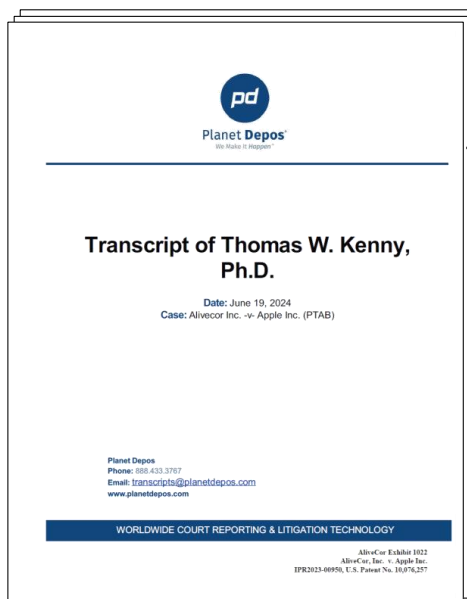
RMTA – Obviousness – Claim 24 – Apple’s Arg. 4



Apple's RMTA Reply

Additionally, AliveCor now asserts that it would have been “obvious to make the bezel from a metallic conductive material” to provide sufficient connectivity. Opp., 14. However, such a modification directly conflicts with the rationale conveyed by AliveCor’s expert for why he believes Markel implicitly discloses a dual layered electrode with a metal pad positioned under the exterior of the device.¹ Specifically, Dr. Berger asserts that when an electrode “is made out of a moderately conductive plastic, then a POSITA would understand that a more conductive material such as a metal pad would, would need to reside underneath that outer layer in order to have sufficient surface area and conductivity.” APPLE-2018, 23:8-24:1. Therefore, if Markel’s conductive plastic electrode is replaced with a conductive metal electrode, as AliveCor now insists with respect to claim 24, the basis for AliveCor’s assertion that Markel *must* include a second conductive pad under the exterior surface is no longer applicable.

Obviousness – Claim 24 – Apple's Arg. 4 – Reply

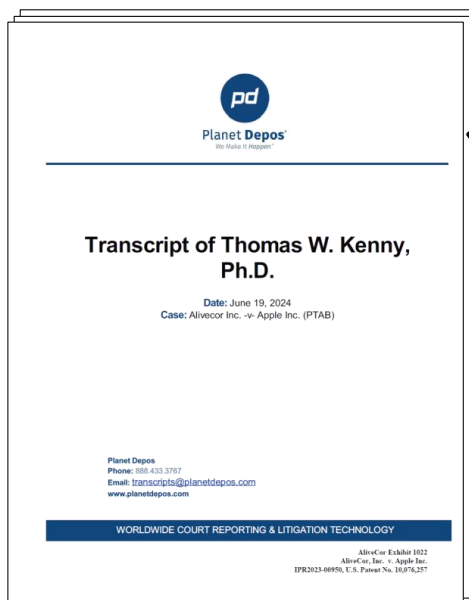


Kenny Tr.

Q. In the context of the '257 patent, can a pad be made of the same material as the enclosure or bezel?

A. [quoting Ex. 1001, 6:17-28] So this is, again, narrative describing the design space, that the heart sensor leads can be constructed from materials that have superior conductivity relative to the other elements of the system, and that makes the design relatively easy. I think, as the conductivities approach each other in value, then the geometry becomes more important.

Obviousness – Claim 24 – Apple’s Arg. 4 – Reply



Kenny Tr.

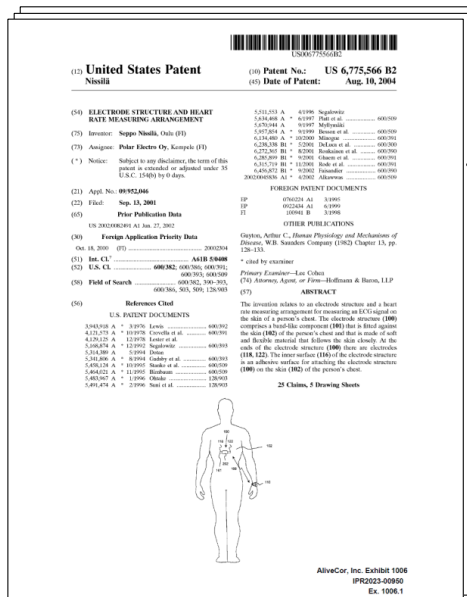
Q. So when you formed your opinions, did you understand that, in the context of the '257 patent, pad can made be [sic] of the same material as the enclosure or the bezel?

A. Well, again, I think the context here is one is attempting to pull signals from the user into this system and measure them accurately. I think one of ordinary skill would be motivated to select materials that make that job easier.

Could one make a bezel and a pad out of the same material? I suppose one could do that. . . .

I think it's a -- this is in this kind of design space where there's tradeoffs and not absolute, you know, "if you choose this material, it will work, if you choose that material, it won't work," because it's a combination of the materials choice and other elements of the design and, frankly, the specifications and parameters that one is applying in order to be sure that the signals from the outside can be captured and measured accurately on the inside.

Obviousness – Claim 24 – Apple's Arg. 4 – Reply



According to a second embodiment, as in FIGS. 3 to 6, the electrodes 118, 122 of the electrode structure 100 consist of a membrane 119 that is located at both ends of the electrode structure 100, at the electrode 118, 122, and is made of metal, electrically conductive plastic or a similar conductive material. The electrodes 118, 122 at both ends of the electrode structure 100 can be equal or narrower in width to the band-like component 101. The membrane 119 can thus

Nissila

Ex. 1006, 5:33-38 (Paper 32, 14)

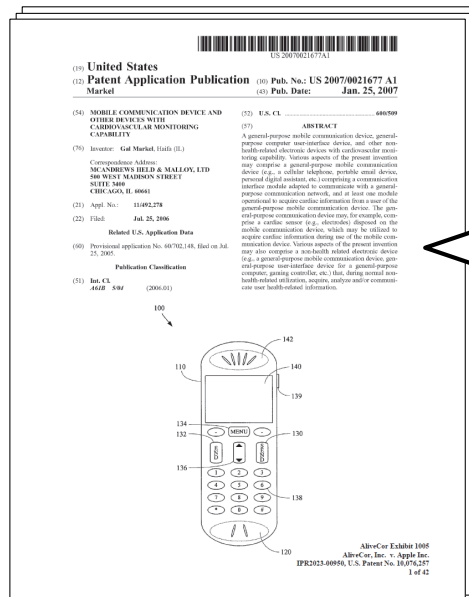
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 220

AliveCor Exhibit 1024
 AliveCor, Inc. v. Apple Inc.
 IPR2023-00950, U.S. Patent No. 10,076,257
 220 of 249

RMTA – Obviousness – Claim 24

[Undisputed]

[24.b]: wherein the second pad is exposed on the exterior surface of the electronic device for direct contact from a user.



Markel

[0037] Electrodes may generally comprise conductive material. For example, **an electrode may comprise a metallic surface exposed for user contact.** Also for example, an electrode may be formed from conductive plastic (or another material) that may be integrated into various molded components of the mobile communication device. For example, various conductive plastics (e.g., graphite-impregnated plastic or the like) may provide sufficient conductivity for an electrode to perform adequately. It should be recognized that the scope of various aspects of the present invention should not be limited by characteristics of particular electrodes or electrode placements.

Ex. 1005, [0037] (Paper 32, 14-15)

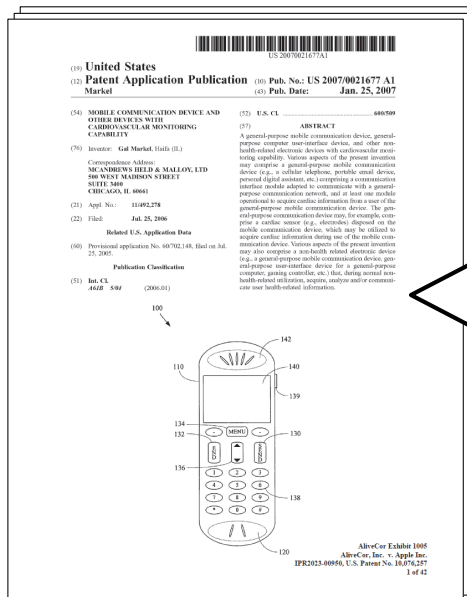
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 221

AliveCor Exhibit 1024
AliveCor, Inc. v. Apple Inc.
IPR2023-00950, U.S. Patent No. 10,076,257
221 of 249

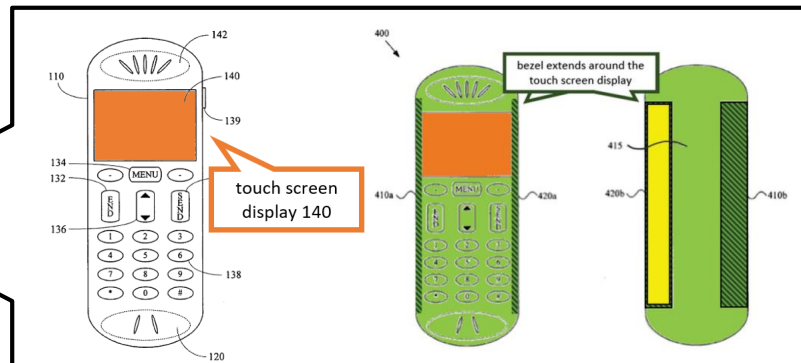
RMTA – Obviousness – Claim 25

[25.a] [Undisputed]

**[25.a]: further comprising a touch screen display,
[25.b]: wherein the first portion of the enclosure is a
bezel; wherein the bezel extends around the touch screen
display; and**



Markel



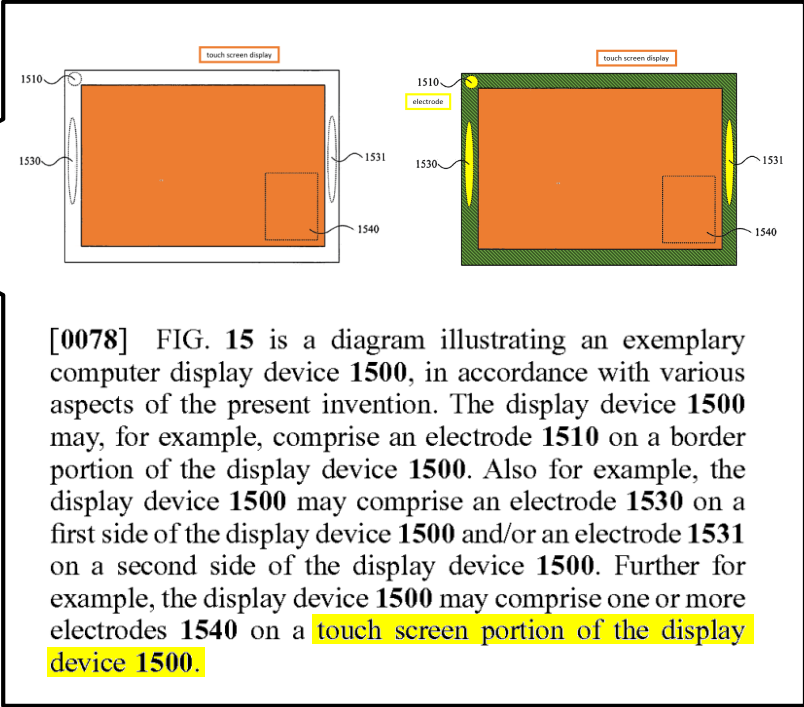
control button 139. The MCD 100 may also comprise various user output features, for example, a display 140 (which may also function as a touch screen input feature) and a speaker 142. Various input and output features of the exemplary MCD 100 will be discussed below. It should be recognized that various aspects of the present invention should not be limited by characteristics of the particular user input and output features illustrated in FIG. 1. Various aspects of the present invention are readily extensible to other MCD features.

Ex. 1005, [0034], Fig. 1, Fig. 4 (annotated) (Paper 32, 15)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 222

RMTA – Obviousness – Claim 25

***[25.a]: further comprising a touch screen display,
[25.b]: wherein the first portion of the enclosure is a
bezel; wherein the bezel extends around the touch screen
display; and***

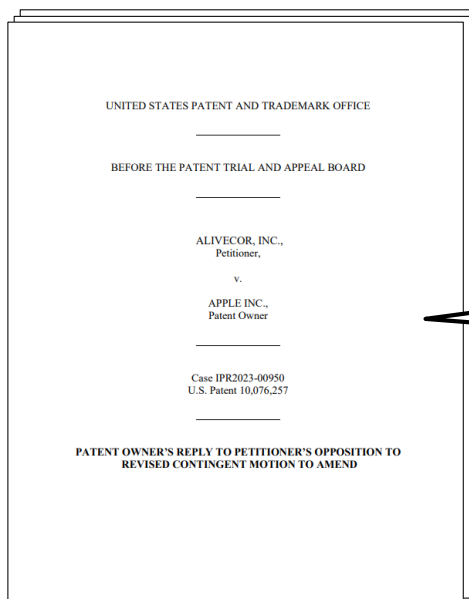


Ex. 1005, [0078], Fig. 15 (annotated) (Paper 32, 15) DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 223

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 223

RMTA – Obviousness – Claim 25

[25.c]: wherein the first pad is embedded in an inner surface of the bezel.



As discussed earlier for element [24.a] and substitute claim 24, it would have been obvious to a POSITA to embed the first pad in an inner surface of the bezel.

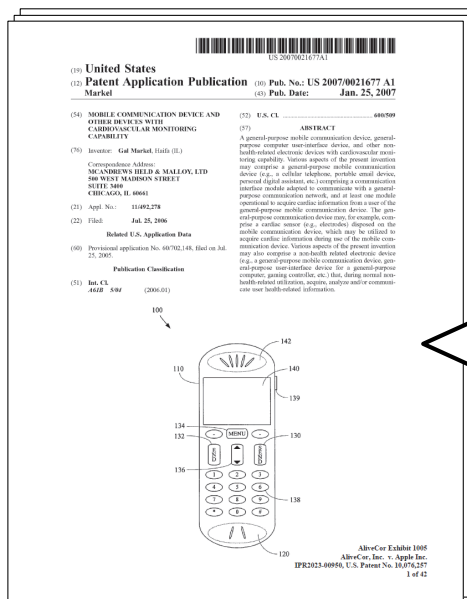
Claim 25 distinguishes over the prior art for the reasons discussed with respect to claim 24, *supra*.

Apple's RMTA Reply

RMTA – Obviousness – Claim 26

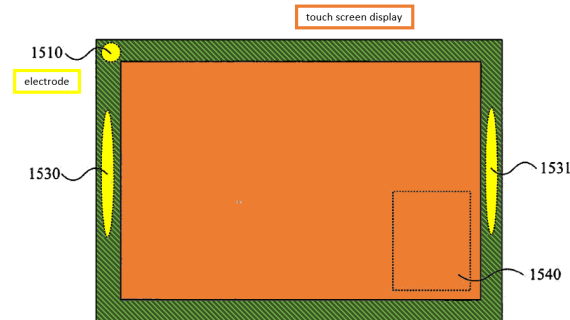
[Undisputed]

[26.a]: a third lead comprising a third pad that is embedded in the second portion of the enclosure, wherein the third pad is configured to detect a third electrical signal of the user's cardiac signal via the user's skin's contact with the third pad; and



Markel

[0051] Though the previous exemplary illustrations generally discuss one or two electrodes, it should be recognized that more than two electrodes might also be utilized. For example, the MCD 100 may be adapted to detect cardiac activity of a user that is conductively coupled to at least two of a first, second and third (or N) electrodes.



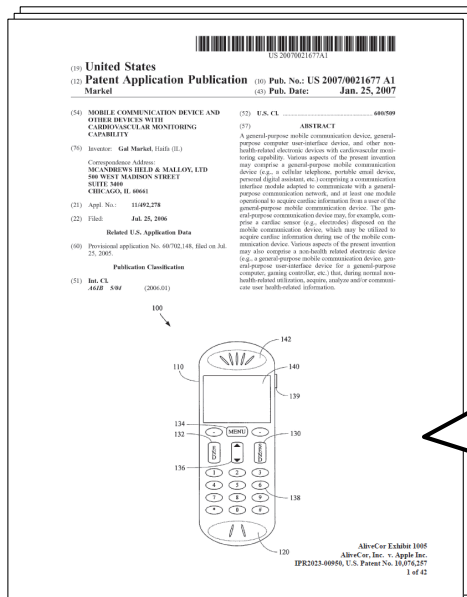
Ex. 1005, [0051], Fig. 15 (annotated) (Paper 32, 15)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 225

RMTA – Obviousness – Claim 26

[Undisputed]

[26.b]: wherein the second pad is configured to detect the second electrical signal of the user's cardiac signal via the user's skin's contact with the second pad;



Markel

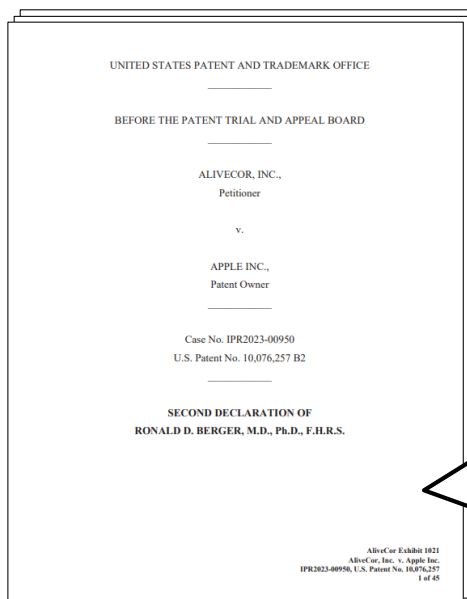
[0037] Electrodes may generally comprise conductive material. For example, **an electrode may comprise a metallic surface exposed for user contact.** Also for example, an electrode may be formed from conductive plastic (or another material) that may be integrated into various molded components of the mobile communication device. For example, various conductive plastics (e.g., graphite-impregnated plastic or the like) may provide sufficient conductivity for an electrode to perform adequately. It should be recognized that the scope of various aspects of the present invention should not be limited by characteristics of particular electrodes or electrode placements.

Ex. 1005, [0037] (Paper 32, 18-19)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 226

RMTA – Obviousness – Claim 26

[26.c]: wherein the first pad detects signals through a first hand, and the second and third pads detect signals through a second hand.

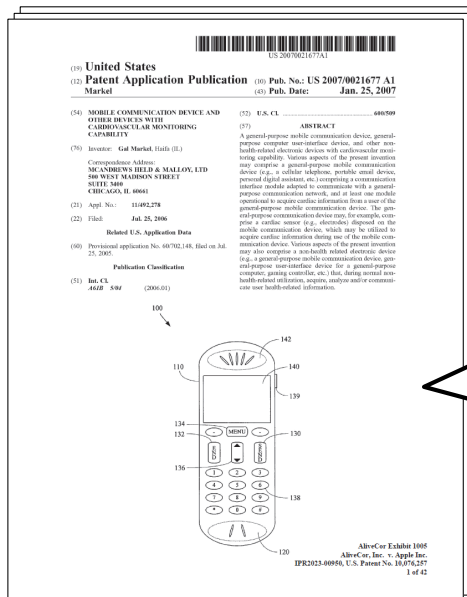


Berger Second Decl.

75. *Markel* teaches that placement of electrodes “provide[s] for convenient access for a user to contact both the first and second electrodes simultaneously (e.g., with different hands or different fingers)” (Ex-1005, [0049]). Further, as discussed in my earlier Declaration, Ex-1003, an ECG is a measure of the difference in electrical activity between two points (Ex-1003, ¶ 49). It would have been obvious to a POSITA to take a measurement between the first and second hand because that would result in a measurement that goes across the heart. It also would have been obvious to a POSITA to contact the second and third pads with the same hand because they are in the same portion of the enclosure. Thus, claim element [24.c] would have been obvious to a POSITA in view of *Markel*.

RMTA – Obviousness – Claim 26

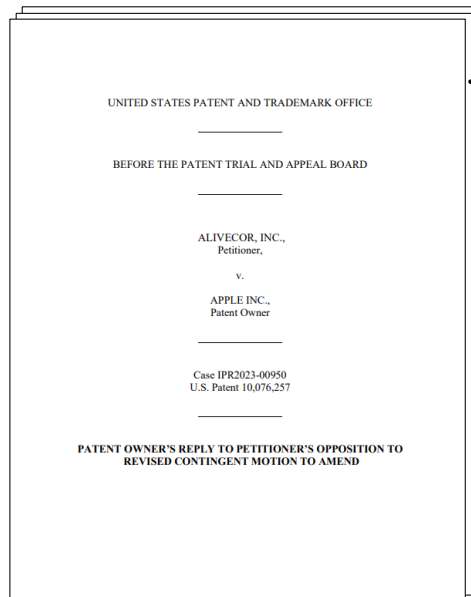
[26.c]: wherein the first pad detects signals through a first hand, and the second and third pads detect signals through a second hand.



Markel

[0049] In another non-limiting exemplary configuration, a first electrode may be disposed on a first pushbutton of the MCD 100, and a second electrode may be disposed on a second pushbutton of the MCD 100. Such placement may, for example, provide for a user to be generally contacting at least one of the first and second electrodes during use of a keypad. Also such placement may, for example, provide for convenient access for a user to contact both the first and second electrodes simultaneously (e.g., with different hands or different fingers).

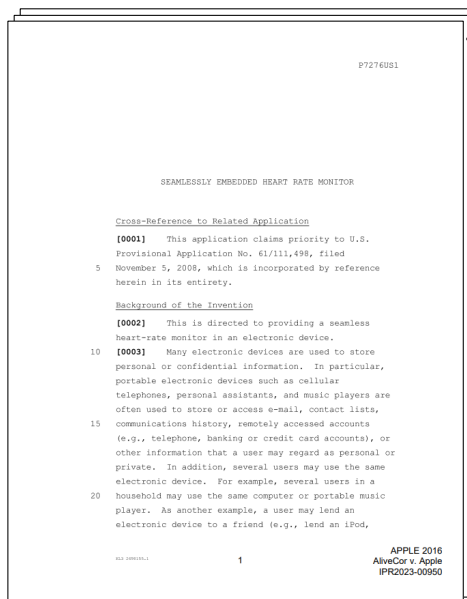
Obviousness – Claim 26 – Apple Arg.



Apple's RMTA Reply

Claim 26 distinguishes over the prior art for the reasons discussed with respect to claim 24, *supra*, regarding the lack of an electrically conductive bezel in either Markel alone or the Markel-Nissilä combination. Additionally, while Markel briefly mentions contacting the electrodes of the device with two different hands, Markel includes no actual support for the described hand placement. Opp., 19.

Obviousness – Claim 26 – Apple Arg. – Reply



APPLE-2016

device). Using lead 326, the electronic device can detect an electrical signal from a different portion of the user's body (e.g., leads 322 and 324 detect signals through a first hand, and lead 326 detects signals through the second hand), which can provide the processor with additional information for determining characteristics of the user's cardiac activity.

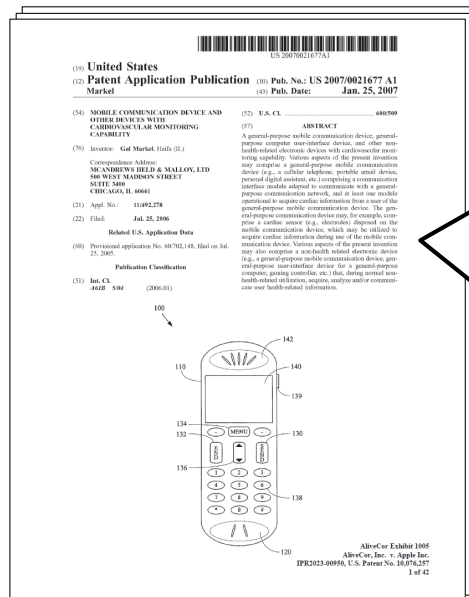
75. *Markel* teaches that placement of electrodes “provide[s] for convenient access for a user to contact both the first and second electrodes simultaneously (e.g., with different hands or different fingers)” (Ex-1005, [0049]). Further, as discussed in my earlier Declaration, Ex-1003, an ECG is a measure of the difference in electrical activity between two points (Ex-1003, ¶ 49). It would have been obvious to a POSITA to take a measurement between the first and second hand because that would result in a measurement that goes across the heart. It also would have been obvious to a POSITA to contact the second and third pads with the same hand because they are in the same portion of the enclosure. Thus, claim element [24.c] would have been obvious to a POSITA in view of *Markel*.

APPLE-2016, [0047]; Ex. 1021, ¶ 75; see also Ex. 1023, ¶36 (Paper 32, 19; Paper 38, 11)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 230

RMTA – Obviousness – Claim 27

[27.a]: wherein the detected cardiac signal is an electrocardiogram signal;



Markel

[0051] Though the previous exemplary illustrations generally discuss one or two electrodes, it should be recognized that more than two electrodes might also be utilized. For example, the MCD 100 may be adapted to detect cardiac activity of a user that is conductively coupled to at least two of a first, second and third (or N) electrodes.

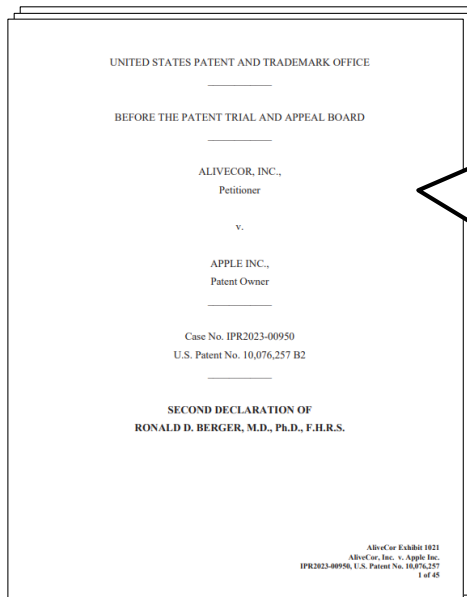
[0058] FIG. 10 is a block diagram illustrating an exemplary mobile communication device 1000 (“MCD”) (or portions thereof) in accordance with various aspects of the present invention. Various exemplary modules will be addressed in more detail later. The exemplary MCD 1000 may, for example, comprise a first electrode 1020 and a second electrode 1022 (and, for example, a third or Nth electrode 1024). Alternatively for example, the exemplary MCD 1000 may comprise any of a variety of sensors (e.g., audio sensors) for monitoring cardiac activity. The exemplary MCD 1000 may also comprise a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user.

Ex. 1005, [0051], [0058] (Paper 32, 21)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 231

RMTA – Obviousness – Claim 27

[27.a]: wherein the detected cardiac signal is an electrocardiogram signal;



Berger Third Decl.

56. *Markel* discloses a “cardiac signal that is an [ECG] signal.” A POSITA would have known that generating an ECG signal requires a user to contact two or more electrodes on different sides of the user’s body in order to measure the potential difference across the user’s heart. *Markel* describes a device with “cardiovascular monitoring capability” that “utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user” (Ex-1005, Abstract, [0058], Fig. 10). *Markel* also teaches that “[t]he [device] may be adapted to detect cardiac activity of a user that is conductively coupled to at least two of a first, second and third (or N) electrodes.” (Ex-1005, [0051] (emphasis added)). Consequently, a POSITA would have at once understood that the device of *Markel* is used to detect an ECG.

RMTA – Obviousness – Claim 27

Kennametal, Inc. v. Ingersoll Cutting Tool Co.

“A reference can anticipate a claim even if it ‘does not expressly spell out’ all the limitations arranged or combined as in the claim, if a [POSITA], reading the reference, would ‘at once envisage’ the claimed arrangement or combination.”

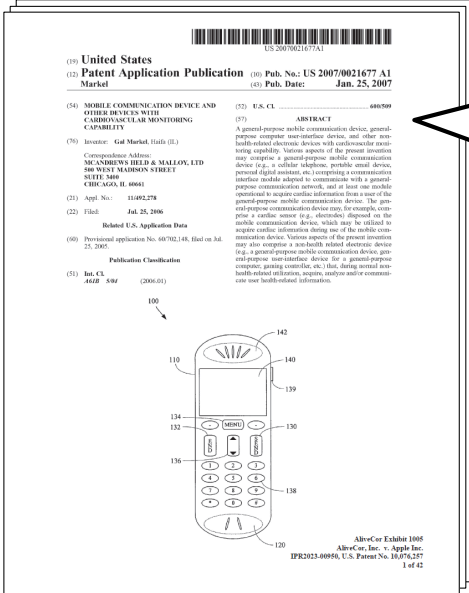
780 F.3d 1376, 1381 (Fed. Cir. 2015)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 233

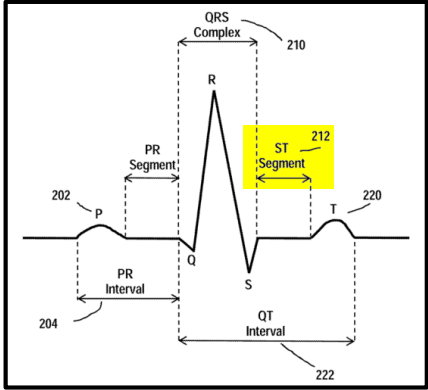
RMTA – Obviousness – Claim 27

[27.a]: wherein the detected cardiac signal is an electrocardiogram signal;

[0115] In a non-limiting exemplary scenario, the processing module 2050 may be adapted to compare changes in a cardiac signal to known pathologic patterns (e.g., ST-segment depression or ST-segment elevation). As mentioned previously, analysis of cardiac signal (or information) changes over time may comprise analyzing changes in heart rate or other heart characteristics (e.g., to monitor effectiveness of anti-arrhythmic medication, blood pressure medication or other medication).



Markel



Ex. 1001, Fig. 1

Ex. 1005, [0115]; Ex. 1001, Fig. 2 (annotated) (Paper 32, 19-21) DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 234

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 234

AliveCor Exhibit 1024
AliveCor, Inc. v. Apple Inc.
IPR2023-00950, U.S. Patent No. 10,076,257
234 of 249

RMTA – Obviousness – Claim 27

[27.a]: wherein the detected cardiac signal is an electrocardiogram signal;

SUMMARY OF THE INVENTION

The object of the invention is to provide an improved electrode structure and heart rate measuring arrangement for measuring an electrical heart beat signal on a human body such that the above problems can be solved. This is achieved with the following electrode structure for measuring an ECG signal on the chest of a person. The electrode structure comprises a band-like component having an inner surface to be placed against the skin of the person's chest and an outer surface opposite thereto, and which electrode structure comprises a first electrode at a first end and a second electrode at a second end of the electrode structure, and the inner surface of the electrode structure is an adhesive surface for attaching the electrode structure to the skin of the person's chest, and the electrode structure is arranged to measure a potential difference between the first and the second electrodes caused by the ECG signal.

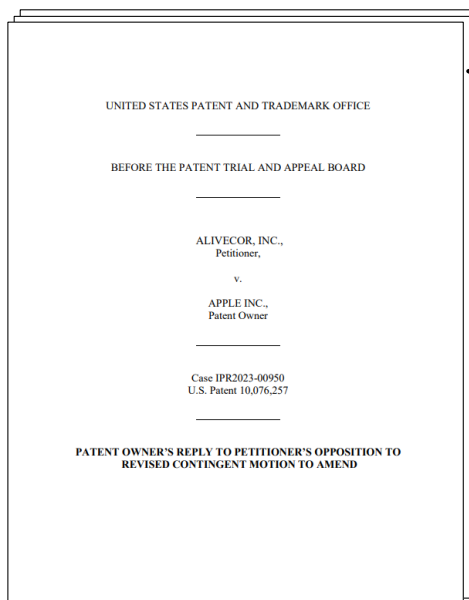
Nissilä

Ex. 1006, 2:17-57 (Paper 32, 22) DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 235

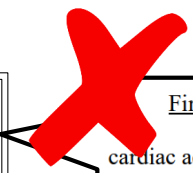
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 235

AliveCor Exhibit 1024
AliveCor, Inc. v. Apple Inc.
IPR2023-00950, U.S. Patent No. 10,076,257
235 of 249

RMTA – Obviousness – Claim 27 – Apple’s Arg. 1

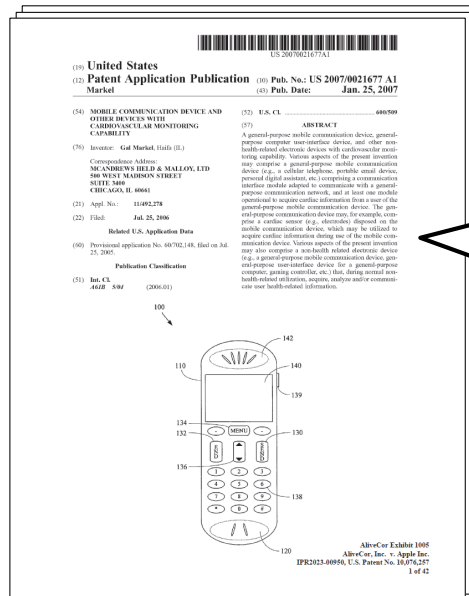


Apple's RMTA Reply

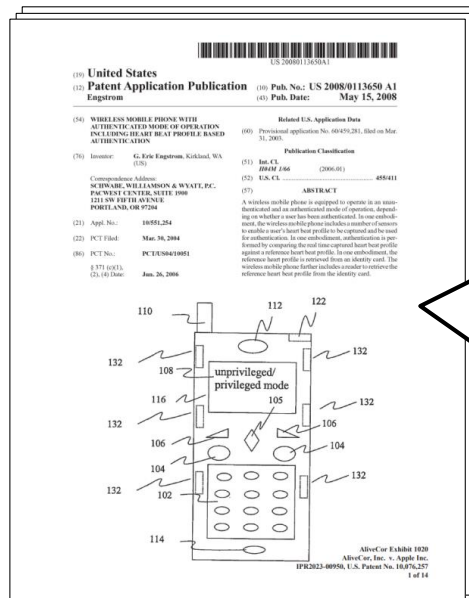
 First, Markel vaguely discloses that its device “may be adapted to detect cardiac activity of a user” but fails to disclose that such cardiac activity included an electrocardiogram signal or a processor configured to extract characteristics of an electrocardiogram signal. *See e.g.*, EX1005, [0051], [0058].

RMTA – Obviousness – Claim 27

[27.b]: wherein the processor is further configured to extract one or more characteristics of the electrocardiogram signal and compare . . . ; and [27.c]: . . . the electronic device authenticates the user.



RMTA – Obviousness – Claim 27



Engstrom

[27.b]: wherein the processor is further configured to extract one or more characteristics of the electrocardiogram signal and compare . . . ; and [27.c]: . . . the electronic device authenticates the user.

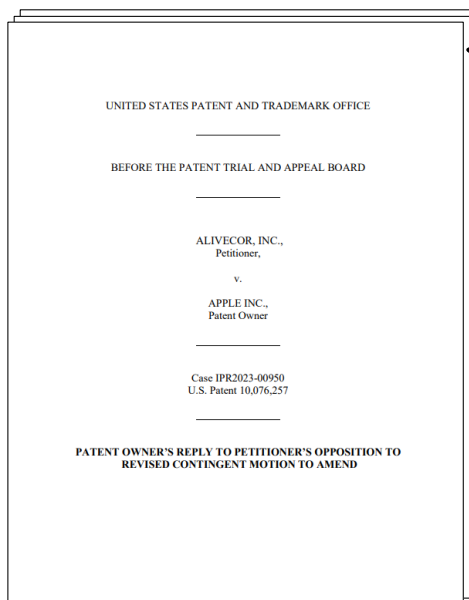
(57)

ABSTRACT

A wireless mobile phone is equipped to operate in an unauthenticated and an authenticated mode of operation, depending on whether a user has been authenticated. In one embodiment, the wireless mobile phone includes a number of sensors to enable a user's heart beat profile to be captured and be used for authentication. In one embodiment, authentication is performed by comparing the real time captured heart beat profile against a reference heart beat profile. In one embodiment, the reference heart profile is retrieved from an identity card. The wireless mobile phone further includes a reader to retrieve the reference heart beat profile from the identity card.

...
[0056] However, if the inputted heart beat profile substantially matches the previously saved reference heart beat profile, block 410, operating logic 240 (or more specifically, security function 242) enables phone 100 to operate in the authenticated mode, block 414. Thereafter, operating logic 240 continues operation at block 404.

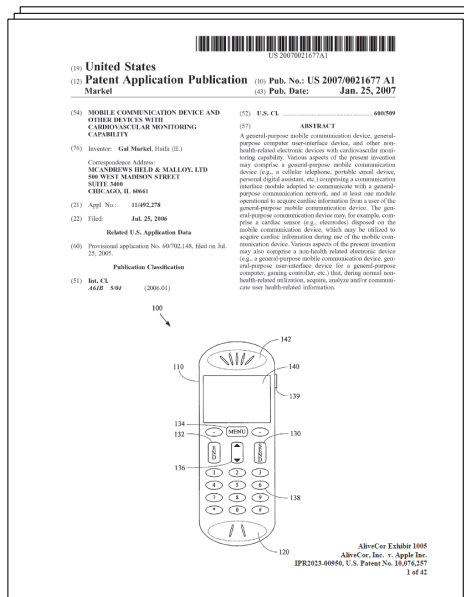
RMTA – Obviousness – Claim 27 – Apple’s Arg. 2



Apple's RMTA Reply

Second, Markel does not disclose user authentication based on cardiac signals. Instead, Markel discloses the opposite — the user's identification is used to retrieve cardiac information, not the other way around as AliveCor proposes. Specifically, Markel discloses storing cardiac information for users based on an identification or authentication of the user, to allow cardiac information for multiple users to be stored and retrieved. EX1005, [0093]. Markel's device can only "identify the user" and use "such identification (or authentication)" to "segment such information according to user identity." *Id.*, [0097], *see also* [0098].

Obviousness – Claim 27 – Apple’s Arg. 2 – Reply

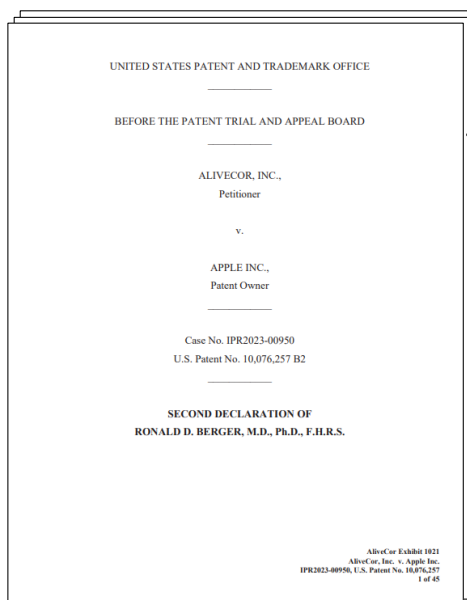


Markel

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[0097] The cardiac information acquisition module 1710 may also, for example, be adapted to identify the user of the MCD 1700. For example, such identification (or authentication) may be utilized in an exemplary scenario where a variety of users may be utilizing the MCD 1700. In such an exemplary scenario, the acquisition module 1710 may be adapted to acquire cardiac information for a plurality of different users and to segment such information according to user identity.

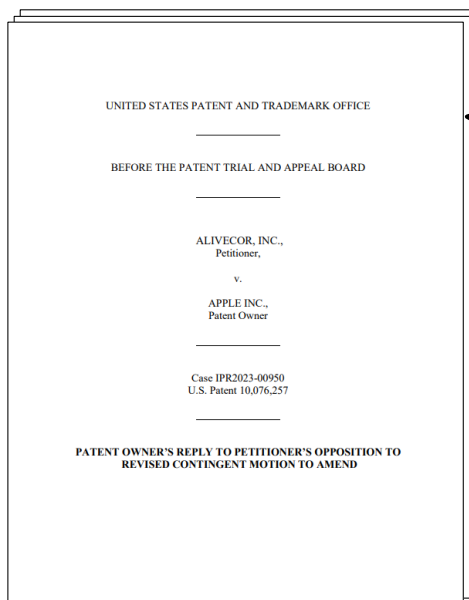
Obviousness – Claim 27 – Apple’s Arg. 2 – Reply



Berger Second Decl.

93. Furthermore, *Markel* teaches that the “cardiac information acquisition module 1710 may also, for example, be adapted to identify the user of the MCD 1700. For example, such identification (or authentication) may be utilized in an exemplary scenario where a variety of users may be utilizing the MCD 1700” (Ex-1005, [0097]). The mobile communication device in *Markel*’s Figure 17 “share[s] various characteristics with the mobile communication devices, and other exemplary devices, illustrated in FIGS. 1-16,” including Figures 4, 6, 10, and 15 discussed here and in my earlier Declaration, Ex-1003. Thus, *Markel* renders obvious a processor configured to authenticate a user based on one or more characteristics of the user’s cardiac signal.

RMTA – Obviousness – Claim 27 – Apple’s Arg. 3

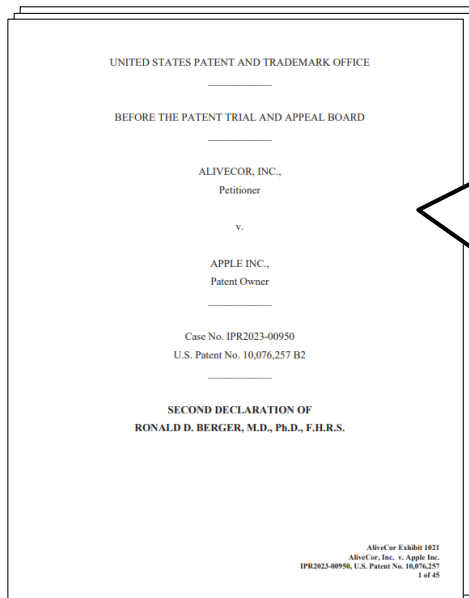


Apple's RMTA Reply

Third, Engstrom does not correct the deficiencies in Markel. Engstrom generically describes "sens[ing] the heart beat pattern of the user" and that the user's "heart beat profile" can be used "for authentication." EX1020, [0049].

There is no disclosure in Engstrom of the makeup of this "heart beat profile" nor of extracting characteristics of the heart beat profile (and certainly not of an electrocardiogram) to compare to stored characteristics to authenticate the user.

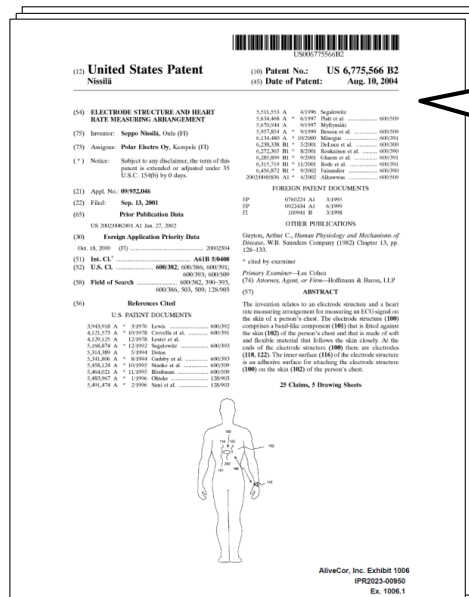
Obviousness – Claim 27 – Apple’s Arg. 3 – Reply



Berger Third Decl.

59. It would have been obvious to a POSITA to use an ECG in the authentication technology of *Engstrom* because ECGs allow a number of detailed and specific measurements and characteristics that would enable authentication of a user, and that would distinguish multiple different users. A POSITA would have known that an ECG is the most sophisticated and detailed cardiac measurement that can be performed on a user, and that an ECG measurement would be able to provide any other measurement that is needed to create a “heart beat profile” in *Engstrom*. In fact, a POSITA would have understood that an ECG is the *best* way to create a “heart beat profile” of *Engstrom*. In addition, *Nissilä* confirms that a POSITA would have been able to extract characteristics such as a heart beat rate from an ECG (Ex. 1006, 3:56-62). Thus, a POSITA would have had a reasonable expectation of success using the authentication system of *Engstrom* with the ECG measurement collected by the device described in *Markel* alone and/or with *Nissilä*.

Obviousness – Claim 27 – Apple's Arg. 3 – Reply



Nissilä

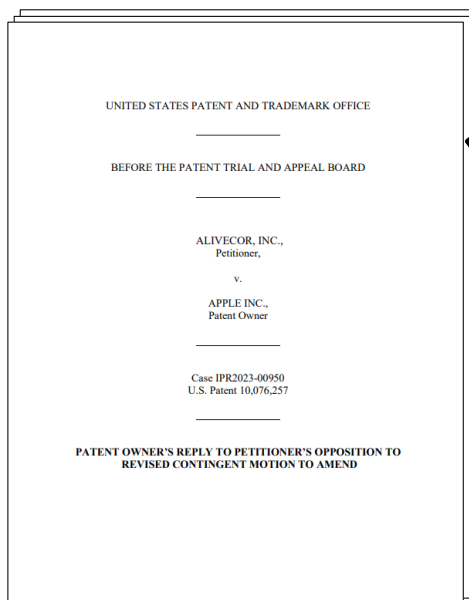
electronic unit. The electronic unit comprises ECG processing means, by which the potential difference caused by the ECG signal between the first and the second electrodes is measured, and an estimate for detected heart beat time instants is formed from the heart rate signals measured by the electrodes, and further the heart beat rate is calculated on the basis of the detected heart beat time instants. The

Ex. 1006, 3:56-62 (Paper 32, 24)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE – 244

AliveCor Exhibit 1024
AliveCor, Inc. v. Apple Inc.
IPR2023-00950, U.S. Patent No. 10,076,257
244 of 249

RMTA – Obviousness – Claim 27 – Apple’s Arg. 4

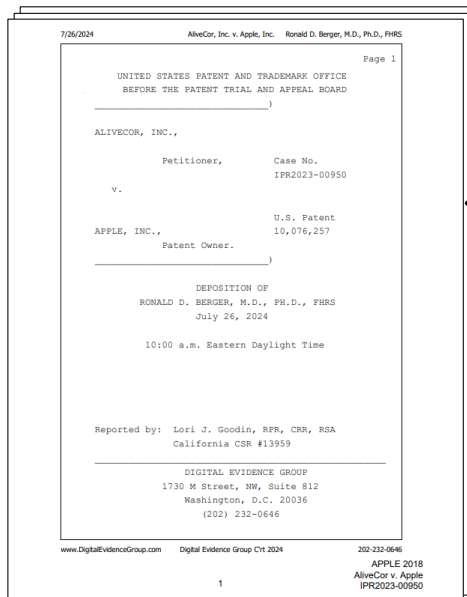


Apple's RMTA Reply

An earlier patent application incorporated by reference in Engstrom upon which Engstrom relies to describe “the sensing data outputted by [the] sensors” indicates that Engstrom’s “heart beat profile” merely includes heart rate information and not ECG signal information. EX1020, [0029]; APPLE-2019, 3:45-49, 5:33-50; APPLE-2018, 12:21-13:1 (Dr. Berger stating that this earlier application describes the “data provided by the sensors.”).

Indeed, in describing Engstrom’s “heart beat profile,” AliveCor’s expert stated that “there are several ways that it could do that” and it merely describes detecting “fluctuations in heart rate” that would be “adequately specific to a particular user.” APPLE-2018, 11:9-12:11. He also admitted that Engstrom does not include details on the information included in its heartbeat profile, stating “[n]o, I don’t believe even this particular patent is explicit about what parts of either an electrocardiogram or a different cardiac signal are specifically required for any particular heartbeat profile.” *Id.*, 13:10-14:5. He went on to state that “a sequence of intervals of beat-to-beat heartbeat intervals” would be sufficient to practice Engstrom’s techniques. *Id.*, 15:20-16:4, 17:3-18:1.

Obviousness – Claim 27 – Apple’s Arg. 4 – Reply



Berger Second Tr.

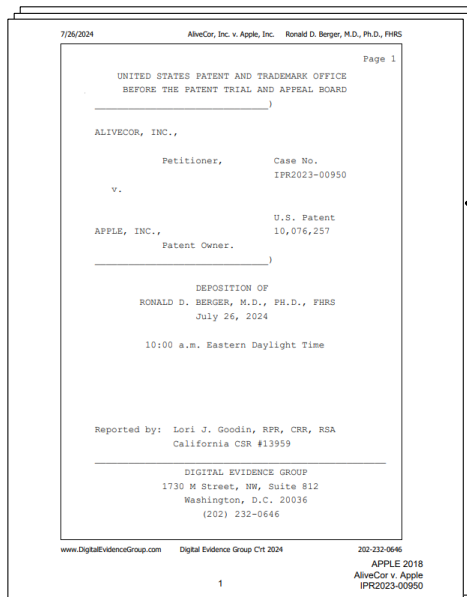
Q: How does Engstrom’s device determine a user’s heartbeat profile?

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

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

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

Obviousness – Claim 27 – Apple's Arg. 4 – Reply



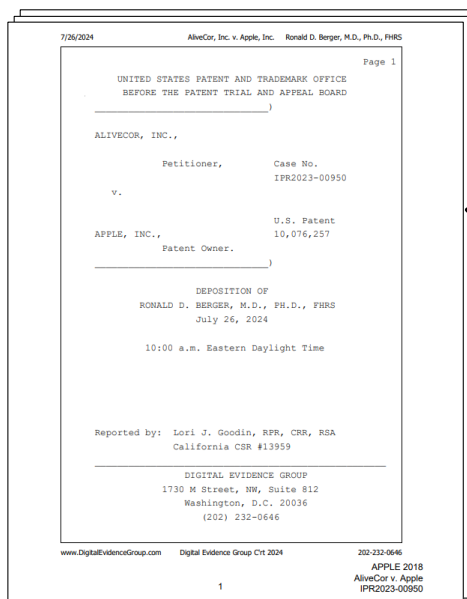
Berger Second Tr.

Q: What information does Engstrom describe as being included in the user's heartbeat profile?

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

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

Obviousness – Claim 27 – Apple’s Arg. 4 – Reply



Berger Second Tr.

Q: Does Engstrom describe what information is extracted from the realtime captured heartbeat profile to compare to the previously saved reference heartbeat profile?

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

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

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

Indefiniteness – Claim 24

[Undisputed]

1. An electronic device for detecting a user's cardiac signal, comprising:
an enclosure;
a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising:
a first lead comprising a first pad that is embedded in a first portion of the enclosure, wherein an exterior surface of the enclosure comprises an exterior surface of the first portion, wherein the first pad is positioned underneath the exterior surface of the first portion, and wherein the first pad is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure; and
a second lead comprising a second pad that is embedded in a second portion of the enclosure, wherein the second pad is configured to detect a second electrical signal of the user's cardiac signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure; and . . .

24. (Substitute for claim 11, if found unpatentable)

The electronic device of claim 1, wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second lead;

wherein the first pad is embedded in an inner surface of an electrically conductive metal bezel that forms a portion of an exterior surface of the electronic device; and

wherein the second pad is exposed on the exterior surface of the electronic device for direct contact from a user.