

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 RESPONSE TO PATENT OWNER'S
CONTINGENT MOTION TO AMEND**

Mail Stop PATENT BOARD
Patent Trial and Appeal Board
US Patent and Trademark Office
PO Box 1450
Alexandria, Virginia 22313-1450

TABLE OF CONTENTS

LIST OF EXHIBITS.....	vi
I. INTRODUCTION	1
II. APPLE’S MOTION FAILS TO PROVIDE A REASONABLE NUMBER OF SUBSTITUTE CLAIMS.....	2
III. THE PROPOSED SUBSTITUTE CLAIMS ARE NOT RESPONSIVE TO THE GROUNDS.	2
IV. THE PROPOSED SUBSTITUTE CLAIMS ENLARGE CLAIM SCOPE.....	3
A. DELETING CLAIM LIMITATIONS IMPERMISSIBLY ENLARGES CLAIM SCOPE	3
B. APPLE’S AMENDMENTS BROADEN THE CLAIMS	4
V. SUBSTITUTE CLAIMS 23-26 AND 29 FAIL TO MEET THE WRITTEN DESCRIPTION REQUIREMENT.....	7
A. SUBSTITUTE CLAIM 23.....	8
B. SUBSTITUTE CLAIM 24.....	9
C. SUBSTITUTE CLAIM 25.....	10
D. SUBSTITUTE CLAIM 26.....	11
E. SUBSTITUTE CLAIM 29.....	11
VI. THE PROPOSED SUBSTITUTE CLAIMS WOULD HAVE BEEN OBVIOUS OVER KNOWN PRIOR ART.....	12
A. U.S. PATENT APPL. PUBL. NO. 2008/0113650 (“ <i>ENGSTROM</i> ”)	13
B. SUB. CLAIM 23: OBVIOUS OVER <i>MARKEL</i> ALONE AND WITH <i>NISSILÄ</i>	15
C. SUB. CLAIM 24: OBVIOUS OVER <i>MARKEL</i> , <i>NISSILÄ</i> , AND/OR <i>ENGSTROM</i>	18
D. SUB. CLAIM 25: OBVIOUS OVER <i>MARKEL</i> , <i>NISSILÄ</i> , AND/OR <i>ENGSTROM</i>	20
E. SUB. CLAIM 26: OBVIOUS OVER <i>MARKEL</i> ALONE AND WITH <i>NISSILÄ</i>	21
F. SUB. CLAIM 27: OBVIOUS OVER <i>MARKEL</i> , <i>NISSILÄ</i> , AND/OR <i>ENGSTROM</i>	22
G. SUB. CLAIM 28: OBVIOUS OVER <i>MARKEL</i> , <i>NISSILÄ</i> , AND/OR <i>ENGSTROM</i>	24

H.	SUB. CLAIM 29: OBVIOUS OVER <i>MARKEL</i> , <i>NISSILÄ</i> , AND/OR <i>ENGSTROM</i>	24
VII.	SUBSTITUTE CLAIMS 25, 28, AND 29 ARE INDEFINITE	25
VIII.	CONCLUSION	25

TABLE OF AUTHORITIES

	Page(s)
CASES	
<i>Apple Inc. v. Valencell, Inc.</i> , IPR2017-00317, Paper 28 (P.T.A.B. Dec. 5, 2017)	2, 5, 6
<i>Aqua Prod., Inc. v. Matal</i> , 872 F.2d 1290 (Fed. Cir. 2017)	12
<i>Aqua Prod., Inc. v. Matal</i> , 872 F.3d 1290 (Fed. Cir. 2017) (en banc)	2
<i>Ariad Pharms., Inc. v. Eli Lilly & Co.</i> , 598 F.3d 1336 (Fed. Cir. 2010)	8, 12
<i>Flash-Control, LLC v. Intel Corp.</i> , No. 2020-2141, 2021 WL 2944592 (Fed. Cir. July 13, 2021)	8
<i>Idle Free</i> , IPR2012-00027, Paper 26.....	6
<i>Idle Free Sys. Inc. v. Bergstrom, Inc.</i> , IPR2012-0027, Paper 26 (P.T.A.B. June 11, 2013)	1
<i>Lectrosonics, Inc. v. Zaxcom, Inc.</i> , IPR2018-01129	3, 7
<i>Masimo Corp. v. Apple Inc.</i> , IPR2023-00745 (<i>see</i> Mot.)	passim
<i>NeuroDerm Ltd. v. AbbVie Inc.</i> , PGR2022-00040, Paper 77 (P.T.A.B. Oct. 31, 2023)	8, 9, 11, 12
<i>Samsung Elecs. Co., Ltd. v. NuCurrent, Inc.</i> , IPR2019-00861, Paper 81 (P.T.A.B. Feb. 23, 2021).....	3
<i>Sisvel Int’l S.A. v. Sierra Wireless, Inc.</i> , 81 F.4th 1231 (Fed. Cir. 2023)	3, 4
<i>Sonix Tech. Co. v. Publ’ns Int’l, Ltd.</i> , 844 F.3d 1370 (Fed. Cir. 2017)	25

<i>Unified Patents, LLC v. Fat Statz, LLC</i> , IPR2020-01665, Paper 51 (P.T.A.B. Apr. 4, 2022)	3
--	---

STATUTES

35 U.S.C. § 316(d)(1)(B)	2
35 U.S.C. § 316(d)(3).....	3

LIST OF EXHIBITS

Exhibit	Short Name	Description
Ex. 1001	'257 Patent	U.S. Patent No. 10,076,257 B2
Ex. 1002	'257 File History	Prosecution History of U.S. Patent No. 10,076,257 B2
Ex. 1003	Berger Declaration	Declaration of Dr. Ronald D. Berger
Ex. 1004	Berger CV	Curriculum vitae of Dr. Ronald Berger
Ex. 1005	Markel	U.S. Patent Appl. No. 11/492,278
Ex. 1006	Nissilä	U.S. Patent No. 6,775,566
Ex. 1007	Righter	U.S. Patent No. 5,191,891
Ex. 1008	Farrington	U.S. Patent No. 7,502,643
Ex. 1009	Cardiology Explained	EUAN A. ASHLEY & JOSEF NIEBAUER, CARDIOLOGY EXPLAINED (2004)
Ex. 1010	Cudahy	U.S. Patent No. 5,184,620
Ex. 1011	Sujdak	U.S. Patent No. 6,847,836
Ex. 1012	Geddes	U.S. Patent No. 4,606,352
Ex. 1013	Ceballos	U.S. Patent No. 6,522,915
Ex. 1014	Gilles	U.S. Patent No. 4,635,646
Ex. 1015	Weiss	U.S. Patent No. 5,623,926
Ex. 1016	Apple's Complaint	Complaint, <i>Apple Inc. v. AliveCor, Inc.</i> , Case No. 4:22-cv-07608-HSG, Dkt. No. 1 (N.D. Cal., Dec. 12, 2022)
Ex. 1017	Hobson	U.S. Patent No. 7,876,274

Exhibit	Short Name	Description
Ex. 1018	National Judicial Caseload Profile	U.S. District Courts – National Judicial Caseload Profile (accessed via https://www.uscourts.gov/sites/default/files/cms_na_distprofile0331.2022.pdf)
Ex. 1019	Kenny Tr.	Transcript of June 19, 2024 deposition of Dr. Thomas W. Kenny
Ex. 1020	Engstrom	U.S. Patent Application Publication No. 2008/0113650
Ex. 1021	Berger Second Decl.	Second Declaration of Ronald D. Berger, M.D., Ph.D., F.H.R.S.

I. INTRODUCTION

The Board should deny Apple's Contingent¹ Motion to Amend ("Motion" or "Mot."). *First*, Apple's Motion fails to provide a reasonable number of substitute claims. *Second*, Apple's Motion fails to show that its amendments meet responsiveness and the non-enlargement requirements. Apple seeks to wholesale replace—not amend—challenged claims 16-22 with entirely different claims, which is an impermissible attempt to "complete[ly] remodel[]" "claim structure according to a different strategy." *Idle Free Sys. Inc. v. Bergstrom, Inc.*, IPR2012-0027, Paper 26 at 6 (P.T.A.B. June 11, 2013). *Third*, Apple's Motion fails to show that its amendments meet the written description requirement. Apple's enlarging amendments cover subject matter that was not disclosed in the '257 patent's specification, yet Apple's Motion fails to address the issues. *Fourth*, Apple's Motion is futile. As explained further below, the substitute claims would have been obvious based on available prior art. Thus, AliveCor respectfully requests that the Board

¹ Although styled as "Contingent," Apple's motion is not really so. Apple's Patent Owner Response (Paper 20) appears to intentionally avoid disputing the patentability of independent claim 15 and dependent claims 16-18, effectively triggering the Motion's condition and granting Apple an opportunity to freely amend its claims with additional guidance from the Board.

deny Apple's Contingent Motion to Amend.

II. APPLE'S MOTION FAILS TO PROVIDE A REASONABLE NUMBER OF SUBSTITUTE CLAIMS.

A motion to amend must have “a reasonable number of substitute claims.” 35 U.S.C. § 316(d)(1)(B). Apple's proposed substitute claims are the same ones that it submitted in *Masimo Corp. v. Apple Inc.*, IPR2023-00745 (“*Masimo* Proceeding”) (see Mot., 2). There, the Board found that Apple “does not appear to have met its burden” regarding the “reasonable number of substitute claims” requirement. See *Masimo* Proceeding, Paper 23, at 4-6 (P.T.A.B. Apr. 26, 2024). Because the exact same substitute claims are at issue here, the Board should reach the same conclusion.

III. THE PROPOSED SUBSTITUTE CLAIMS ARE NOT RESPONSIVE TO THE GROUNDS.

As Apple has acknowledged, a “patent owner must include ... a detailed explanation of the significance of the amended claims (e.g., a statement that clearly points out the patentably distinct features for the proposed new or amended claims).” *Apple Inc. v. Valencell, Inc.*, IPR2017-00317, Paper 28 at 1-2 (P.T.A.B. Dec. 5, 2017) (quoting *Aqua Prod., Inc. v. Matal*, 872 F.3d 1290, 1306 (Fed. Cir. 2017) (en banc)). Apple has also contended that this requires a “meaningful” discussion of “the actual prior art references on which trial was instituted.” *Id.* Beyond mentioning the them by name, however, Apple has failed to address the prior art references on which

trial was instituted (*see* Mot., 7-10). Apple has thus failed to demonstrate how the proposed amendments are responsive to a ground of rejection.

IV. THE PROPOSED SUBSTITUTE CLAIMS ENLARGE CLAIM SCOPE.²

A. Deleting Claim Limitations Impermissibly Enlarges Claim Scope

An amendment “may not enlarge the scope of the claims.” 35 U.S.C. § 316(d)(3). The Board has consistently held that amendments that delete limitations are broadening. In *Samsung Electronics Co., Ltd. et al v. NuCurrent, Inc.*, for example, the Board denied a motion to amend because the substitute claims added certain limitations and deleted substantially all original limitations of corresponding original claims. *See* IPR2019-00859, Paper 88 at 48-49 (P.T.A.B. Feb. 23, 2021) (explaining that such deletions “enlarge the scope of the claims they replace, notwithstanding any added limitations”); *see also Samsung Elecs. Co., Ltd. v. NuCurrent, Inc.*, IPR2019-00861, Paper 81 at 54-55 (P.T.A.B. Feb. 23, 2021); *Unified Patents, LLC v. Fat Statz, LLC*, IPR2020-01665, Paper 51 at 39-40 (P.T.A.B. Apr. 4, 2022); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129

² To the extent Apple later seeks to amend any claims other than 16-22, there may be additional enlargement concerns. *See, e.g., Masimo* Proceeding, Paper 27, at 1 (P.T.A.B. May 13, 2024) (“Revised” motion seeking to amend different claims (3 and 11-14) from the original “Motion to Amend” claims (16-22)).

(“*Lectrosonics*”), Paper 15 at 7-8 (P.T.A.B. Feb. 25, 2019). This is consistent with Federal Circuit case law. *See Sisvel Int’l S.A. v. Sierra Wireless, Inc.*, 81 F.4th 1231, 1240-41 (Fed. Cir. 2023) (holding that a “claim that does not include a limitation present in the original patent claims is broader in that respect” and broadening in any respect is impermissible).

B. Apple’s Amendments Broaden the Claims

“A patent owner bears the burden of persuasion to show, by a preponderance of the evidence, that the motion to amend complies with the [applicable] requirements.” *Sisvel*, 81 F.4th at 1238 (quoting 37 C.F.R. §41.121(d)(1)). As explained below, Apple has broadened the claims by changing the direct or indirect dependencies of all the substitute claims from independent claim 15 to claim 1. In addition, Apple deleted all the original claim limitations in each of the original dependent claims. As a result, every substitute claim is broader in some respect than the original claim. Like in the *Masimo* Proceeding, therefore, the Board should determine that “Patent Owner may not have met its burden to establish that the Motion to Amend complies with the non-enlargement requirement.” *Masimo* Proceeding, Paper 23 at 7-8.

The original claims depend on independent claim 15. Claim 15 recites “a display screen exposed to the user through an opening in the enclosure” and “a second lead embedded in the display screen of the electronic device.” Claim 1, on

the other hand, recites “a second lead comprising a second pad that is embedded in a second portion of the enclosure.” Changing the dependency from claim 15 to claim 1 would therefore remove at least the “display screen” limitations. Yet Apple’s Motion never addresses this difference between Claims 1 and 15.³

Apple has also failed to explain other significant aspects of its amendments. For example, each of Apple’s amendments requires deleting the original narrowing claim limitations (*see, e.g.*, Mot., Claims Appendix, Cl. 23 (deleting claim 16’s limitation of “wherein the first lead is configured to detect the first electrical signal of the user’s cardiac signal via the user’s contact with the first lead”)). But Apple has not even *attempted* to explain how the new, amended claim language is similar or narrower in scope compared to the original, deleted claim language. Nor could Apple have made this showing, because the deleted claim language recites “contact with the first lead” and the amended claim language mentions no lead at all. Apple is broadening claims with utter disregard for the non-enlargement requirement. *See* 37 C.F.R. § 42.121(a)(2)(ii).

³ Presumably, Apple removed the “display screen” limitations because the accused AliveCor products in the related district court proceeding have no display (*see generally* Ex-1016 (Apple’s Complaint)). This overt attempt to cover products not covered by the original claims is, by definition, a broadening amendment.

Indeed, Apple itself has opposed the same type of substitute claim amendments it now proposes. In *Apple Inc. v. Valencell, Inc.*, for example, the patent owner deleted limitations of the dependent claims. IPR2017-00317, Paper 28 at 2 (P.T.A.B. Dec. 5, 2017). Apple argued that deleting an original claim limitation “improperly enlarge[s] claim scope by removing the limitation.” *Id.* (citing *Idle Free*, IPR2012-00027, Paper 26 at 5). The Board agreed. *Id.*, Paper 46 at 55 (P.T.A.B. June 1, 2018). Here, similarly, Apple seeks to delete limitations in original claims 16-22. Like the *Valencell* patent owner, Apple is improperly enlarging claim scope by removing limitations.

The Board should discard Apple’s feeble attempt to show compliance with 37 C.F.R. § 41.121 (*see* Mot., 3). Apple contends that the proposed substitute claims “all depend from existing independent or dependent claims” and therefore do not enlarge claim scope. *Id.* But the Board already rejected this argument in the *Masimo* Proceeding. *See Masimo* Proceeding, Paper 23 at 7-8 (finding Apple “has not met the burden of establishing that broadening substitute dependent claims *beyond even the scope of the original independent claim (here claim 15) from which the substitute original dependents (16-22) depended*, would satisfy the statutory and regulatory non-enlargement requirements”).

Thus, the Board should deny Apple’s Motion because the amendments to claims 16-22 impermissibly broaden the claims.

V. SUBSTITUTE CLAIMS 23-26 AND 29 FAIL TO MEET THE WRITTEN DESCRIPTION REQUIREMENT.

Apple has not met its burden to establish § 112 written description support in *the original disclosure* of the '257 patent that was filed December 20, 2013 (as Appl. No. 14/136,658), or in *the original disclosure* of the parent of the '257 patent that was filed Jan. 23, 2009 (as Appl. No. 12/358,905). *See Lectrosonics*, Paper 15 at 7-8 (requiring patent owner to “set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim”); *see also* 37 C.F.R. §42.121(b)(1). Even assuming the disclosures in Patent Application Publ. No. 2014/0171776 (APPLE-2011) and U.S. provisional application No. 61/111,498 (APPLE-2012) are substantially the same as the original disclosure, however, Apple has failed to meet its burden to establish written description support.

“[T]he motion must set forth written description support for each proposed substitute claim *as a whole*, and not just the features added by the amendment.” *Lectrosonics*, Paper 15 at 7-8 (emphasis added). Here, Apple has merely identified a smattering of paragraphs with broad teachings, while attempting to combine disparate features in the specification, or fabricate features from thin air. That is impermissible. *See Flash-Control, LLC v. Intel Corp.*, No. 2020-2141, 2021 WL 2944592, at *4 (Fed. Cir. July 13, 2021) (finding insufficient written description when “the specification provides at best disparate disclosures that an artisan might have been able to combine in order to make the claimed invention”). Indeed, Apple

appears to assume that a substitute claim has sufficient written description support if it would have been *obvious* from the specification's disclosure, but that contradicts Federal Circuit precedent. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1356 (Fed. Cir. 2010); *NeuroDerm Ltd. v. AbbVie Inc.*, PGR2022-00040, Paper 77 at 31 (P.T.A.B. Oct. 31, 2023). Apple has failed its written description burden.

A. Substitute Claim 23

First, under Apple's interpretation of "embedded in" (which AliveCor has disputed) Apple failed to establish written description support for a "first pad is embedded in an inner surface" of a bezel. In its Patent Owner Response, Apple argues that "it is not sufficient for two components to be merely in parallel contact or adjacent to each other" for a component to be "embedded in" another component (Paper 20, 8-9). For written description support, however, Apple flip-flops and relies on disclosures stating that "each lead can include a pad or extended area *placed on* the outer or inner surface of an electronic device bezel" (APPLE-2011, [0034] (emphasis added)).⁴ If a "pad" is "placed on" a bezel, then the "pad" can be "parallel" to the bezel. Under Apple's own overly narrow interpretation of "embedded in," therefore, Apple has failed to meet its burden to show that substitute claim 23 has

⁴ For simplicity, this response cites to the identified paragraphs in APPLE-2011, but the same analysis applies to any corresponding paragraphs in APPLE-2012.

written description support.

Second, Apple has failed to meet its burden to show that substitute claim 23 has written description support as a whole. For example, although a bezel (*id.* at [0009], [0044], Fig. 3, 4B, 5) and a touch screen (*id.* at [0024]-[0025]) may individually be disclosed, Apple has failed to identify written description support for a bezel that “extends around the touch screen display” instead of another portion of the device or a non-touch screen display. The other paragraphs Apple identified do not remedy this failure, and the description of the figures do not indicate whether or how the bezel depicted “extends around” the display. The bezel and touch screen display are merely disparate elements combined from various figures and disclosures. This is insufficient to meet Apple’s burden.

B. Substitute Claim 24

First, substitute claim 24 depends from substitute claim 23. Apple has failed its burden on substitute claim 24 for the reasons given for substitute claim 23.

Second, Apple failed to establish written description support for a “third pad that is embedded in the second portion of the enclosure.” Based on its dependency from claim 1, this claim language requires two pads that are “embedded in” the *same* portion of the enclosure. But Apple failed to identify any such disclosure. Instead, the written description identified by Apple actually teaches the opposite—i.e., that leads can be “placed along *different* portions” of the enclosure (APPLE-2011,

[0047]). And the specification does not explain what it means for two pads to be “embedded in” the same portion of the enclosure, versus “different portions.”

Third, Apple failed to establish written description support for a third pad embedded in a portion of the enclosure and exposed for “user’s skin’s contact with the third pad.” Figure 3 is the only figure with a third lead. Not only is that lead embedded in the display, which is a different element from the “enclosure,” it is also not exposed for “user’s skin’s contact with the third pad.”

Fourth, Apple failed to meet its burden to establish written description support for “second and third pads detect signals through a second hand.” The identified disclosures discuss hands associated with only one configuration of leads: “leads 322 and 324 detect signals through a first hand, and lead 326 detects signals through the second hand” (APPLE-2011, [0043]). The Board previously found that this embodiment “*do[es] not map to the leads recited in proposed substitute claim [24]*” because the three leads are not all embedded in an enclosure or bezel. *See Masimo* Proceeding, Paper 23 at 12. The identified disclosures also do not support two leads *in the same portion* detecting signals from one hand. *See id.*, Paper 18, at 8.

C. Substitute Claim 25

Substitute claim 25 depends from substitute claim 24. Apple has failed its burden on substitute claim 25 for the reasons given for substitute claims 23 and 24.

D. Substitute Claim 26

Substitute claim 26 recites “the first pad is embedded in an inner surface” of a bezel. Apple has failed its burden on substitute claim 26 for the same reasons given for the “embedded in” term for substitute claim 23.

E. Substitute Claim 29

First, Apple failed to meet its burden to establish written description support for the term “same face.” Apple has failed to identify any disclosure in its application that uses the term “face” or that illustrates pads being on the “same face of the electronic device.”

Second, Apple failed to meet its burden to establish written description support for “detecting signals” from “a first hand” and “a second hand” “on a same face of the electronic device.” None of the identified disclosures describe different hands on two adjacent pads that are on a “same face.” Apple failed its burden to establish written description for the reasons given for claim 24. As Masimo already explained, claim 29 would require significant modification to the disclosed embodiments, including making the two leads adjacent, as illustrated below. *See Masimo Proceeding*, Paper 18, at 10. The Board in the *Masimo Proceeding* indicated concern that Apple had not met its burden on this point. *Id.*, Paper 23, 12-13, 20. It is insufficient for the original disclosures to “render obvious” the claimed invention. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1356 (Fed. Cir. 2010).

Third, substitute claim 29 further requires “the first and second portions of the enclosure each comprise a metallic conductive portion exposed for direct user contact.” To the extent Apple contends that an enclosure’s “metallic conductive portion” can be configured to detect an electrical signal of the user’s cardiac signal, Apple failed to meet its burden to establish written description because the applicant disclaimed this very structure during prosecution (Ex. 1002, 209-210, 300-01; Ex. 1003, ¶¶ 61, 64, 72-73; Ex. 1013 (Ceballos); Ex. 1015 (Weiss)).

VI. THE PROPOSED SUBSTITUTE CLAIMS WOULD HAVE BEEN OBVIOUS OVER KNOWN PRIOR ART.

The Petition showed how claims 1 and 12 (the claims from which the substitute claims newly depend) are unpatentable over Grounds 1 and 2 of *Markel* alone and/or in view of *Nissilä* (Pet., 7-84). Apple has not addressed these references or the Petition in its motion. This Opposition thus addresses only the added limitations of proposed substitute claims 23-29 (Ex. 1021, ¶43). *See Aqua Prod., Inc. v. Matal*, 872 F.2d 1290, 1326 (Fed. Cir. 2017).

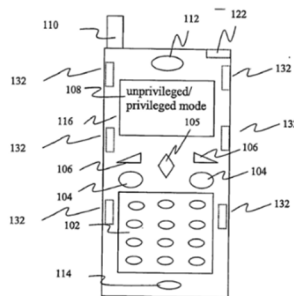
Substitute claims 23-29 would have been obvious to a POSITA in view of *Markel* alone and/or in view of *Nissilä* (Grounds 1 and 2). In addition, substitute claims 24-25 and 27-29 would also have been obvious over *Markel* in view of *Nissilä* and/or *Engstrom* (Ex. 1020). The level of skill of a POSITA remains the same as in the Petition (Pet., 6-7; Ex. 1021, ¶¶31-32).

A. U.S. Patent Appl. Publ. No. 2008/0113650 (“Engstrom”)

Engstrom is prior art known to Apple but not addressed in its motion. *Engstrom* was identified in applicant’s information disclosure statement and considered by the Examiner during prosecution (albeit for the original claims) (Ex. 1002 at 106, 183; Ex. 1021, ¶¶36, 39). The Office has not considered *Engstrom* in view of these newly presented claims.

Engstrom is directed to a wireless mobile phone (Ex. 1020, Abstract). The phone in *Engstrom* “includes a number of sensors to enable a user’s heart beat profile to be captured and be used for authentication” (*id.*). “[A]uthentication is performed by comparing the real time captured heart beat profile against a reference heart beat profile” (*id.*). *Engstrom* discloses an array of sensors “disposed along and underneath the side surfaces of phone 100” (*id.*, [0029], Fig. 1). (Ex. 1021, ¶¶37-42).

Ex. 1021, Fig. 1 (annotated)



Motivation to Combine Markel with Engstrom and/or Nissilä

As discussed in the Petition, a POSITA would have been motivated to combine *Markel*’s electrode structure with *Nissilä*’s electrode structure for the reasons described in the Petition (Pet., 69-71) (Ex. 1021, ¶45).

Further, a POSITA would have been motivated to combine *Markel*'s electronic device with *Engstrom*'s electrode placement (Ex. 1021, ¶46). *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]; *see also* Ex. 1021, ¶46). *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; *see also* Ex. 1021, ¶46). 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]; *see also* Ex. 1021, ¶47). Specifically, *Engstrom*'s device uses "sensors 132 to facilitate real time capturing of heart beat profile of the user" (Ex. 1020, [0026]; *see also* Ex. 1021, ¶47). Indeed, *Engstrom* advantageously 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 a measurement (Ex. 1020, [0029]; *see also* Ex. 1021, ¶47).

Further, both *Markel* and *Engstrom* contemplate user authentication based on cardiac information (Ex. 1005, [0097]; Ex. 1020, Abstract; *see also* Ex. 1021, ¶¶48-49). A POSITA would have looked to *Engstrom* to better understand how to implement user authentication based on detected heart characteristics (Ex. 1021, ¶48). A POSITA would also have had a reasonable expectation of success in

combining *Markel* and *Engstrom* because they share relevant similarities in the structure of hardware and software of the disclosed communication devices (Ex. 1005, [0042], [0179]; Ex. 1020, [0034], [0046]) (Ex. 1021, ¶¶49-50).

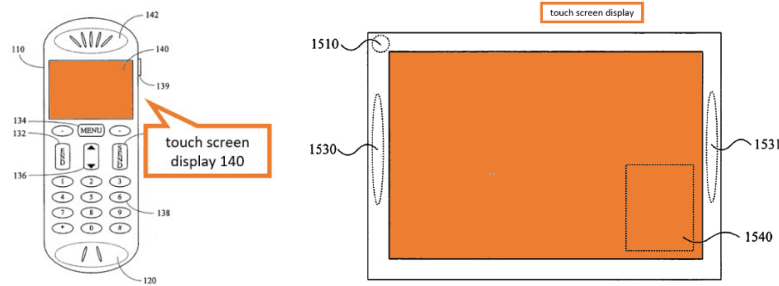
B. Sub. Claim 23: Obvious Over *Markel* Alone and with *Nissilä*

[23.a]: a touch screen display,

Markel teaches that the “display 140” of *Markel*’s “MCD100” (illustrated in *Markel*’s Figure 4) can function as a “touch screen input feature” (Ex. 1005, [0034]). Thus, *Markel*’s Figure 4 teaches claim element [23.a] (Ex. 1021, ¶53).

In addition, *Markel* teaches that teachings related to Figure 4 can “apply to user interfaces discussed herein,” including Figure 15 (Ex. 1005, [0068]). A POSITA would have been motivated to incorporate the teachings of *Markel*’s Figure 15 in *Markel*’s Figure 4. The Board in the *Masimo* Proceeding found that the embodiment in *Markel*’s Figure 4 “appears to disclos[e] generally the same embodiment as that in Figure 15 directed to ‘an exemplary computer display device.’” *Masimo* Proceeding, Paper 8 at 43 (citing Ex. 1005, [0078]). In particular, Figure 15 discloses a video display device 1500 that has a touch screen display (Ex. 1005, [0034], [0078]). As applied to *Markel*’s Figure 4, *Markel*’s Figure 15 thus renders obvious claim element [23.a] (Ex. 1021, ¶54).

Ex. 1005, Figs. 1, 15 (annotated)

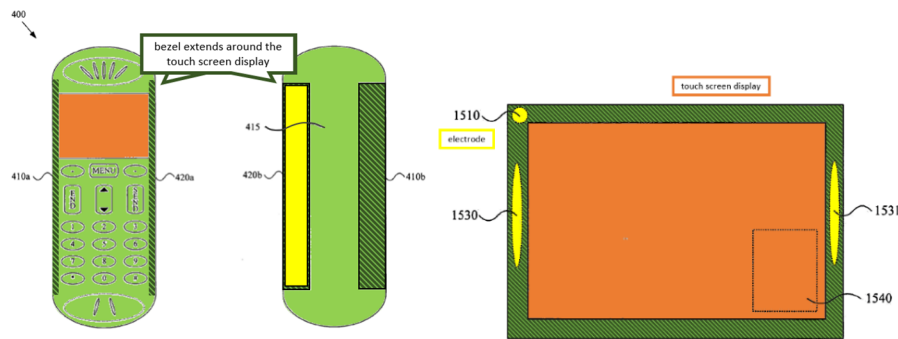


***[23.b]: wherein the bezel extends around the touch screen display;
and***

As discussed in the Petition, the “right side portion” of *Markel*’s Figure 4 is “like a bezel” (Pet., 48). *Markel* teaches that “an electrode may be disposed on a video display device 140 (e.g., a *border* of the display or integrated into a touch screen)” (Ex. 1005, [0044] (emphasis added)). A POSITA would have been motivated to extend the edges of *Markel*’s “second electrode” in 420b so that they reached the “border of the display” (i.e., bezel) because this would have created additional contact area (Pet., 49). The “border of the display” extends around the display 140. *Markel*’s Figure 4 renders obvious element [23.a] (Ex. 1021, ¶57).

In addition, *Markel*’s Figure 15 further discloses a bezel that extends around a touch screen display. *Markel* teaches that “display device 1500 may, for example, comprise an electrode 1510 *on a border portion* of the display device 1500” (Ex. 1005, [0078] (emphasis added)). The “border portion” of the display in Figure 15 extends around the touch screen display (Ex. 1021, ¶58).

Ex. 1005, Figs. 4, 15 (annotated)



Furthermore, *Markel*'s Figure 15 discloses electrodes on two sides of the device, like Figure 4 (Ex. 1005, [0078] ("an electrode 1530 on a first side of the display device 1500" and "an electrode 1531 on a second side of the display device 1500")). As shown above, the sides of the display device "extend around the touch screen," like a bezel. Thus, *Markel*'s Figure 15 as applied to Figure 4 renders obvious claim element [23.b] (Ex. 1021, ¶59).

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

As discussed in Grounds 1-2 of the Petition, *Markel* alone and/or *Nissilä* renders obvious (1) a first pad that is embedded in a first portion of the enclosure, (2) the first pad is positioned underneath the exterior surface of the first portion, and (3) the first portion of the enclosure is a bezel. Thus, *Markel* alone and/or *Nissilä* renders obvious a first pad that is 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. (Ex. 1021, ¶62) A POSITA would have been motivated to

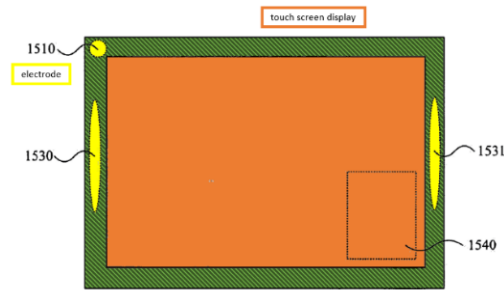
embed the pad on the inner surface of the enclosure in order to simultaneously create an electrically conductive connection between the pad and the outer surface of the enclosure while ensuring that the pad accessible to the wiring inside the enclosure that is necessary to complete the electrical circuit. (Ex. 1021, ¶63).

C. Sub. Claim 24: Obvious Over *Markel*, *Nissilä*, and/or *Engstrom*

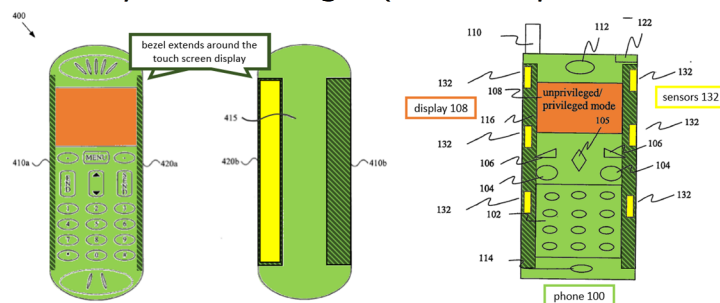
[24.a]: a third lead comprising a third pad that is embedded in the second portion of the enclosure, . . . user's skin's contact with the third pad; and

Markel teaches that “more than two electrodes might be utilized” (Ex. 1005, [0051]). For example, a POSITA would have been motivated to build a device with more than two electrode pads in order to simultaneously record the electrical potential difference between two hands while simultaneously measuring other cardiac signals with a third electrode pad (Ex. 1021, ¶67). Thus, a POSITA would have been motivated to add additional electrode pads to the “left side portion 410” of *Markel*'s Figure 4, which corresponds to the second portion of the enclosure, in order to provide additional points of contact for the user. *Markel*'s Figure 4 renders obvious claim element [24.a] (Ex. 1021, ¶67).

In addition, *Markel*'s Figure 15 discloses two electrodes on the left side portion of the device. Thus, the pads of electrode 1310 and electrode 1330 are embedded in the same portion of the enclosure, and *Markel*'s Figure 15 renders obvious claim element [24.a] (Ex. 1021, ¶68).

Ex. 1005, Fig. 15 (annotated)

To the extent a POSITA sought additional detail on placement of another pad, that POSITA would have turned to *Engstrom*, which teaches electrode placement that “advantageously . . . facilitate[s] real time capturing of a heart beat profile of the user” (Ex. 1020, [0026]). Specifically, *Engstrom* teaches that “sensors 132 are disposed along and underneath the side surfaces of phone 100” (Ex. 1020, [0029]). As shown below (next to *Markel*’s Figure 4), *Engstrom*’s Figure 1 shows two electrode pads embedded in the left side portion of the phone. Thus, a POSITA would have been motivated to place a third pad in the “left side portion” of *Markel* to better position the electrode pads (*see* Motivation to Combine), and the combination renders obvious claim element [24.a] (Ex. 1021, ¶69).

Ex. 1005, Fig. 4 (annotated); Ex. 1020, Fig. 1 (annotated)

[24.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;

As discussed in Grounds 1 and 2 of the Petition, the second pad can be configured to detect the user's cardiac signal via the user's skin's contact with the second pad (Pet., 46-47 (discussing claim 11)). (Ex. 1021, ¶72).

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

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 Dr. Berger's original declaration, 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 (Ex. 1021, ¶75). 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* (*id.*).

D. Sub. Claim 25: Obvious Over *Markel*, *Nissilä*, and/or *Engstrom*

[25.a]: wherein the second and third pads are adjacent pads; and

As shown in *Markel*'s Figure 15, electrodes 1510 and 1530 on the left side portion are adjacent. In addition, *Engstrom*'s sensors 132 on the left side portion of

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, and a POSITA would have been motivated to make the bezel out of metal. Thus, *Markel* renders obvious claim element [26.a] (Ex. 1021, ¶87).

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] (Ex. 1021, ¶88).

As discussed in the Petition’s Grounds 1-2, the second pad can be configured to detect the user’s cardiac signal via the user’s skin’s contact with the second pad. *See* Pet., 46-47 (cl. 11). Thus, *Markel* renders obvious claim element [26.b] (Ex. 1021, ¶89).

F. Sub. Claim 27: Obvious Over *Markel*, *Nissilä*, and/or *Engstrom*

[27.a]: wherein the processor . . . ; and
[27.b]: wherein . . . authenticates the user.

The ’257 patent’s “Background of the Invention” indicates that it was known that “an electronic device can authenticate a user based on the attributes of the user’s heartbeat” (Ex. 1001, 1:49-2:3). *Markel* also 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 MCD 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 the Petition. Thus, *Markel* renders obvious claim 27 (Ex. 1021, ¶¶92-93).

POSITA would have turned to *Engstrom* for additional detail on authentication technology based on cardiac signals (*see* Motivation to Combine). Specifically, *Engstrom* teaches “operating logic 240” “automatically invoke sensors 132 to capture heart beat profile of the user real time” (Ex. 1020, [0027]). *Engstrom* further teaches that “authentication is performed by comparing the real time captured heart beat profile against a reference heart beat profile” (Ex. 1020, Abstract). The operating logic in *Engstrom* “captur[es]” “a heart beat profile of the user, and [saves] as a reference for subsequent analysis of a real time captured heart beat profile of the user to authenticate the user” (Ex. 1020, [0031]). *Engstrom* teaches this claim in a similar manner as the ’257 patent (Ex. 1001, 1:49-2:3, 10:34-55). Finally, *Engstrom* teaches that the “operating logic 240” enables phone 100 to operate in authenticate mode “if the input heartbeat profile substantially matches the previously saved reference heart beat profile” (Ex. 1020, [0056]). Thus, *Engstrom* further renders obvious claim elements [27.a] and [27.b] (Ex. 1021, ¶¶94-97).

G. Sub. Claim 28: Obvious Over *Markel*, *Nissilä*, and/or *Engstrom*

[28.a]: wherein the exterior surface of the enclosure . . . ;

[28.b]: wherein the first and second pads are adjacent pads

Claim element [28.a] is obvious for the same reasons claim elements [1.c.i], [1.c.ii], [1.c.iii], and claim 10 are obvious (Ex. 1021, ¶101). Claim element [28.b] is obvious for the same reasons substitute claim 25 is obvious (*id.*, 104).

H. Sub. Claim 29: Obvious Over *Markel*, *Nissilä*, and/or *Engstrom*

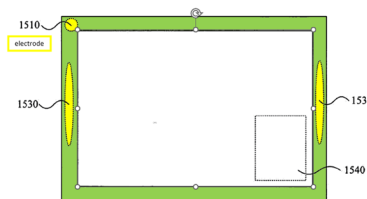
[29.a]: wherein the first pad detects signals . . . ;

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]). As discussed for claim element [24.c], it would have been obvious to detect signals from two different hands. Thus, claim element [29.a] would have been obvious (Ex. 1021, ¶108).

[29.b]: wherein the first and second portions . . . ; and

Markel’s Figure 15 discloses electrodes 1530 and 1510 that are both adjacent and located on the same face of the electronic device. Thus, *Markel*’s Figure 15 renders obvious claim element [29.b] (Ex. 1021, ¶111).

Ex. 1005, Fig. 15 (annotated)



[29.c]: wherein the . . . metallic conductive portion exposed

As discussed in the Petition, a POSITA would have understood the “main body portion” of *Markel* to be an enclosure (Pet., 8-9). In addition, a POSITA would have found it obvious to make the enclosure from a metallic conductive material for the same reasons discussed above for substitute claim 26 (Ex. 1021, ¶114).

VII. SUBSTITUTE CLAIMS 25, 28, AND 29 ARE INDEFINITE

Terms of degree are indefinite absent guidance as to the scope of the claims. *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017). Here, the specification and prosecution history fail to provide any guidance as to scope of the term “adjacent” in substitute claims 25, 28, and 29. Although the specification provides an example of when leads *are* “adjacent” (i.e., when their “distance” is “sufficiently large” that they “cannot detect the same electrical signal” (Ex. 1001, 9:52-57)), neither the specification nor prosecution history provide any examples of when leads are *no longer* “adjacent” (Ex. 1021, ¶116). The claim term is indefinite.

VIII. CONCLUSION

For the foregoing reasons, the Board should deny Apple’s Motion to Amend.

Date: June 26, 2024

By: /Christopher TL Douglas /
Christopher TL Douglas

CLAIMS APPENDIX

<u>Claim</u>	<u>Recitation</u>
1.pre	An electronic device for detecting a user's cardiac signal, comprising:
1.a	an enclosure;
1.b	a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising:
1.c.i	a first lead comprising a first pad that is embedded in a first portion of the enclosure,
1.c.ii	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
1.c.iii	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
1.d.i	a second lead comprising a second pad that is embedded in a second portion of the enclosure,
1.d.ii	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
1.e	a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal, wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor, and wherein the second lead further comprises a second connector coupled to the second pad and configured to provide the second electrical signal detected by the second pad to the processor.
2.pre	The electronic device of Claim 1,

<u>Claim</u>	<u>Recitation</u>
2.a	wherein the first portion and the second portion are located on opposite sides of the electronic device.
3.pre	The electronic device of Claim 1,
3.a	wherein the first portion is electrically isolated from the second portion.
4.pre	The electronic device of Claim 1, wherein:
4.a	the first portion is separated from the second portion by a third portion of the enclosure;
4.b	at least the third portion is constructed from a material having a first conductivity; and
4.c	the first conductivity is insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion.
5.pre	The electronic device of Claim 4, wherein:
5.a	the material having the first conductivity comprises one of aluminum and steel; and
5.b	the second pad is constructed from a silver based compound.
6.pre	The electronic device of Claim 4, wherein:
6.a	the exterior surface of the enclosure further comprises an exterior surface of the second portion;
6.b	the second pad is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the exterior surface of the second portion;
6.c	the second pad is positioned from the exterior surface of the second portion by a thickness of the second portion;
6.d	at least the thickness of the second portion is constructed from material having a second conductivity; and

<u>Claim</u>	<u>Recitation</u>
6.e	the second conductivity is defined such that the second electrical signal is not able to be transmitted through material having the second conductivity over a distance larger than the thickness of the second portion.
7.pre	The electronic device of Claim 6,
7.a	wherein the first pad and the second pad are positioned apart from one another at a distance larger than the thickness of the second portion by material having the second conductivity.
8.pre	The electronic device of Claim 1, wherein:
8.a	the enclosure further comprises at least one pocket underneath the exterior surface of the enclosure; and
8.b	at least one of the first pad and the second pad is placed within the at least one pocket.
9.pre	The electronic device of Claim 1, further comprising:
9.a	a display, wherein the enclosure supports the display, and wherein at least a portion of the exterior surface of the enclosure forms at least a portion of an exterior surface of the electronic device behind the display; and
9.b	a third lead embedded with the display, wherein the third lead is configured to detect a third electrical signal of the user's cardiac signal via the user's contact with at least one of the third lead and the display.
10.pre	The electronic device of Claim 1,
10.a	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 portion of the enclosure.
11.pre	The electronic device of Claim 1,

<u>Claim</u>	<u>Recitation</u>
11.a	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.
12.pre	The electronic device of Claim 1,
12.a	wherein the first portion of the enclosure is a bezel.
13.pre	The electronic device of Claim 1,
13.a	wherein the second portion of the enclosure is a bezel.
14.pre	The electronic device of Claim 1,
14.a	wherein an interior surface of the enclosure comprises an interior surface of the first portion, wherein the first pad is positioned on the interior surface of the first portion.
15.pre	An electronic device for detecting a user's cardiac signal, comprising:
15.a	an enclosure;
15.b	a display screen exposed to the user through an opening in the enclosure;
15.c	a heart sensor configured to detect the user's cardiac signal, the heart sensor comprising:
15.d.i	a first lead embedded in a first portion of the enclosure of the electronic device,
15.d.ii	wherein the first lead is configured to detect a first electrical signal of the user's cardiac signal via the user's contact with at least one of the first lead and the first portion of the enclosure of the electronic device; and
15.e.i	a second lead embedded in the display screen of the electronic device,

<u>Claim</u>	<u>Recitation</u>
15.e.ii	wherein the second lead is configured to detect a second electrical signal of the user's cardiac signal via the user's contact with at least one of the second lead and the display screen of the electronic device; and
15.f	a processor coupled to the heart sensor and configured to process the first and second electrical signals of the user's cardiac signal.
16.pre	The electronic device of Claim 15,
16.a	wherein the first lead is configured to detect the first electrical signal of the user's cardiac signal via the user's contact with the first lead.
17.pre	The electronic device of Claim 16,
17.a	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.
18.pre	The electronic device of Claim 16,
18.a	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 display screen.
19.pre	The electronic device of Claim 15, wherein:
19.a	the first portion of the electronic device comprises a bezel of the enclosure;
19.b	the electronic device further comprises a non-conductive component positioned between the bezel and the display screen for electrically isolating the first lead from the second lead.
20.pre	The electronic device of Claim 15,
20.a	wherein the first lead is configured to detect the first electrical signal of the user's cardiac signal via the user's contact with the first portion of the enclosure.

<u>Claim</u>	<u>Recitation</u>
21.pre	The electronic device of Claim 20,
21.a	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.
22.pre	The electronic device of Claim 20,
22.a	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 display screen.

PROPOSED SUBSTITUTE CLAIMS

<u>Claim</u>	<u>Recitation</u>
23.pre	The electronic device of claim 12,
23.a	further comprising a touch screen display,
23.b	wherein the bezel extends around the touch screen display; and
23.c	wherein the first pad is embedded in an inner surface of the bezel.
24.pre	The electronic device of Claim 23, further comprising:
24.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
24.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;

<u>Claim</u>	<u>Recitation</u>
24.c	wherein the first pad detects signals through a first hand, and the second and third pads detect signals through a second hand.
25.pre	The electronic device of claim 24
25.a	wherein the second and third pads are adjacent pads; and
25.b	wherein an electrically isolating component is inserted between the second and third pads.
26.pre	The electronic device of claim 1,
26.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
26.b	wherein the second pad is exposed on the exterior surface of the electronic device for direct contact from a user.
27.pre	The electronic device of claim 1,
27.a	wherein the processor is further configured to extract one or more characteristics of the detected cardiac signal and compare the extracted one or more characteristics with one or more characteristics previously stored in memory that were associated with an authorized user; and
27.b	wherein if the extracted one or more characteristics match those of an authorized user, the electronic device authenticates the user.
28.pre	The electronic device of claim 1,
28.a	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;
28.b	wherein the first and second pads are adjacent pads; and wherein an electrically isolating component is inserted between the first and second pads.

<u>Claim</u>	<u>Recitation</u>
29.pre	The electronic device of claim 28,
29.a	wherein the first pad detects signals from a first hand and the second pad detects signals from a second hand;
29.b	wherein the first and second portions of the enclosure are located on a same face of the electronic device; and
29.c	wherein the first and second portions of the enclosure each comprise a metallic conductive portion exposed for direct user contact.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e), 42.105, the undersigned hereby certifies that true and correct copies of the above-captioned PETITIONER'S RESPONSE TO PATENT OWNER'S CONTINGENT MOTION TO AMEND and all associated exhibits were served via electronic mail to the following attorneys of record for

Patent Owner:

W. Karl Renner
Jeremy Monaldo
Grace Kim
Andrew B. Patrick
Patrick J. Bisenius
IPR50095-0157IP1@fr.com
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
Tel: 202-783-5070
Fax: 877-769-7945

Date: June 26, 2024

By: / Christopher TL Douglas /

Christopher TL Douglas