

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIVECOR, INC.,
Petitioner,

v.

APPLE INC.,
Patent Owner

Case IPR2023-00950
U.S. Patent 10,076,257

**PATENT OWNER'S REPLY TO PETITIONER'S OPPOSITION TO
REVISED CONTINGENT MOTION TO AMEND**

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LIST OF EXHIBITS

APPLE-2001	Declaration of Dr. Thomas Kenny
APPLE-2002	Curriculum Vitae of Dr. Thomas Kenny
APPLE-2003	Complaint, <i>Apple Inc., v Masimo Corporation, et al.</i> , Case No. 1-22-cv-01378 (D. Del., Oct. 20, 2022)
APPLE-2004	Second Declaration of Dr. Thomas Kenny
APPLE-2005	Definition of “embedded” from Wiley Electrical and Electronics Engineering Dictionary, IEEE Press, Wiley-Interscience (2004)
APPLE-2006	Finland Patent No. 119716 B (Application No. 20002304) (patent application to which Nissilä (EX1006) claims priority)
APPLE-2007	Certified English Translation of Finland Patent No. 119716 B (Application No. 20002304)
APPLE-2008	Definition of “bezel” from Wiley Electrical and Electronics Engineering Dictionary, IEEE Press, Wiley-Interscience (2004)
APPLE-2009	Definition of “bezel” from Meriam-Webster’s Collegiate Dictionary, Eleventh Edition (2006)
APPLE-2010	Definition of “bezel” from McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition (2002)
APPLE-2011	U.S. Patent Application Publication No. 2014/0171776 (“Lin”)
APPLE-2012	U.S. Provisional Application No. 61/111,498
APPLE-2013	Transcript of March 27, 2024 deposition of Dr. Ronald D. Berger

APPLE-2014	Definition of “membrane” from ASM Materials Engineering Dictionary, ASM International (2006)
APPLE-2015	Definition of “membrane” from Collins English Dictionary, HarperCollins Publishers (1998)
APPLE-2016	U.S. Patent App. Ser. No. 14/136,658
APPLE-2017	U.S. Patent App. Ser. No. 12/358,905
APPLE-2018	Transcript of July 26, 2024 deposition of Dr. Ronald D. Berger
APPLE-2019	U.S. Patent No. 6,549,756 to Engstrom (“Engstrom-756”)

I. Apple’s Contingently Proposed Substitute Claims are Reasonable in Number and Do Not Enlarge Original Claim Scope

Apple’s contingently proposed substitute claims are reasonable in number and non-broadening, at least because Apple submitted only one substitute claim for each of challenged claims 3 and 11-14 (the “RMTA claims”), and because each substitute claim retains the corresponding RMTA claim’s dependencies.

AliveCor inaccurately suggests that “Apple has effectively proposed more than one substitute for claim 12.” *See* Opp. (Pap. 32), 1-2. More specifically, AliveCor complains that “substitute claims 25 and 26 would *both* include all of original claim 12’s limitations,” and that neither “would include any limitations original to dependent claim 13.” *Id.* Yet, consistent with 37 C.F.R. § 42.121(a)(3)’s “presumption” that “only one substitute claim would be needed to replace each challenged claim,” Apple has proposed a single substitute claim for each of original claims 12 and 13 (respectively, claims 25 and 26).

More, although AliveCor cites *Lectrosonics, Inc. v. Zacom*, IPR2018-01129, Pap. 15 at 4-5 (PTAB Feb. 25, 2019), neither the cited pages nor any other part of *Lectrosonics* actually supports AliveCor’s argument. To the contrary, in stating that “[a]ll proposed claims should be traceable to an original challenged claim,” *Lectrosonics* notably does not add that every proposed claim must retain every feature of the corresponding original challenged claim. *Id.* at 5.

Proposed claim 26's substitution of the term "first" for "second" results in a feature that is plainly traceable to claim 13's original language: "wherein the ~~second~~first portion of the enclosure is a bezel." Indeed, the PTAB has previously held that it is "reasonable to remove" terms from dependent claims in a Motion to Amend. *Apple Inc. v. Qualcomm Inc.*, IPR2018-01277, Paper 46 at 45 (PTAB Jan. 17, 2020). For at least that reason, AliveCor's argument is without merit.

AliveCor also wrongly asserts that the proposed substitute claims enlarge claim scope. Opp., 3-4. In fact, the only proposed deletion to original claim language occurs in the portion of proposed claim 26 quoted above, and proposed claim 26 would retain dependency from original claim 1, which remains unmodified. As the Federal Circuit has held, where, as here, "the scope of [the independent claim] has not changed, there has not been improper claim broadening." *Network-1 Techs., Inc. v. Hewlett-Packard Co.*, 981 F.3d 1015, 1029, (Fed. Cir. 2020). Here, proposed substitute claim 26 does not "contain[] within its scope any conceivable apparatus or process which would not have infringed the *original patent*" because claim 1 of the original patent remains unchanged. *Predicate Logic, Inc. v. Distributive Software, Inc.*, 544 F.3d 1298, 1303 (Fed. Cir. 2008) (emphasis added).

II. The Substitute Claims Do Not Introduce New Subject Matter

AliveCor does not identify elements of claims 23 and 27 that are allegedly unsupported by Apple's priority documents. Instead, AliveCor asserts, without citation to a supporting rule, statute, or case, that inclusion of a table that comprehensively identifies support for the proposed claim features is somehow improper. Opp., 4-5. As indicated in the RMTA's table and explained in more detail below, the priority documents fully support the substitute claims.

For example, with respect to claim 23, the priority documents cited in the RMTA (pp. 13-14) disclose that: (1) "the leads" may be "coupled to an electrically conductive portion of the device enclosure" and "the leads may be electrically isolated to avoid shorting or interference among leads" including "an electrically isolating component [that] can be inserted between adjacent leads" (*see* APPLE-2016, [0009]-[0010]; APPLE-2017, [0009]-[0010], APPLE-2012, [0008]-[0009]); and (2) "the leads can be positioned underneath the exterior surface of the enclosure" such that "lead 472 can be placed within the thickness of bezel 460...but underneath the outer surface of the bezel" (*see* APPLE-2016, [0011], [0047]; APPLE-2017, [0011], [0047], APPLE-2012, [0010], [0046]).

With respect to claim 27, the supporting documents describe that the device can "determine unique characteristics of the signal" including "durations between

peaks in an EKG signal, peak values or ratios between peaks in the EKG signal, or any other suitable characteristic” and “compare the determined characteristics of the detected cardiac signals with a library of signals associate [sic] with known authorized users” to authenticate the user. APPLE-2016, [0055], [0005]; APPLE-2017, [0055], [0005]; APPLE-2012, [0054], [0004]. The priority documents describe “extract[ing] one or more characteristics of the received activity and compar[ing] extracted characteristics with the characteristics previously stored in memory that were associated with authorized users” to “authenticate the identified user.” APPLE-2016, [0051]; APPLE-2017, [0051]; APPLE-2012, [0050].

Furthermore, 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 “[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*” and that “bezel 310 can include...*any other suitable distribution of leads.*” APPLE-2016, [0046]-[0047], [0042], [0009], FIG. 4B; APPLE-2017, [0046]-[0047], [0042], [0009], FIG. 4B; APPLE-2012, [0045]-[0046], [0041], [0008], FIG. 4B, cl. 18.

Regarding substitute claim 26, the priority documents disclose that: (1) “bezel 310 can include *any other suitable number of leads, or any other suitable*

distribution of leads,” (see APPLE-2016, [0042]; APPLE-2017, [0042]; APPLE-2012, [0041]); (2) “*each lead can include a pad or extended area placed on the outer or inner surface of an electronic device bezel or housing*” (see APPLE-2016, [0034]; APPLE-2017, [0034]; APPLE-2012, [0033]); and (3) “the leads can be exposed such that the user may directly contact the leads” and that the leads can be positioned adjacent each other with “an electrically isolating component... inserted between adjacent leads” (see APPLE-2016, [0009]-[0010]; APPLE-2017, [0009]-[0010]; APPLE-2012, [0008]-[0009]).

The priority documents also support selecting “the size and location of the leads” for multiple “different possible positions of the user’s hands on the device” including an arrangement in which two leads “detect signals through a first hand” and a third lead “detects signals through the second hand.” APPLE-2016, [0042]-[0043]; APPLE-2017, [0042]-[0043]; APPLE-2012, [0041]-[0042].

III. AliveCor Fails to Demonstrate Unpatentability of the Substitute Claims, which are Non-Obvious Over the Prior Art of Record

a. AliveCor Has Failed to Demonstrate That the Prior Art Discloses the Claimed Arrangement for the Second Pad Recited in Claim 23

As discussed in the Patent Owner’s Response (“POR”) and Patent Owner’s Sur-Reply, there is no disclosure in Markel of a “pad positioned underneath the exterior surface of the second portion of the enclosure.” POR, 22-23, 26-37; Sur-

Rep., 6; APPLE-2004, ¶¶61-66, 77-94. Markel expressly describes its electrodes as being positioned on the exterior of the device. APPLE-2004, ¶¶82, 85-88, 64. Markel makes clear that electrode concealment is achieved by forming an electrode from “molded conductive plastic with little or no visible indication of the electrode presence.” EX1005, [0040]. In other words, Markel’s exterior conductive plastic *is* the electrode. APPLE-2004, ¶¶79, 81.

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].

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.

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.

And AliveCor's arguments with respect to claim 23 are silent with respect to Nissilä. For at least these reasons, claim 23 distinguishes over known prior art.

b. The Prior Art Fails to Disclose “the first pad is embedded in an inner surface of an electrically conductive metal bezel” as Recited by Claim 24

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.

There is no disclosure in Markel of the claimed first pad being embedded in a bezel, and certainly not of being “embedded in an inner surface of an electrically conductive metal bezel,” as required by claim 24. POR, 71-74. FIG. 4 of Markel shows electrodes positioned on the back side of the device, not within the bezel. APPLE-2004, ¶157.

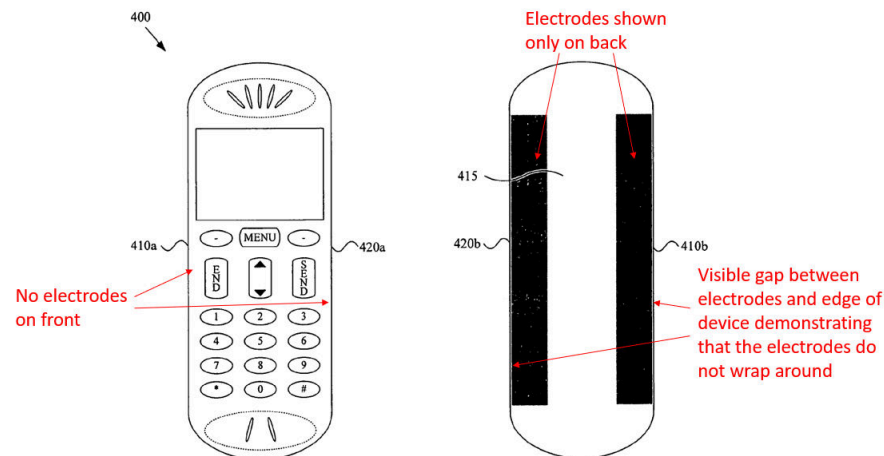


Figure 4

AliveCor fails to demonstrate that the electrodes identified by AliveCor as corresponding to the claimed “first portion” and “second portion” of the enclosure are a bezel. APPLE-2004, ¶158.

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.

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

¹ To be clear, as addressed in the POR and Patent Owner’s Sur-Reply, Markel includes no such teaching or suggestion.

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.

c. Claim 25 Distinguishes Over the Prior Art

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

d. The Prior Art Fails to Disclose the Arrangement for the First, Second, and Third Pads Recited by Claim 26

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.

**e. The Prior Art Fails to Disclose Authenticating a User by
Extracting ECG Characteristics as Recited by Claim 27**

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].

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].

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.

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.

There is simply no disclosure in the prior art of record of extracting characteristics of an electrocardiogram signal to compare to store electrocardiogram characteristics to authenticate a user as required by claim 27.

Respectfully submitted,

Date: October 8, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on October 8, 2024, a complete and entire copy of this Patent Owner's Reply to the Petitioner's Opposition to the Contingent Revised Motion to Amend and its accompanying exhibit were provided via email to the Petitioners by serving the correspondence email addresses of record as follows:

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