

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

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104

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TABLE OF CONTENTS

| | |
|--|-----------|
| LIST OF EXHIBITS..... | vi |
| I. STANDING UNDER 37 C.F.R. §42.104(a)..... | 1 |
| II. PAYMENT OF FEES | 1 |
| III. OVERVIEW OF CHALLENGES AND RELIEF REQUESTED..... | 1 |
| IV. '257 PATENT SUMMARY | 1 |
| A. SPECIFICATION..... | 2 |
| B. PROSECUTION HISTORY | 3 |
| C. CLAIM CONSTRUCTION..... | 4 |
| V. PRIOR ART | 5 |
| A. <i>MARKEL</i> (EX. 1005) | 6 |
| B. <i>NISSILÄ</i> (EX. 1006) | 6 |
| C. <i>RIGHTER</i> (EX. 1007) | 6 |
| VI. LEVEL OF ORDINARY SKILL IN THE ART | 6 |
| VII. ARGUMENT..... | 7 |
| A. GROUND 1: CLAIMS 1-22 ARE UNPATENTABLE UNDER 35 U.S.C. §103 OVER <i>MARKEL</i> | 7 |
| B. GROUND 2: CLAIMS 1-22 ARE UNPATENTABLE UNDER 35 U.S.C. §103 OVER <i>MARKEL</i> IN VIEW OF <i>NISSILÄ</i> | 69 |
| C. GROUND 3: CLAIMS 12-13 AND 19 ARE UNPATENTABLE AS OBVIOUS UNDER 35 U.S.C. §103 OVER <i>MARKEL</i> IN VIEW OF <i>NISSILÄ</i> AND/OR <i>RIGHTER</i> | 84 |
| VIII. PRIOR ART NOT PREVIOUSLY PRESENTED TO THE OFFICE | 91 |
| IX. THE <i>FINTIV</i> FACTORS FAVOR INSTITUTION..... | 91 |
| X. CONCLUSION | 94 |
| XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8..... | 95 |
| A. REAL PARTY IN INTEREST UNDER 37 C.F.R. §42.8(B)(1) | 95 |

| | | |
|----|---|----|
| B. | RELATED MATTERS UNDER 37 C.F.R. §42.8(B)(2) | 95 |
| C. | DESIGNATION OF COUNSEL UNDER 37 C.F.R. §42.8(B)(3)..... | 95 |
| D. | SERVICE INFORMATION..... | 97 |

TABLE OF AUTHORITIES

| | Page(s) |
|---|----------------|
| CASES | |
| <i>Adobe, Inc. v. Realtime Adaptive Streaming LLC</i> , IPR2019-00712, Paper 9 (PTAB Sept. 12, 2019)..... | 91 |
| <i>Apple Inc. v. AliveCor, Inc.</i> , Case 4:22-cv-07608-HSG..... | 95 |
| <i>Apple Inc. v. Fintiv, Inc.</i> , IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) | 92 |
| <i>CommScope Technologies LLC v. Dali Wireless, Inc.</i> , IPR2022-01242, Paper 23 (PTAB Feb. 27, 2023)..... | 93 |
| <i>Kennametal, Inc. v. Ingersoll Cutting Tool Co.</i> , 780 F.3d 1376 (Fed. Cir. 2015) | 36 |
| <i>Sand Revolution II, LLC v. Cont’l Intermodal Grp. - Trucking LLC</i> , IPR2019-01393, Paper 24 (PTAB June 16, 2020) | 92, 93 |
| <i>Shoes by Firebug v. Stride Rite Children’s Group</i> , 962 F.3d 1362 (Fed. Cir. 2020) | 5 |
| STATUTES | |
| 35 U.S.C. §102(a) | 6 |
| 35 U.S.C. §102(b) | 6 |
| 35 U.S.C. §103..... | 1, 7, 69, 84 |
| 35 U.S.C. §311–319 | 1 |
| 35 U.S.C. §325(d) | 91 |
| OTHER AUTHORITIES | |
| 37 C.F.R. §42 | 1 |
| 37 C.F.R. §§42.6(e), 42.105..... | 8 |

| | |
|---------------------------------|--------|
| 37 C.F.R. §42.8 | 95 |
| 37 C.F.R. §42.8(b)(1)..... | 95 |
| 37 C.F.R. §42.8(b)(2)..... | 95 |
| 37 C.F.R. §42.8(b)(3)..... | 95 |
| 37 C.F.R §42.10(b) | 96 |
| 37 C.F.R. §42.24 | 7 |
| 37 C.F.R. §42.104(a)..... | 1 |
| 37 CFR §42.24(a)(i)..... | 7 |
| U.S. Patent No. 10,866,257..... | passim |
| U.S. Patent No. 10,866,619..... | 95 |

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) |

AliveCor, Inc. (“Petitioner”) seeks IPR under 35 U.S.C. §§311-319 and 37 C.F.R. §42 of Claims 1-22 (“the Challenged Claims”) of Patent No. 10,076,257 (“the ’257 Patent”). Petitioner requests cancellation of the Challenged Claims.

I. STANDING UNDER 37 C.F.R. §42.104(a)

Petitioner certifies that the ’257 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. PAYMENT OF FEES

Petitioner authorizes Account No. 16-0605 to be charged.

III. OVERVIEW OF CHALLENGES AND RELIEF REQUESTED

Pursuant to 42.22(a)(1) and 42.104(b)(1)-(2), Petitioner requests cancellation of the Challenged Claims pursuant to the grounds below. Additional support is provided in the Declaration of Dr. Berger (Ex. 1003 (“Berger Declaration”)).

Ground 1: Claims 1-22 are unpatentable under pre-AIA 35 U.S.C. §103 over *Markel*.

Ground 2: Claims 1-22 are unpatentable under pre-AIA 35 U.S.C. §103 over *Markel* in view of *Nissilä*.

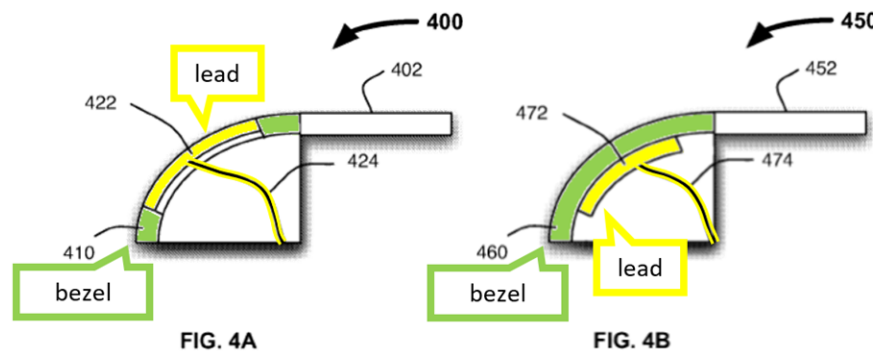
Ground 3: Claims 12-13 and 19 are unpatentable under pre-AIA 35 U.S.C. §103 over *Markel* in view of *Righter*.

IV. ’257 PATENT SUMMARY

A. Specification

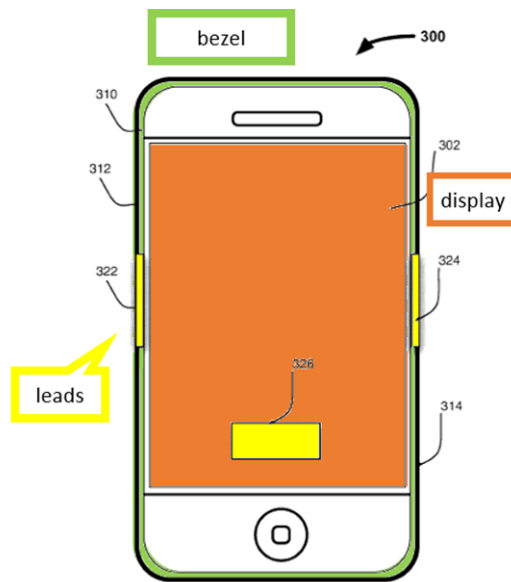
The '257 Patent relates generally to a heart rate monitor in an electronic device (see Ex. 1001, Abstract; Ex. 1003, ¶52). The electronic device includes “at least two leads that the user contacts in order to detect the user’s cardiac signals” (Ex. 1001, 1:56-58, 2:38-42). The '257 Patent purports to solve alleged problems relating to the physical placement of these leads by disclosing an electronic device with “a seamlessly integrated cardiac sensor” (Ex. 1001, 2:7-8; Ex. 1003, ¶53). “[T]he leads can be exposed such that the user may directly contact the leads or may instead or in addition be coupled to an electrically conductive portion of the device enclosure” so that the lead is positioned underneath the bezel (Ex. 1001, 2:45-50, Figs. 4A, 4B; Ex. 1003, ¶53).

Ex. 1001, Figs. 4A, 4B (annotated)



“Leads 322 and 324, which can include conductive pads, can be coupled to sides 312 and 314 of bezel 310, respectively” and “electronic device 300 can include additional lead 326 embedded in or behind display 302” (Ex. 1001, 8:20-21, 8:40-41; Ex. 1003, ¶54).

Ex. 1001, Fig. 3 (annotated)

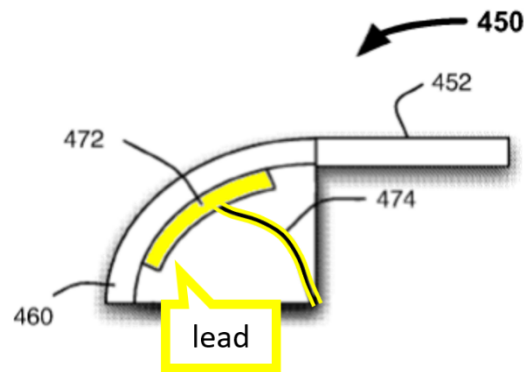


B. Prosecution History

Application Number 14/136,658 was filed on December 20, 2013 (Ex. 1001, Cover). On June 19, 2015, the Examiner rejected all pending claims in view of *Ceballos* (Ex. 1013) (Ex. 1002, 173, 176-180; Ex. 1003, ¶59).

In response, the Applicant amended the claims (Ex. 1002, 199-205; Ex. 1003, ¶60). Applicant explained *Ceballos* did not disclose the amended claim language because *Ceballos* disclosed an *exposed* electrode that was *not* “positioned underneath the exterior surface” of the enclosure (Ex. 1002, 209-210; Ex. 1003, ¶64). Applicant referred to the '257 Patent's Figure 4B as an example of the amended claim language in the first independent claim. (Ex. 1002, 208-209; Ex. 1003, ¶61).

Ex. 1001, Fig. 4B (annotated)



Next, the Examiner issued a Final Rejection, rejecting all pending claims in view of *Gilles* (Ex. 1014; Ex. 1002, 217-220; Ex. 1003, ¶68). In response, Applicant traversed the rejection and argued that the amended claims requiring a pad “positioned underneath the exterior surface of the first portion” avoided *Gilles* (Ex. 1002, 274; Ex. 1003, ¶70-71).

The Examiner issued another Final Rejection rejecting all pending claims in view of *Weiss* (Ex. 1015; Ex. 1002, 300-301; Ex. 1003, ¶72). In response, Applicant traversed the rejection (Ex. 1002, 316; Ex. 1003, ¶73). The Examiner issued a Notice of Allowance on May 22, 2018 (Ex. 1003, ¶56–74).

C. Claim Construction

The language “An electronic device for detecting a user’s cardiac signal” in elements [1.pre] and [15.pre] is limiting and should receive its plain and ordinary meaning (Ex. 1003, ¶¶75-77).

A preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim. *Shoes by Firebug v. Stride Rite Children’s Group*, 962 F.3d 1362, 1367 (Fed. Cir. 2020). Dependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention. *Id.*

Here, the language “An electronic device for detecting a user’s cardiac signal” in [1.pre] and [15.pre] provides antecedent basis that defines language in the claim body. For example, [1.pre] and [15.pre] each recite “*a* user’s cardiac signal,” which is referred back to later in the claim bodies as “*the* user’s cardiac signal” (Ex. 1003, ¶77)¹. The phrase “a user” in [1.pre] and [15.pre] is referred back to in the claim bodies as part of “*the* user’s skin’s contact” (Ex. 1003, ¶77). As another example, [15.pre] recites “An electronic device,” which is referred back to later in the claim body as “*the* electronic device” (Ex. 1003, ¶77). Consequently, a person of ordinary skill in the art would have understood that the language “An electronic device for detecting a user’s cardiac signal” in [1.pre] and [15.pre] is limiting and should receive its plain and ordinary meaning (Ex. 1003, ¶77).

V. PRIOR ART

¹ All emphasis is added unless otherwise noted.

A. *Markel* (Ex. 1005)

Publication No. 2007/0021677 (“*Markel*,” Ex. 1005) published on January 25, 2007 (Ex. 1005, Cover; *see also* Ex. 1003, ¶¶78-86). *Markel* is prior art under at least 35 U.S.C. §102(a) and §102(b) (pre-AIA) (Ex. 1003, ¶79).

B. *Nissilä* (Ex. 1006)

Patent No. 6,775,566 (“*Nissilä*,” Ex. 1006) issued on August 10, 2004 (Ex. 1006, Cover; *see also* Ex. 1003, ¶¶87-91). *Nissilä* is prior art under at least 35 U.S.C. §102(b) (pre-AIA) (Ex. 1003, ¶88).

C. *Righter* (Ex. 1007)

Patent No. 5,191,891 (“*Righter*,” Ex. 1007) issued on March 9, 1993 (Ex. 1007, Cover; *see also* Ex. 1003, ¶¶92-100). *Meyers* is prior art under at least 35 U.S.C. §102(b) (pre-AIA) (Ex. 1003, ¶93).

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) at the time of the alleged invention of the ’257 Patent would have been a person with a working knowledge of physiological monitoring technologies, a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, and training or at least one to two years of related work experience with capture and processing of data or information, including but not limited to

physiological monitoring technologies (Ex. 1003, ¶38). More education can supplement practical experience and vice versa (Ex. 1003, ¶38).

VII. ARGUMENT

A. Ground 1: Claims 1-22 Are Unpatentable Under 35 U.S.C. §103 over *Markel*

Markel renders obvious claims 1-22 of the '257 Patent (Ex. 1003, ¶¶101-349).

1. Claim 1

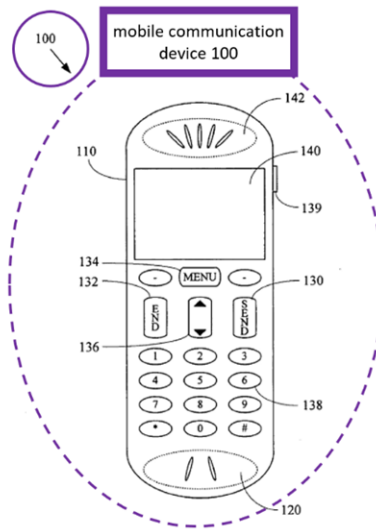
i. [1.pre]: An electronic device for detecting a user's cardiac signal, comprising:

Markel renders obvious [1.pre] (Ex. 1003, ¶¶102-107).

Markel discloses “[a] general-purpose *mobile communication device*, general-purpose *computer user-interface device*, and other non-health-related *electronic devices with cardiovascular monitoring capability*” (Ex. 1005, Abstract, [0004], [0060]; Ex. 1003, ¶103). *Markel* teaches “various aspects of the present invention may also be applied to other electronic devices” (Ex. 1005, [0080], [0099], [0125], [0154]; Ex. 1003, ¶104).

Figure 1 illustrates a mobile communication device 100. (Ex. 1005, [0006], [0033], Figs. 1, 4-9; Ex. 1003, ¶105).

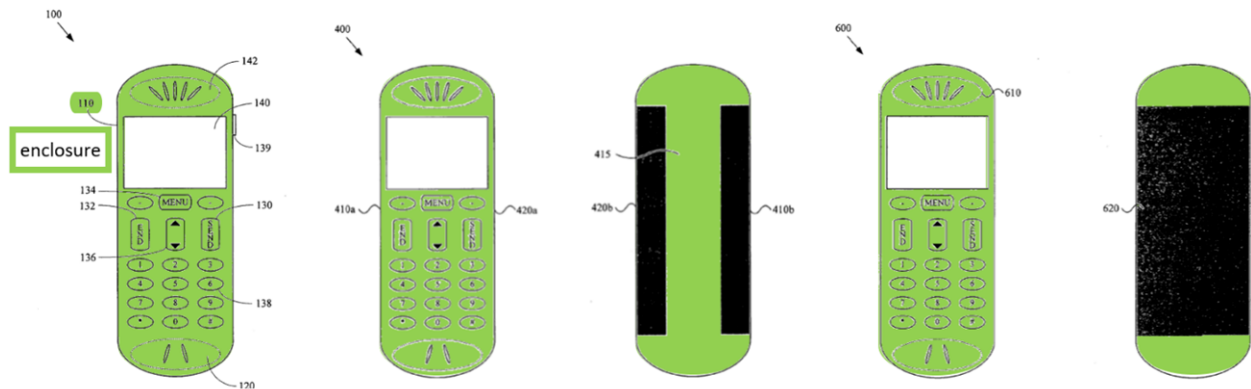
Ex. 1005, Fig. 1 (annotated)



ii. [1.a]: an enclosure;

Markel renders obvious [1.a] (Ex. 1003, ¶¶108-110; *see also* Ex. 1005, Figs. 1, 4, 6 (annotated)).

Ex. 1005, Figs. 1, 4, 6 (annotated)



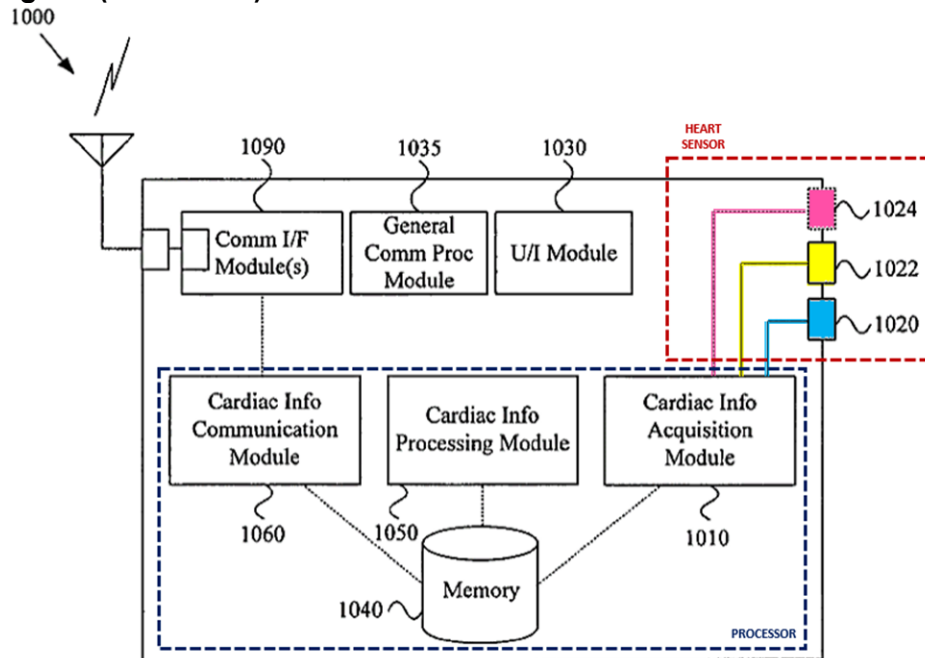
Markel discloses a “main body portion 110” (green), which corresponds to the claimed “enclosure” of [1.a] (Ex. 1003, ¶109). *Markel* discloses that “mobile communication device 100 (‘MCD’) may comprise a **main body portion 110**”

(Ex. 1005, [0034], Fig. 1; Ex. 1003, ¶109; *see also* Ex. 1005, [0053], [0054], [0056], [0076], [0077]). *Markel* describes the main body portion as “compris[ing] the portion of the [mobile communication device] that is generally held in the hand of the user during normal use of the [mobile communication device]” (Ex. 1005, [0043]; *see also id.* [0064]; Ex. 1003, ¶109).

iii. [1.b]: a heart sensor configured to detect the user’s cardiac signal,

Markel renders obvious [1.b] (Ex. 1003, ¶¶111-114; *see also* Ex. 1005, Fig. 10 annotated).

Ex. 1005, Fig. 10 (annotated)



Markel discloses components (red) that correspond to the claimed “heart sensor configured to detect the user’s cardiac signal” (Ex. 1003, ¶112). *Markel* discloses that “mobile communication device 1000” includes “a first electrode 1020

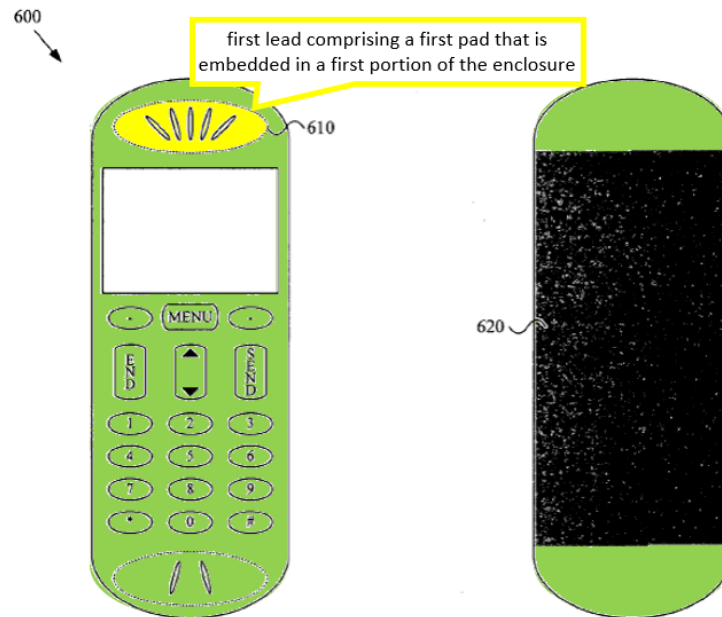
and a second electrode 1022 (and, for example, a third or Nth electrode 1024)” (Ex. 1005, [0058]; Ex. 1003, ¶112). *Markel* further discloses that the electronic device utilizes electrodes “to detect and *acquire various cardiac (i.e., heart-related) signals from a user*” (Ex. 1005, [0058]; *see also id.*, [0060]; Ex. 1003, ¶112).

Markel further discloses an electronic device that “comprise[s] at least one *cardiac sensor* (e.g., one or more electrodes, an audio monitoring or acoustical detection device, etc.) that is adapted to *detect cardiac activity of the user* of the [electronic device]” (Ex. 1005, [0035]; *see also id.*, Abstract; Ex. 1003, ¶113).

iv. [1.c.i]: the heart sensor comprising: a first lead comprising a first pad that is embedded in a first portion of the enclosure,

Markel renders obvious [1.c.i] (Ex. 1003, ¶¶115-121; *see also* Ex. 1005, Fig. 6 annotated).

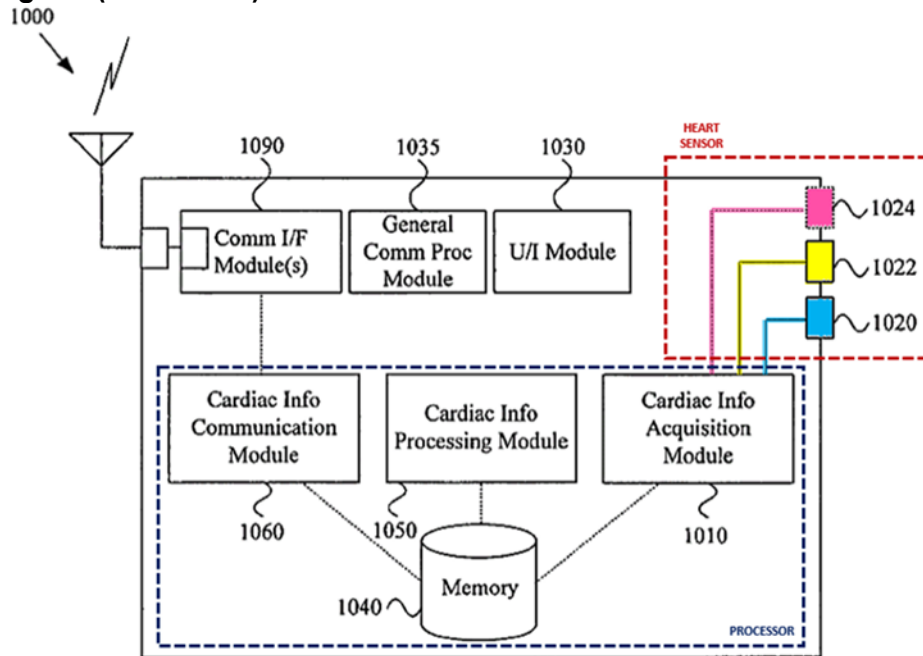
Ex. 1005, Fig. 6 (annotated)



A POSITA would have understood the plain and ordinary meaning of “lead” to include (1) an electrode that comes into contact with a user and (2) the electrical connection (*e.g.*, wires) that connects the electrode to additional electronics that implement that ECG signal acquisition (Ex. 1003, ¶116). A POSITA would have understood that a “pad” is a component of the electrode (Ex. 1003, ¶116).

Markel discloses components that correspond to the claimed “a heart sensor configured to detect the user’s cardiac signal” (*see* [1.b]; Ex. 1003, ¶117).

Ex. 1005, Fig. 10 (annotated)

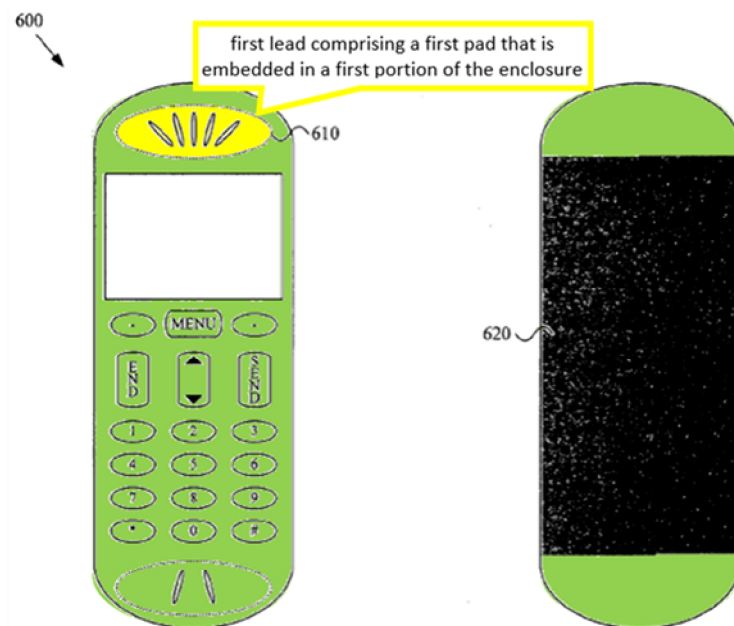


One of those components is a “second electrode 1022” and associated wiring (yellow), which correspond to the claimed “first lead” (Ex. 1005, [0058]; Ex. 1003, ¶118). *Markel* discloses that the second electrode is “coupled” to the cardiac information acquisition module (Ex. 1005, [0059]; (Ex. 1003, ¶118)). A POSITA would thus have understood that *Markel*’s “second electrode” and associated wiring is a “first lead” (Ex. 1003, ¶118).

In *Markel*’s Figure 6 configuration, the second electrode is “*molded into the audio output portion 610* or positioned on the main body portion 610” of the electronic device (Ex. 1005, [0050]; (Ex. 1003, ¶119)). A POSITA would thus have understood that *Markel*’s “second electrode” comprises a first pad that is “molded

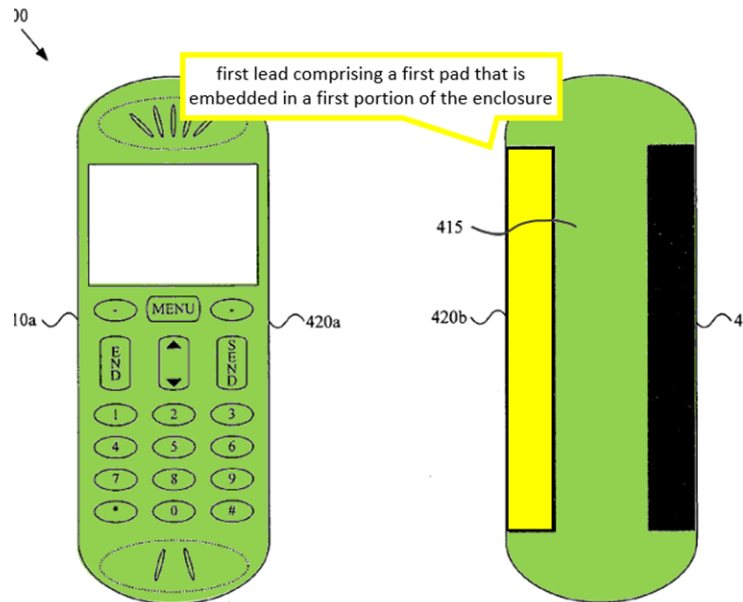
into the audio output portion 610” (i.e., embedded in a first portion of the enclosure)
(Ex. 1003, ¶119).

Ex. 1005, Fig. 6 (annotated)



Additionally, *Markel* discloses that the “second electrode” may be “placed on the right side portion 420 (e.g., placed on or *molded into region 420b*)” (Ex. 1005, [0045]; (Ex. 1003, ¶120). A POSITA would thus have understood that Figure 4’s “second electrode” would include a first pad that is embedded into the “right side portion 420,” (i.e., a first portion of the enclosure) in the Figure 4 configuration (Ex. 1003, ¶120).

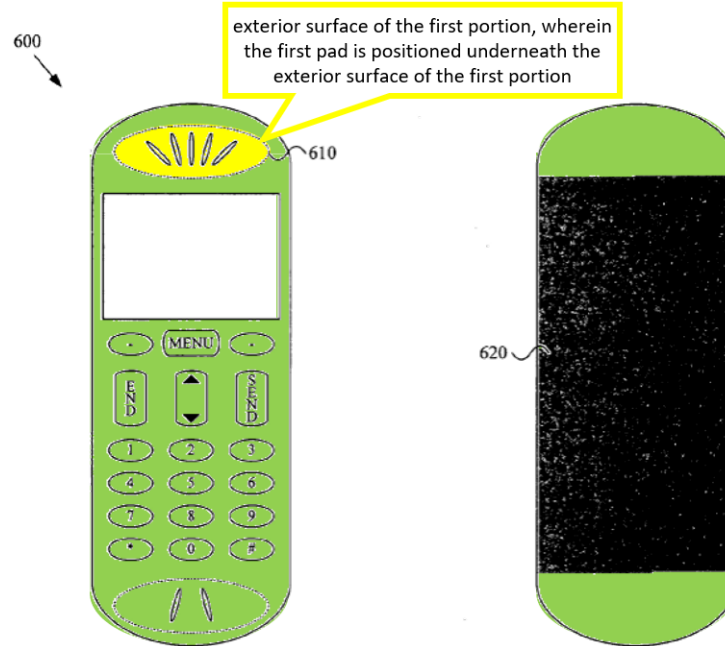
Ex. 1005, Fig. 4 (annotated)



-
- v. ***[1.c.ii]: wherein an exterior surface of the enclosure comprises an exterior surface of the first portion,***

Markel renders obvious [1.c.ii] (Ex. 1003, ¶¶122-125; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel discloses a “main body portion 110,” which corresponds to the claimed “enclosure” (see [1.a]; Ex. 1003, ¶123). Furthermore, a POSITA would have understood that *Markel*’s “second electrode” comprises a first pad that is embedded in the “audio output portion 610” (i.e., a first portion of the enclosure) (see [1.c.i]; Ex. 1003, ¶123). Thus, a POSITA would have understood that the exterior surface of the “audio output portion 610” corresponds to the “exterior surface of the first portion” of [1.c.ii] (Ex. 1003, ¶123).

Additionally, a POSITA would have understood that Figure 4’s “second electrode” comprises a first pad that is embedded in the “right side portion 420” (see [1.c.i]; Ex. 1003, ¶124). A POSITA would have understood that the exterior surface

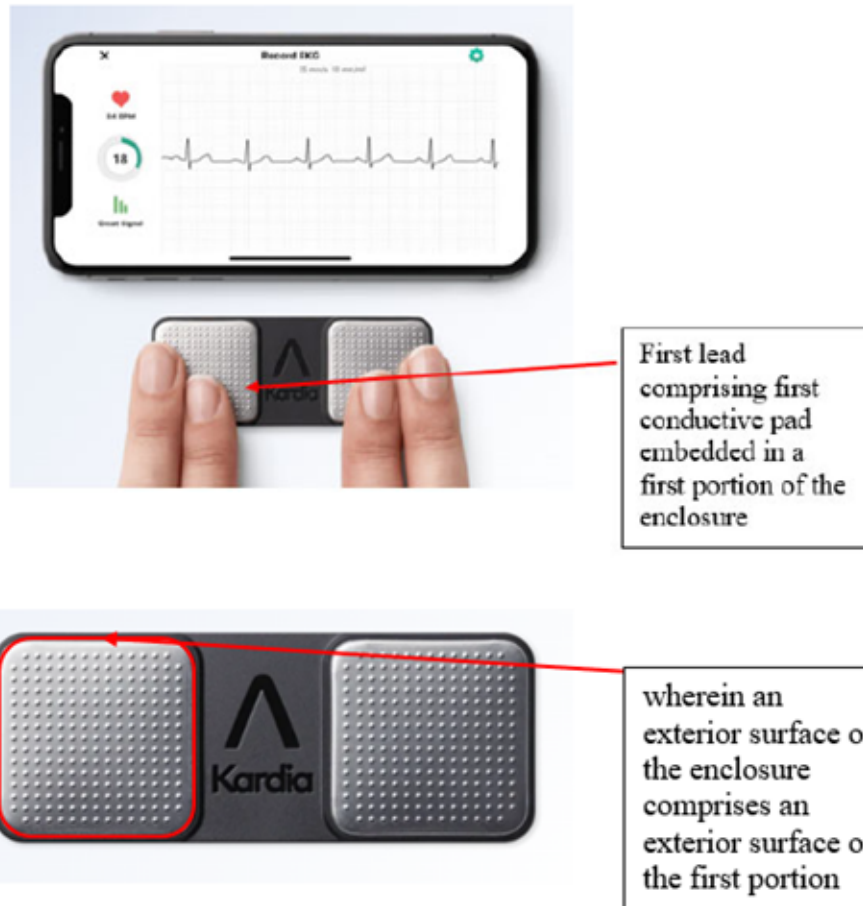
of the “right side portion 420” corresponds to the “exterior surface of the first portion” of [1.c.ii] in the Figure 4 configuration (Ex. 1003, ¶124).

- vi. ***[1.c.iii]: 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;***

Markel renders obvious [1.c.iii] under Apple’s interpretation and a correct interpretation of the claim language (Ex. 1003, ¶¶126-140).

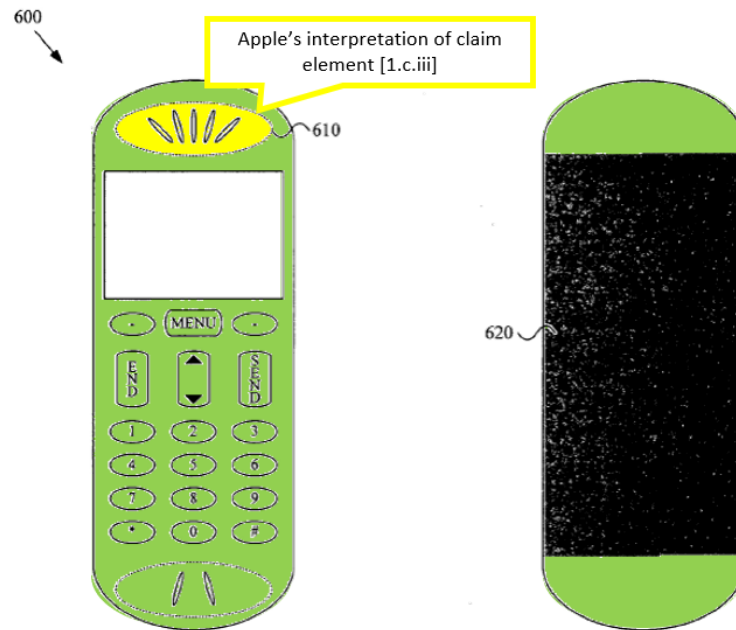
Apple’s interpretation of [1.c.iii]. For purposes of showing alleged infringement, Apple appears to have interpreted [1.c.ii] to include the surface of an exposed electrode pad that is configured to detect a cardiac signal via direct contact with the user’s skin (Ex. 1003, ¶127-128).

Ex. 1016 (Apple's Complaint), 11-12 (annotation in original)



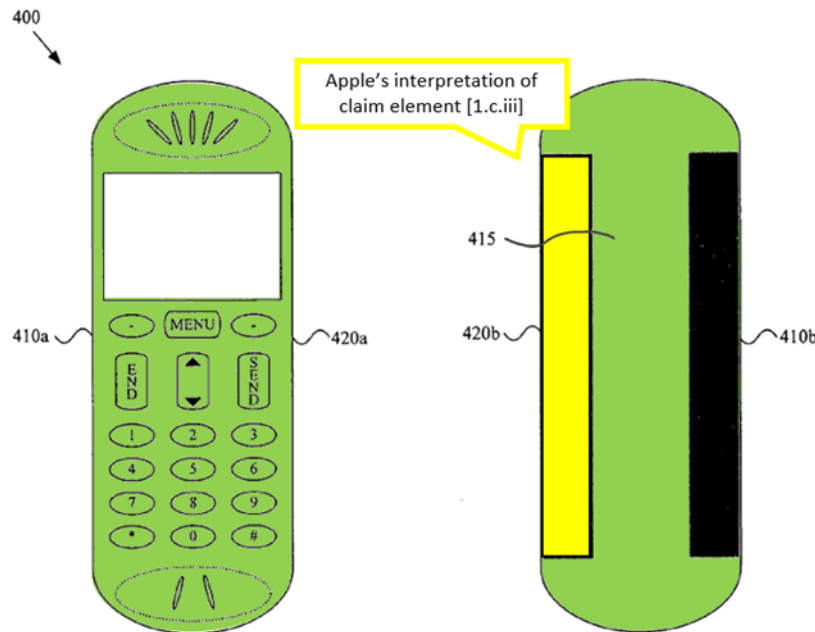
Markel teaches that the second electrode is “***positioned on the audio output portion 610***” of the electronic device (Ex. 1005, [0050]; Ex. 1003, ¶129; *see also* Ex. 1005, [0044]; Ex. 1003, ¶130). “Such electrode placement may, for example, provide for ***user contact***” with the second electrode “during the process of listening” to the electronic device (Ex. 1005, [0050]; Ex. 1003, ¶129).

Ex. 1005, Fig. 6 (annotated)



With respect to *Markel's* Figure 4 configuration, the second electrode is “*placed on the right side portion 420*” of the electronic device (Ex. 1005, [0045]; Ex. 1003, ¶131). Such electrode placement allows the electrode to “*contact a user* during normal (or typical) use of the [electronic device]” (Ex. 1005, [0041]; Ex. 1003, ¶131).

Ex. 1005, Fig. 4



Markel further discloses that electrodes “**detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes)**” (Ex. 1005, [0035]; Ex. 1003, ¶132). *Markel*’s electrodes also “may comprise a metallic surface exposed for user contact” (Ex. 1005, [0037]; Ex. 1003, ¶132). Consequently, *Markel* discloses that its “second electrode” may include an exposed electrode pad that is configured to detect a cardiac signal via direct contact with the user’s skin (Ex. 1003, ¶132), which is consistent with Apple’s interpretation of [1.c.iii] (Ex. 1003, ¶133).

Correct interpretation of [1.c.iii]. In the alternative, and under the correct interpretation of [1.c.iii], *Markel* renders obvious [1.c.iii] (Ex. 1003, ¶134).

Markel teaches that an electrode “may be ***substantially concealed (or hidden)*** ***from a user . . . with little or no visible indication*** of the electrode presence” (Ex. 1005, [0040]; Ex. 1003, ¶135). A POSITA would have understood that *Markel*’s “second electrode” comprises a first pad that is embedded in the “audio output portion 610” (i.e., a first portion of the enclosure) (see [1.c.i]; Ex. 1003, ¶135). When “integrated into various molded components of the mobile communication device,” this “electrode may be formed from ***conductive plastic*** (or another material)” (Ex. 1005, [0037]; Ex. 1003, ¶135). A POSITA would thus have been motivated to place the pad of the “second electrode” *underneath* the conductive plastic of the “audio output portion.” This would have “substantially concealed (or hidden)” the electrode pad from the user, which would have been desirable to increase the device’s aesthetics while protecting the electrode (Ex. 1003, ¶135).

Markel further teaches that an electrode’s pad need not be in direct contact with a user and may be “adapted to detect cardiac activity of a user that is ***conductively coupled*** to the electrodes (e.g., by touching the electrodes)” (Ex. 1005, [0035]; Ex. 1003, ¶136). Specifically, a POSITA would recognize that the pad of an electrode can be conductively coupled to a user through an intermediate conductive material (Ex. 1003, ¶136). Indeed, *Markel* teaches that “a ***conductive plastic*** (or another material) [] may be integrated into various ***molded components of the mobile communication device.***” (Ex. 1005, [0037]; Ex. 1003, ¶136).”

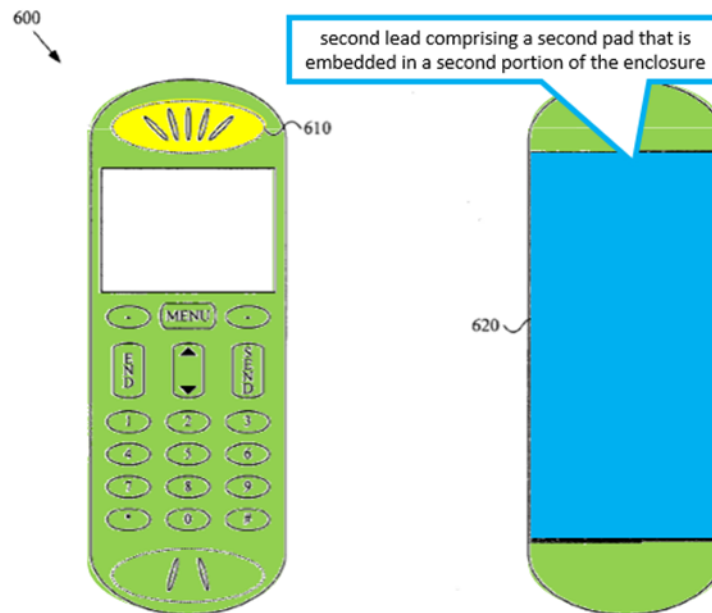
Moreover, a POSITA would have had a reasonable expectation of success in placing the electrode pad underneath and detecting a cardiac signal via the conductive plastic of the “audio output portion” because *Markel* discloses that (1) “electrodes may be *incorporated into the [electronic device] in any of a variety of manners*” and “in any of a *variety of locations*” (Ex. 1005, [0035], [0045]; Ex. 1003, ¶137), and (2) electrodes “detect cardiac activity of a user that is *conductively coupled* to the electrodes” and conductive plastics “may provide *sufficient conductivity* for an electrode to perform adequately” (Ex. 1005, [0037]; Ex. 1003, ¶137). Thus, the first pad is configured to detect a first electrical signal of a cardiac signal via the user’s skin’s contact with the exterior surface of the electronic device’s “audio output portion” (i.e., the first portion of the enclosure) (Ex. 1003, ¶138).

A POSITA would have understood that *Markel*’s “second electrode” in Figure 4 comprises a first pad that is embedded in the “right side portion 420” (*see* [1.c.i]; Ex. 1003, ¶139). Similarly, a POSITA would have placed the pad of the “second electrode” in *Markel*’s Figure 4 *underneath* the conductive plastic of the “right side portion 420” (Ex. 1003, ¶139). In that configuration, that first pad would have been configured to detect a first electrical signal of a cardiac signal via the user’s skin’s contact with the exterior surface of the electronic device’s “right side portion” (i.e., the first portion of the enclosure) (Ex. 1003, ¶139).

- vii. *[1.d.i]: the heart sensor comprising: . . . a second lead comprising a second pad that is embedded in a second portion of the enclosure,*

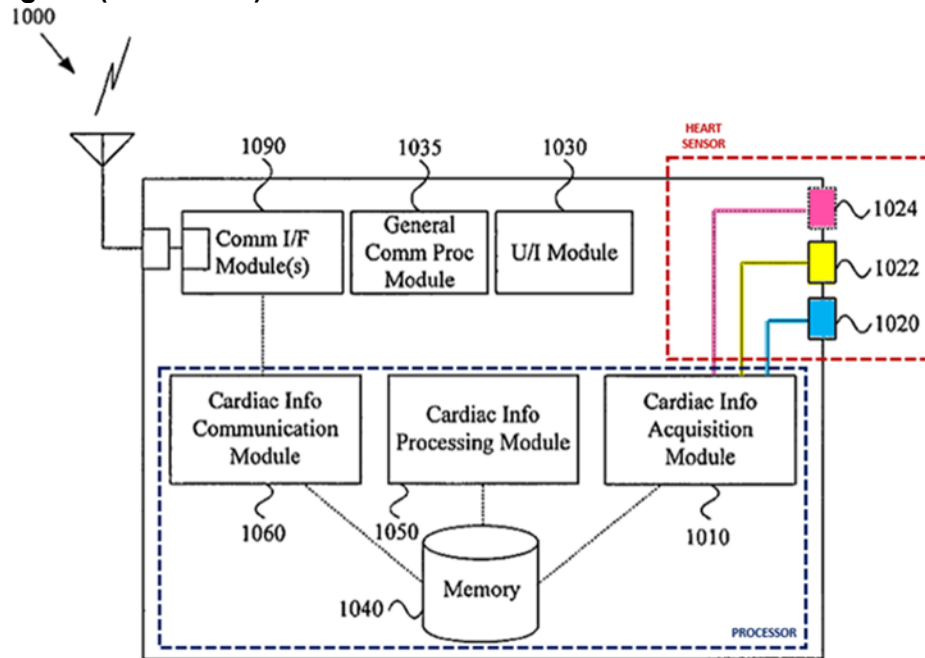
Markel renders obvious [1.d.i] (Ex. 1003, ¶¶141-147; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel discloses components that correspond to the claimed “a heart sensor configured to detect the user’s cardiac signal” (*see* [1.b]; Ex. 1003, ¶143).

Ex. 1005, Fig. 10 (annotated)

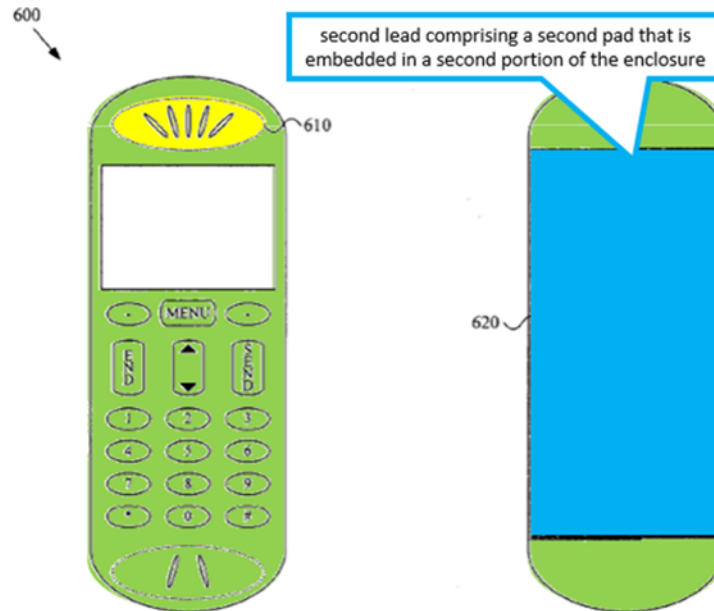


One of those components is a “first electrode 1020” and associated wiring (blue), which correspond to the claimed “second lead” (Ex. 1005, [0058]; Ex. 1003, ¶144). *Markel* discloses that the first electrode is “coupled” to the cardiac acquisition module (Ex. 1005, [0059]; Ex. 1003, ¶144). A POSITA would thus have understood that *Markel*’s “first electrode” and associated wiring is a “second lead” (Ex. 1003, ¶144).

In *Markel*’s Figure 6, the “first electrode” is “disposed on the main body portion 620 (e.g., *molded into the main body portion 620 or positioned on the main body portion 620*)” (Ex. 1005, [0050]; Ex. 1003, ¶145). A POSITA would thus have understood that *Markel*’s “first electrode” comprises a second pad that is “molded

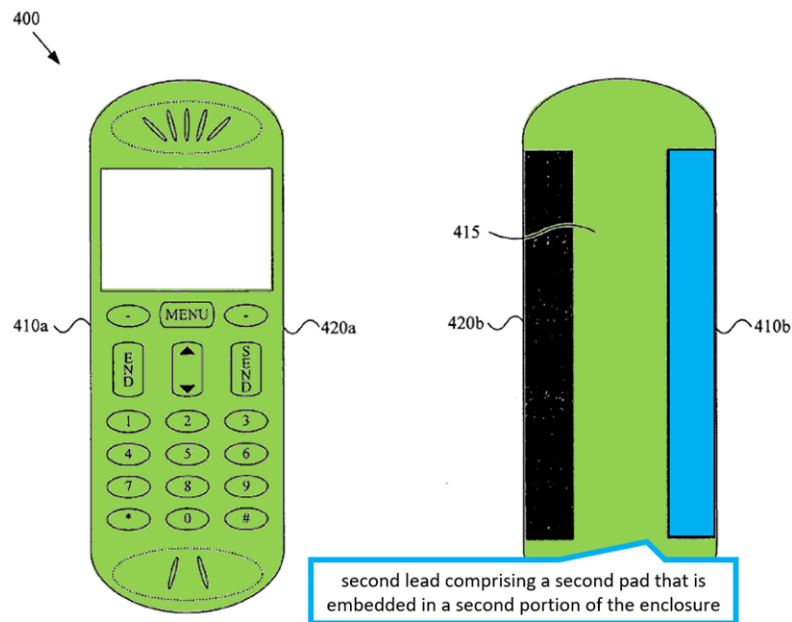
into the main body portion 620” (i.e., embedded in a second portion of the enclosure)
(Ex. 1003, ¶145).

Ex. 1005, Fig. 6 (annotated)



Additionally, *Markel* discloses a configuration in Figure 4 wherein the “first electrode” is “placed on the left side portion 410 (e.g., *placed on or molded into region 410b*)” (Ex. 1005, [0045]; Ex. 1003, ¶146). A POSITA would thus have understood that Figure 4’s “first electrode” would include a second pad that is embedded into the “left side portion 410,” (i.e., a second portion of the enclosure) in the Figure 4 configuration (Ex. 1003, ¶146).

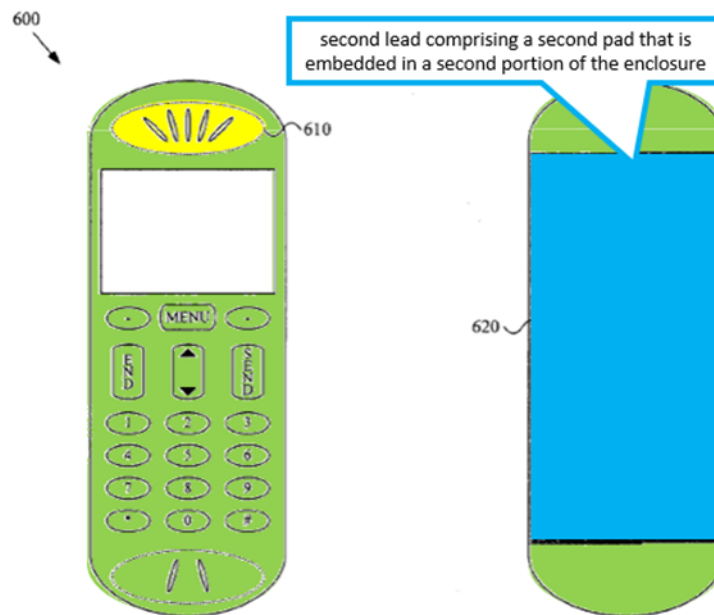
Ex. 1005, Fig. 4 (annotated)



-
- viii. *[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;*

Markel renders obvious [1.d.ii] (Ex. 1003, ¶¶148-157; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel discloses a “main body portion 110,” which corresponds to the claimed “enclosure” (see [1.a]; Ex. 1003, ¶149). Furthermore, a POSITA would have understood that *Markel*’s “first electrode” is embedded in the “main body portion 620” (i.e., a second portion of the enclosure) (see [1.d.i]; Ex. 1003, ¶149).

First, *Markel* renders obvious that the second pad of the “first electrode” is configured to detect a second electrical signal of a cardiac signal via the user’s skin’s contact with the second pad (Ex. 1003, ¶151). *Markel* discloses that electrodes “**detect cardiac activity of a user that is *conductively coupled to the electrodes (e.g., by touching the electrodes)***” (Ex. 1005, [0035]; Ex. 1003, ¶151). *Markel* discloses that “electrodes contact a user during normal (or typical) use of the [electronic

device].” (Ex. 1005, [0041]; Ex. 1003, ¶151). *Markel*’s electrodes “may comprise a metallic surface exposed for ***user contact***” (Ex. 1005, [0037]; Ex. 1003, ¶151).

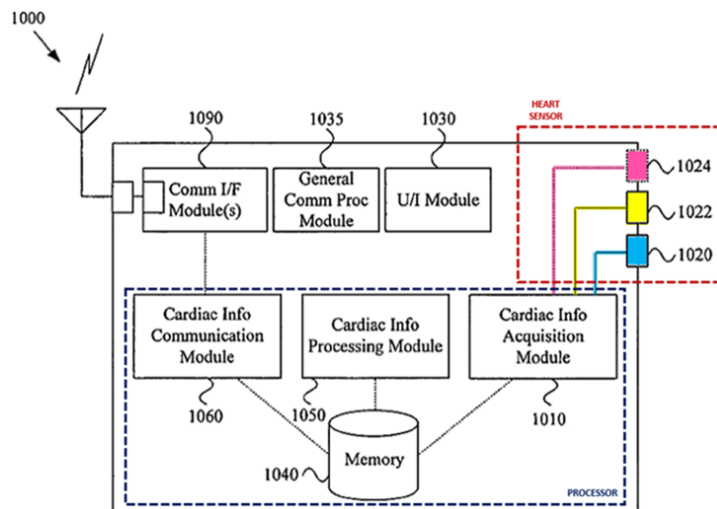
Second, and in the alternative, *Markel* renders obvious that the second pad of the “first electrode” is configured to detect a second electrical signal of a cardiac signal via the user’s skin’s contact with the second portion of the enclosure for the same reasons as discussed with regard to the first pad of the “second electrode” in [1.c.iii] (*see* [1.c.iii]; Ex. 1003, ¶152-155). *Markel* teaches that an electrode’s pad need not be in direct contact with a user and may be “adapted to detect cardiac activity of a user that is ***conductively coupled*** to the electrodes (e.g., by touching the electrodes)” (*see* [1.c.iii]; Ex. 1005, [0035]; Ex. 1003, ¶153).

A POSITA would have understood that *Markel*’s “first electrode” in Figure 4 comprises a second pad that is embedded in the “left side portion 410” (*see* [1.d.i]; Ex. 1003, ¶156). Similarly, a POSITA would have placed the pad of the “first electrode” in *Markel*’s Figure 4 underneath the conductive plastic of the “left side portion 410” (Ex. 1003, ¶156). In that configuration, that second pad would have been configured to detect a second electrical signal of a cardiac signal via the user’s skin’s contact with the exterior surface of the electronic device’s “left side portion” (i.e., the second portion of the enclosure) (Ex. 1003, ¶156).

- ix. [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.

Markel renders obvious [1.e] (Ex. 1003, ¶¶158-162; see also Ex. 1005, Fig. 10 annotated).

Ex. 1005, Fig. 10 (annotated)



First, *Markel* renders obvious a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal. *Markel* teaches a “cardiac information processing module 1050” (dark blue) that “*processes acquired cardiac information*” from the “cardiac information acquisition module 1010”

(Ex. 1005, [0058], [0059]; *see also id.* [0178]; Ex. 1003, ¶159 (module “integrated into a baseband *processor chip*”)).

Second, *Markel* renders obvious that 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. *Markel* discloses a “second electrode” coupled to a cardiac acquisition module, which corresponds to the claimed “first lead comprising a first pad” (*see* [1.c.i]; Ex. 1003, ¶160). Furthermore, *Markel* discloses a “first electrode” coupled to a cardiac acquisition module, which corresponds to the claimed “second lead comprising a second pad” (*see* [1.d.i]; Ex. 1003, ¶160).

In *Markel*, the first electrode and second electrode are connected to the “cardiac information processing module 1050” through the “cardiac information acquisition module 1010” and a “memory 1040” (Ex. 1005, [0058], [0059]; Ex. 1003, ¶161).

2. Claim 2

i. [2.pre]: The electronic device of claim 1,

Markel renders obvious [2.pre] (*see* Claim 1; Ex. 1003, ¶163-164).

- ii. [2.a]: wherein the first portion and the second portion are located on opposite sides of the electronic device.

Markel renders obvious [2.a] (Ex. 1003, ¶¶165-169; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)

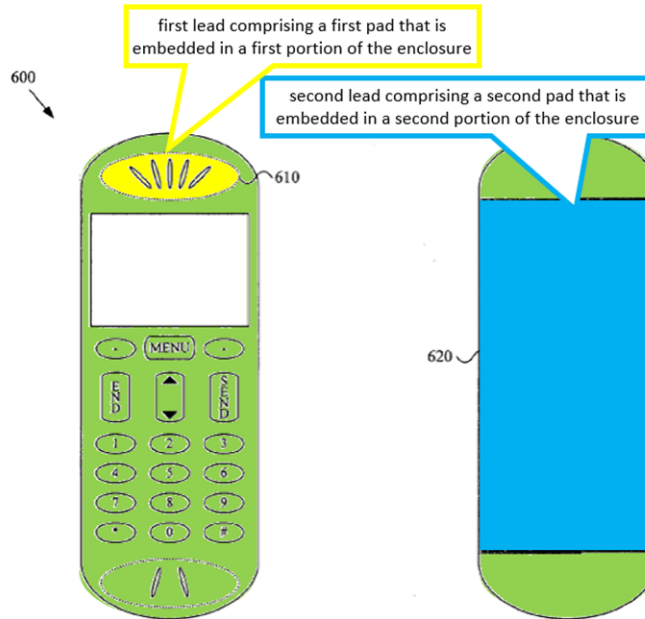
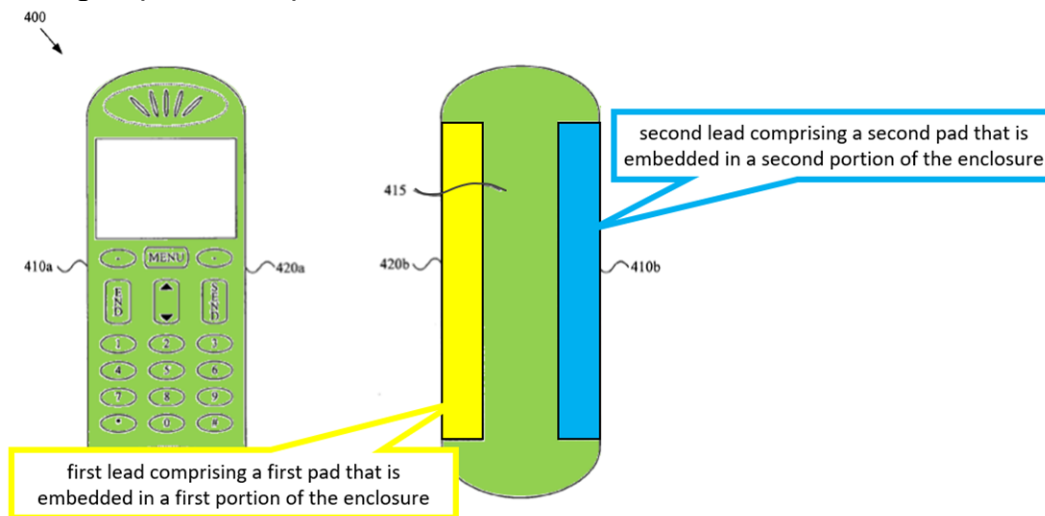


Figure 6 of *Markel* discloses an “audio output portion 610” (i.e., the first portion of the enclosure) and a “main body portion 620” (i.e., the second portion of the enclosure) on opposite sides of the electronic device (*see* Elements [1.c.i], [1.d.i]; Ex. 1005, [0050]; Ex. 1003, ¶166).

Furthermore, in *Markel*’s Figure 4, the “right side portion 420” (which corresponds to the claimed “first portion”) and the “left side portion 410” (which corresponds to the claimed “second portion”) are on opposite sides of the electronic device (Ex. 1005, [0045]; Ex. 1003, ¶167).

Ex. 1005, Fig. 4 (annotated)



Markel further teaches that electrodes “may be positioned such that the one or more electrodes contact a user during normal (or typical) use of the [electronic device].” (Ex. 1005, [0041]; Ex. 1003, ¶168; *see also* Ex. 1005, [0043]). A POSITA would have a reasonable expectation of success in combining the electrode placement of Figure 4 with the electrode structure described above because Markel discloses that “electrodes may be *incorporated into the [electronic device] in any of a variety of manners*” and “in any of a *variety of locations*” (Ex. 1005, [0035], [0045]; Ex. 1003, ¶168). A POSITA would have implemented the electrode placement of Figure 4 because it would have allowed a user to view the display while contacting the electronic device with their left and right hands, allowing the user to observe a real-time ECG measurement (Ex. 1003, ¶168).

3. Claim 3

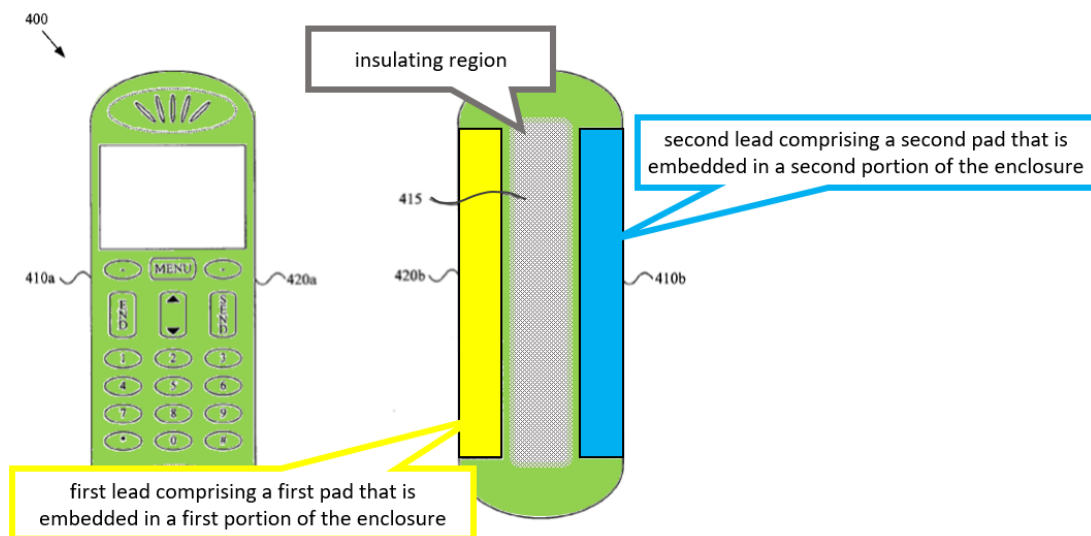
i. [3.pre]: *The electronic device of claim 1,*

Markel renders obvious [3.pre] (see Claim 1; Ex. 1003, ¶¶170-171).

ii. [3.a]: *wherein the first portion is electrically isolated from the second portion.*

Markel renders obvious [3.a] (Ex. 1003, ¶¶172-176; see also Ex. 1005, Fig. 4 annotated).

Ex. 1005, Fig. 4 (annotated)



A POSITA would have understood that the “second electrode” in *Markel*’s Figure 4 is embedded in the “right side portion 420” of the electronic device (i.e., the first portion of the enclosure) (see [1.c.i]; Ex. 1003, ¶¶173). A POSITA would have understood that the “first electrode” in *Markel*’s Figure 4 is embedded in the “left side portion 410” of the electronic device (i.e., the second portion of the enclosure) (see [1.d.i]; Ex. 1003, ¶¶173).

Markel further teaches that an “*insulating region 415* may *separate* regions 410*b* and 420*b*” of the electronic device, electrically isolating “regions 410*b* and 420*b*” (Ex. 1005, [0045]; Ex. 1003, ¶174).

A POSITA would have known that *Markel*’s Figure 6 embodiment would similarly include an “insulating region” to electrically isolate the “audio output portion 610” from the “main body portion 620” (Ex. 1003, ¶175). A POSITA would have known that in order to measure the potential difference as part of an ECG, *Markel*’s electrodes would be electrically isolated as taught in *Markel*’s Figure 4 (Ex. 1003, ¶175).

4. Claim 4

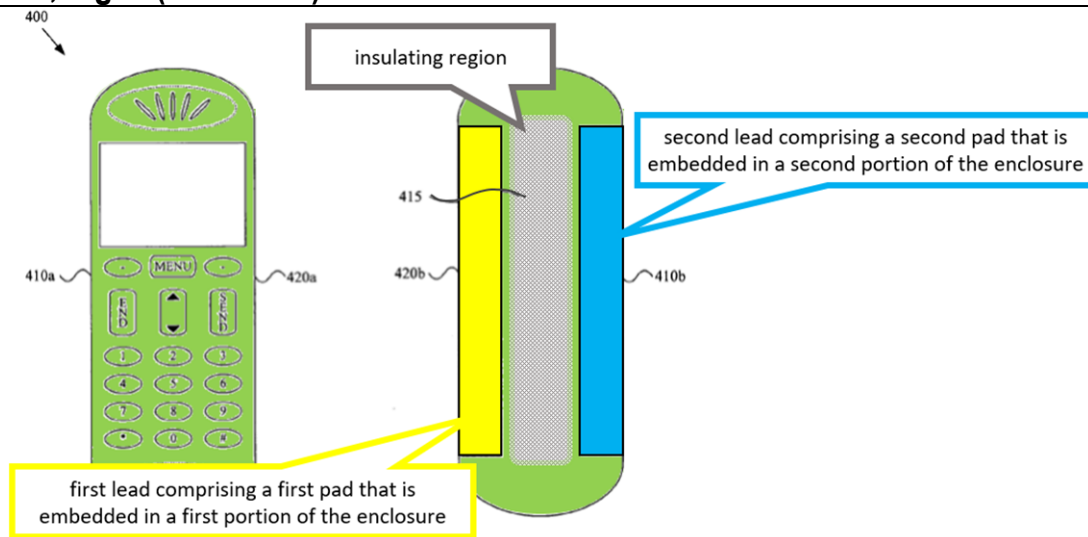
i. [4.pre]: The electronic device of claim 1,

Markel renders obvious [4.pre] (see Claim 1; Ex. 1003, ¶177-178).

ii. [4.a]: wherein the first portion is separated from the second portion by a third portion of the enclosure;

Markel renders obvious [4.a] (Ex. 1003, ¶¶179-181; see also Ex. 1005, Fig. 4 annotated).

Ex. 1005, Fig. 4 (annotated)



The “insulating region” taught by *Markel* corresponds to the claimed “third portion of the enclosure” (*see* Elements [1.c.i]-[1.c.iii], [1.d.i]-[1.d.ii], Claim 3; Ex. 1003, ¶180).

- iii. ***[4.b]: at least the third portion is constructed from a material having a first conductivity; and***
- iv. ***[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.***

Markel renders obvious [4.b] and [4.c] (Ex. 1003, ¶¶182-184).

Markel’s “isolating region” corresponds to the claimed “third portion of the enclosure” (*see* Element [4.a]; Ex. 1003, ¶183). Moreover, a POSITA would have known to use a material having relatively less conductivity (Ex. 1003, ¶183).

5. Claim 5

- i. ***[5.pre]: The electronic device of claim 4, wherein:***

Markel renders obvious [5.pre] (*see* Claim 4; Ex. 1003, ¶185-186).

ii. [5.a]: the material having the first conductivity comprises one of aluminum or steel; and

Markel renders obvious [5.a] (Ex. 1003, ¶¶187-190).

Markel discloses an “insulating region,” which corresponds to the claimed “third portion” of claim 4, and a POSITA would have known to use a material having relatively less conductivity (*see* Claim 4; Ex. 1003, ¶188).

A POSITA would further have known that aluminum and steel were used in the construction of mobile devices and were examples of materials having relatively less conductivity (Ex. 1003, ¶189; *see, e.g.*, Ex. 1017 (“Hobson”), 6:55-60). A POSITA would have known that stainless steel and aluminum have relatively lower conductivity than silver base compounds (*see* [5.b] below) (Ex. 1003, ¶189).

iii. [5.b]: the second pad is constructed from a silver base compound.

Markel renders obvious [5.b] (Ex. 1003, ¶¶191-193).

Markel discloses a “first electrode” comprising a second pad, which corresponds to the claimed “second pad” (*see* [1.d.ii]; Ex. 1003, ¶192). A POSITA would have known electrodes “generally [comprise] pads containing conductive material, such as silver chloride” (Ex. 1011 (“*Sujdak*”), 1:30-31; Ex. 1003, ¶192; *see also* Ex. 1012 (“*Geddes*”), 3:34-38). Consequently, a POSITA would have at once envisaged that the second pad would have been comprised of a silver base compound

(Ex. 1003, ¶192). *See Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015).

6. Claim 6

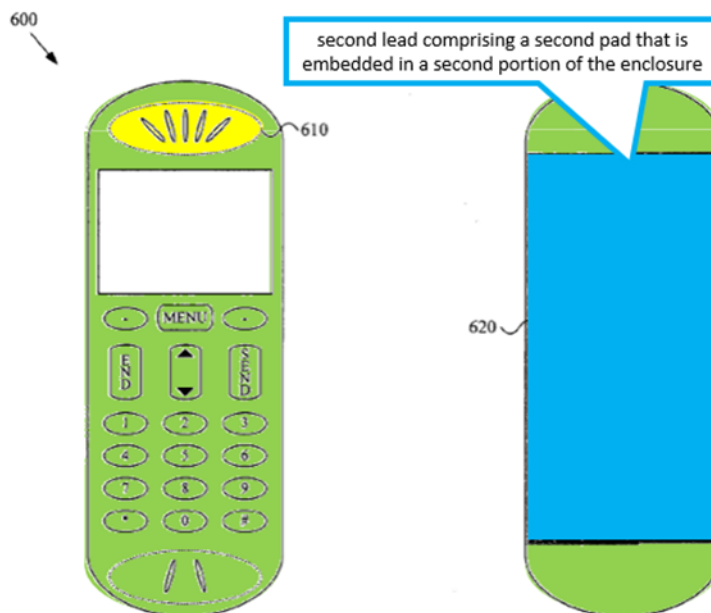
i. [6.pre]: The electronic device of claim 4, wherein:

Markel renders obvious [6.pre] (*see* Claim 4; Ex. 1003, ¶194-195).

ii. [6.a]: the exterior surface of the enclosure further comprises an exterior surface of the second portion;

Markel renders obvious [6.a] (Ex. 1003, ¶¶196-198; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



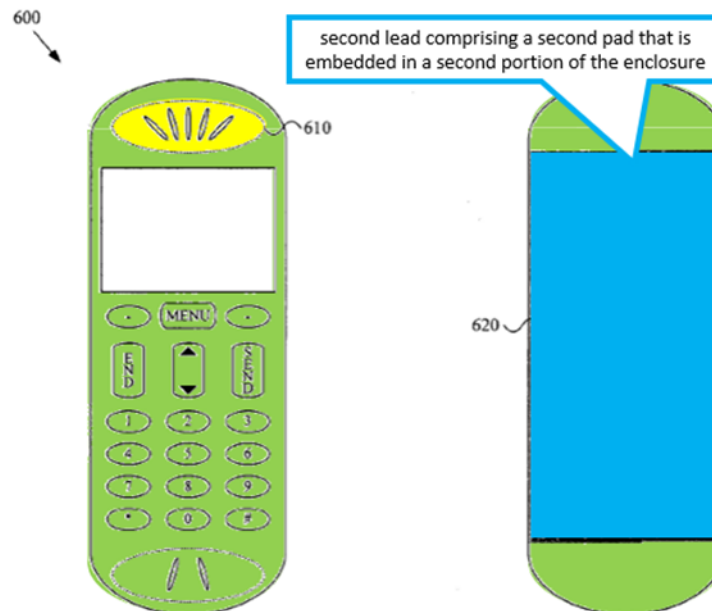
A POSITA would have understood that *Markel*’s “first electrode” comprises a second pad that is embedded in the “main body portion 620” (i.e., a second portion of the enclosure) (*see* [1.d.i]; Ex. 1003, ¶197). Thus, a POSITA would have

understood that the exterior surface of the “main body portion 620” corresponds to the claimed “exterior surface of the second portion” (Ex. 1003, ¶197).

- iii. ***[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;***

Markel renders obvious [6.b] (Ex. 1003, ¶¶199-204; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel teaches that the second pad of the “first electrode” is configured to detect the second electrical signal of a cardiac signal via the user’s contact with the exterior surface of the second portion for the same reasons as discussed with regard to the first pad of the “second electrode” in [1.c.iii] (*see* [1.c.iii]; Ex. 1003, ¶200-204).

- iv. ***[6.c]: the second pad is positioned from the exterior surface of the second portion by a thickness of the second portion;***

Markel renders obvious [6.c] (Ex. 1003, ¶¶205-207).

A POSITA would have placed the electrode pad *underneath* the conductive plastic of the “main body portion 620” positioned from the exterior surface by a thickness of the “main body portion 620” so that the electrode pad is conductively coupled to the user via the conductive plastic of the “main body portion 620” (*see* [6.b]; Ex. 1003, ¶206).

- v. ***[6.d]: at least the thickness of the second portion is constructed from material having a second conductivity; and***
- vi. ***[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.***

Markel renders obvious [6.d] and [6.e] (Ex. 1003, ¶¶208-211).

Markel teaches that “various conductive plastics (e.g., graphite-impregnated plastic or the like) may provide **sufficient conductivity** for an electrode to perform adequately” (Ex. 1005, [0037]; Ex. 1003, ¶209). But, *Markel* also renders obvious an “insulating region” to electrically isolate the “audio output portion 610” from the “main body portion 620” (*see* Claim 3; Ex. 1003, ¶209).

A POSITA would have known that in order to measure the potential difference as part of an ECG, *Markel*’s electrodes would be electrically isolated as taught in

Figure 4 (Ex. 1003, ¶210). Consequently, a POSITA would have known to use a material with a conductivity sufficient to transmit a signal over a distance of the thickness of the second portion to the second pad but insufficient to transmit the second electrical signal a distance larger than the thickness of the second portion (Ex. 1003, ¶210).

7. Claim 7

i. [7.pre]: The electronic device of claim 6,

Markel renders obvious [7.pre] (see Claim 6; Ex. 1003, ¶212-213).

ii. [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.

Markel renders obvious [7.a] (Ex. 1003, ¶¶214-218).

The language of [6.c] defines “the second conductivity” as being “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.” Thus, the plain and ordinary meaning of [7.a] requires positioning the first pad and the second pad “at a distance larger than” the distance that the second electrical signal can be transmitted (e.g., the first pad and the second pad “at a distance” that creates electrical isolation) (Ex. 1003, ¶216).

A POSITA would have known that in order to measure the potential difference as part of an ECG, *Markel*’s electrodes would be electrically isolated as taught in

Markel's Figure 4 (Ex. 1003, ¶217). Consequently, a POSITA would have positioned *Markel's* “second electrode” and “first electrode” apart from one another at a distance larger than the thickness of the second portion by material having the second conductivity (Ex. 1003, ¶217).

8. Claim 8

i. [8.pre]: *The electronic device of claim 1, wherein:*

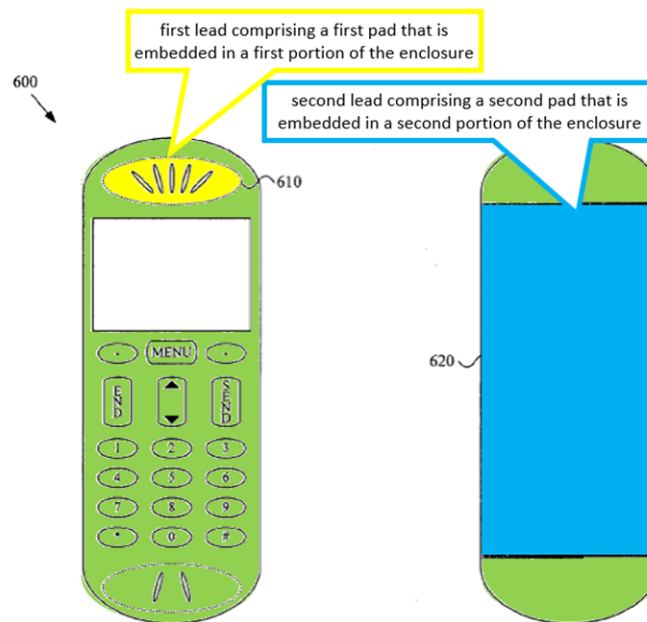
Markel renders obvious [8.pre] (see Claim 1; Ex. 1003, ¶219-220).

ii. [8.a]: *the enclosure further comprises at least one pocket underneath the exterior surface of the enclosure; and*

iii. [8.b]: *at least one of the first pad and the second pad is placed within the at least one pocket.*

Markel renders obvious [8.a] and [8.b] (Ex. 1003, ¶¶221-224; see also Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



A POSITA would have understood that *Markel*'s "second electrode" comprises a first pad that is embedded in the "audio output portion 610" (i.e., a first portion of the enclosure) (*see* [1.c.i]; Ex. 1003, ¶222). Furthermore, *Markel* discloses an exterior surface of the "audio output portion 610," which corresponds to the claimed "exterior surface of the first portion" of the enclosure (*see* [1.c.ii]; Ex. 1003, ¶222).

Markel teaches that an electrode "may be ***substantially concealed (or hidden)*** ***from a user . . . with little or no visible indication*** of the electrode presence" (Ex. 1005, [0040]; Ex. 1003, ¶223). A POSITA would have understood that in order to place a pad under "audio output portion 610," the electronic device would require a pocket underneath the exterior surface of the enclosure (Ex. 1003, ¶223). That

would allow for placement of the first pad of *Markel*'s "second electrode" within the pocket such that the "first pad" is "conductively coupled" to the user through the exterior surface of the "audio output portion" (*see* Ex. 1005, [0035]; Ex. 1003, ¶223). The pocket under "audio output portion 610" corresponds to the "at least one pocket underneath the exterior surface of the enclosure" (Ex. 1003, ¶223).

9. Claim 9

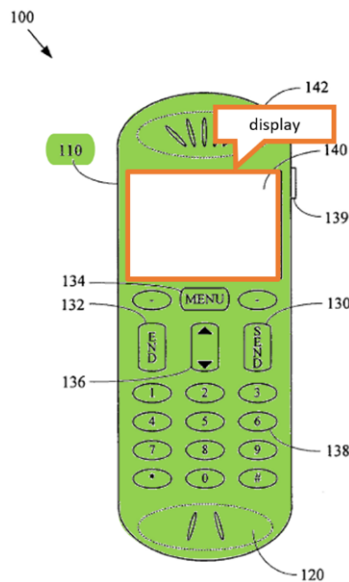
- i. [9.pre]: The electronic device of claim 1, further comprising:**

Markel renders obvious [9.pre] (*see* Claim 1; Ex. 1003, ¶225-226).

- ii. [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;**

Markel renders obvious [9.a] (Ex. 1003, ¶¶227-229; *see also* Ex. 1005, Fig. 1 annotated).

Ex. 1005, Fig. 1 (annotated)

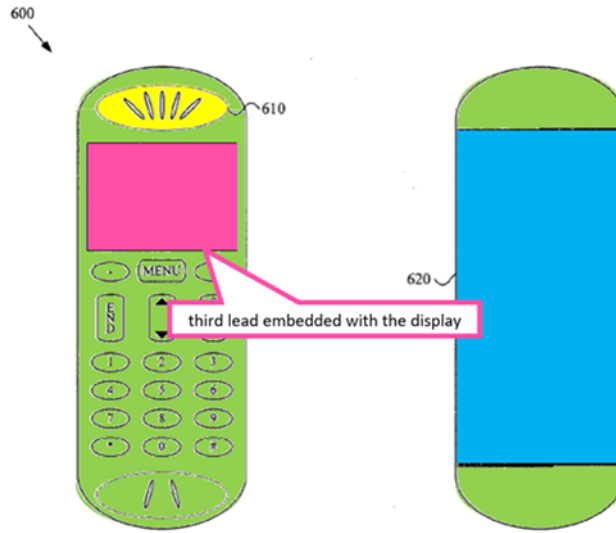


Markel discloses a “main body portion 110,” which corresponds to the claimed “enclosure” (*see* [1.a]; Ex. 1003, ¶228). *Markel* discloses that the electronic device “may also comprise . . . a **display 140 (which may also function as a touch screen input feature)**” (Ex. 1005, [0034]). Figure 1 of *Markel* discloses a “display 140” (orange) wherein the “main body portion 110” supports the “display 140,” and wherein at least a portion of the exterior surface of the electronic device is behind the “display 140” (Ex. 1003, ¶228).

- iii. ***[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.***

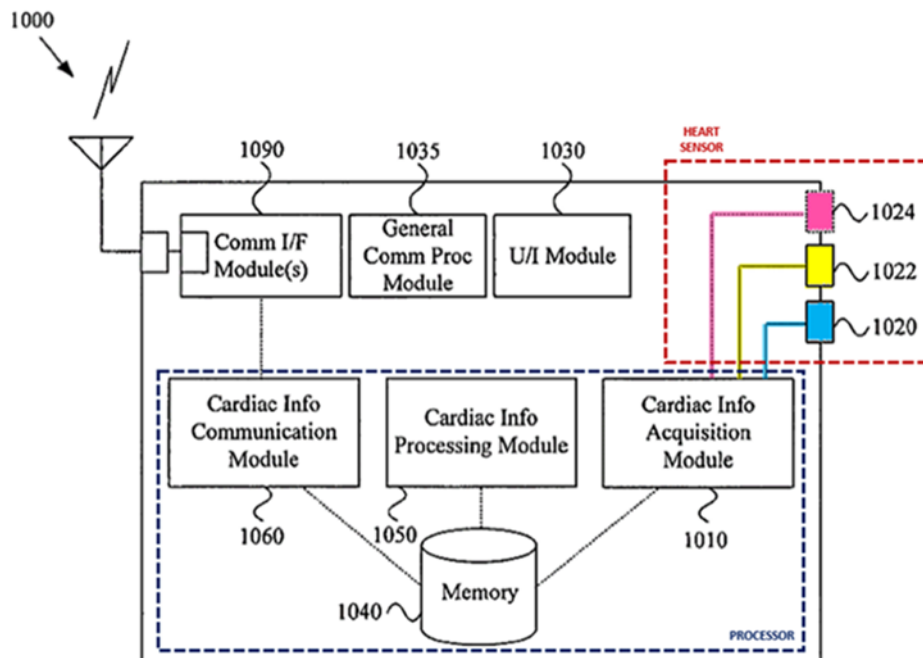
Markel renders obvious [9.b] (Ex. 1003, ¶¶230-235; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



First, *Markel* renders obvious a third lead. Markel discloses components that correspond to the claimed “a heart sensor configured to detect the user’s cardiac signal” (see [1.b]; Ex. 1003, ¶231).

Ex. 1005, Fig. 10 (annotated)



One of those components is a “third or Nth electrode 1024” and associated wiring (pink), which correspond to the claimed “third lead” (Ex. 1005, [0058]; Ex. 1003, ¶232; *see also* Ex. 1003, [0051]). *Markel* discloses that the third electrode is “coupled” to the cardiac information acquisition module (Ex. 1005, [0059]; Ex. 1003, ¶232). A POSITA would thus have understood that *Markel*’s “third or Nth electrode” and associated wiring is a “third lead” (Ex. 1003, ¶232).

Second, *Markel* renders obvious that the third lead is embedded in the display. *Markel* discloses 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]; Ex. 1003, ¶233). A POSITA would have known that an electrode pad that is “integrated into a touch screen” is *embedded* in “display 140” (Ex. 1003, ¶233). A POSITA would thus have understood that *Markel*’s “third or Nth electrode” may be embedded with the “display 140” (Ex. 1003, ¶233).

Third, *Markel* renders obvious that the third lead is configured to detect a third electrical signal of a cardiac signal via the user’s contact with at least one of the third lead and the display (Ex. 1003, ¶234). *Markel* discloses that electrodes “*detect cardiac activity of a user* that is *conductively coupled to the electrodes (e.g., by touching the electrodes)*” (Ex. 1005, [0035]; Ex. 1003, ¶234). *Markel* also discloses that “electrodes contact a user during normal (or typical) use of the [electronic

device].” (Ex. 1005, [0041]; Ex. 1003, ¶234). Consequently, *Markel* discloses that a user may contact the “third or Nth electrode” during normal use of the “display 140 (which may also function as a touch screen input feature)” (Ex. 1003, ¶234).

10. Claim 10

i. [10.pre]: The electronic device of claim 1,

Markel renders obvious [10.pre] (*see* Claim 1; Ex. 1003, ¶236-237).

ii. [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.

Markel renders obvious [10.a] for substantially the same reasons that it discloses [6.a] and [6.b] (*see* [6.a], [6.b]; Ex. 1003, ¶238-240).

11. Claim 11

i. [11.pre]: The electronic device of claim 1,

Markel renders obvious [11.pre] (*see* Claim 1; Ex. 1003, ¶241-242).

ii. [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.

Markel renders obvious [11.a] (Ex. 1003, ¶¶243-245).

Markel discloses a “first electrode” coupled to a cardiac acquisition module, which corresponds to the claimed “second lead comprising a second pad” (*see* [1.d.i]; Ex. 1003, ¶244). Furthermore, *Markel* discloses that the second pad may be configured to detect a cardiac signal via direct contact with the user’s skin (*see*

[1.d.ii]; Ex. 1003, ¶244). Consequently, the second lead is configured to detect the second electrical signal of a cardiac signal via the user's contact with the second lead (Ex. 1003, ¶244).

12. Claim 12

i. [12.pre]: The electronic device of claim 1,

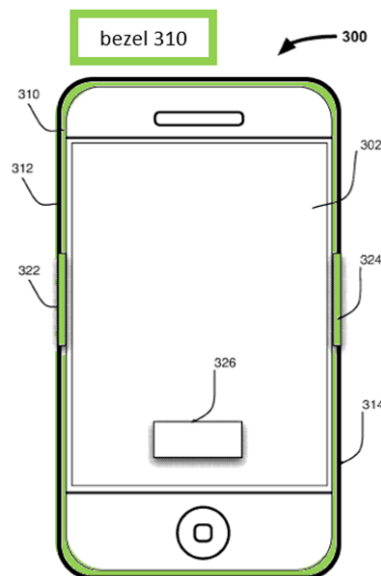
Markel renders obvious [12.pre] (*see* Claim 1; Ex. 1003, ¶246).

ii. [12.a]: wherein the first portion of the enclosure is a bezel.

Markel renders obvious [12.a].

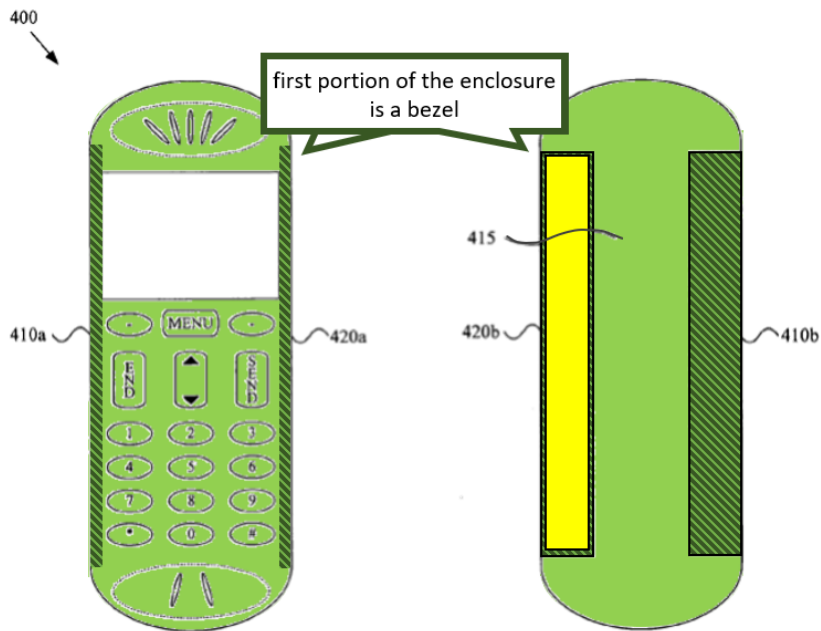
A POSITA would have understood the plain and ordinary meaning of “bezel” to include a rim that encircles an electronic device (Ex. 1003, ¶249; *see also* Ex. 1001, Fig. 3 annotated).

Ex. 1001, Fig. 3 (annotated)



Markel renders obvious wherein the first portion of the enclosure is a bezel (Ex. 1003, ¶250). *Markel*'s Figure 4 discloses a "second electrode" comprising a first pad that is embedded in the "right side portion 420" of the electronic device (i.e., the first portion of the enclosure) (*see* [1.c.i]; Ex. 1003, ¶250-251). According to Figure 4 of *Markel*, the "side portions" (dark green, below) wrap around the front and back of the device, like a bezel (Ex. 1003, ¶251). Both the front and back view of *Markel*'s electronic device have labels corresponding to the "right side portion 420" (Ex. 1005, Fig. 4; Ex. 1003, ¶251). As illustrated below, furthermore, the second electrode extends to the rim that encircles *Markel*'s electronic device (Ex. 1003, ¶251). *Markel* also discloses an electrode "disposed in a ***border*** of the display" (Ex. 1005, [0044]; Ex. 1003, ¶251). A POSITA would thus have understood that the first pad of *Markel*'s "second electrode" is embedded in 420*b* (i.e., the "first portion of the enclosure") which includes the "bezel" (Ex. 1003, ¶251).

Ex. 1005, Fig. 4 (annotated)



To the extent that *Markel*'s Figure 4 is not found to disclose that the “first portion of the enclosure” includes the “bezel,” this would have been a trivial modification well-within the general knowledge of a POSITA (Ex. 1003, ¶252). *Markel* discloses an electrode “disposed on a video display device 140 (e.g., a ***border of the display*** or integrated into a touch screen)” (Ex. 1005, [0044]; Ex. 1003, ¶252). A POSITA would have extended the edges of *Markel*'s “second electrode” in 420b so that they reached the border of the “display 140” (i.e., bezel) because this would have created additional contact area to enhance the ability of the “second electrode” to detect a signal from a user's hand and make it more likely that a user would interact with the second electrode so as to have a successful test (Ex. 1003, ¶252).

13. Claim 13

i. [13.pre]: *The electronic device of claim 1,*

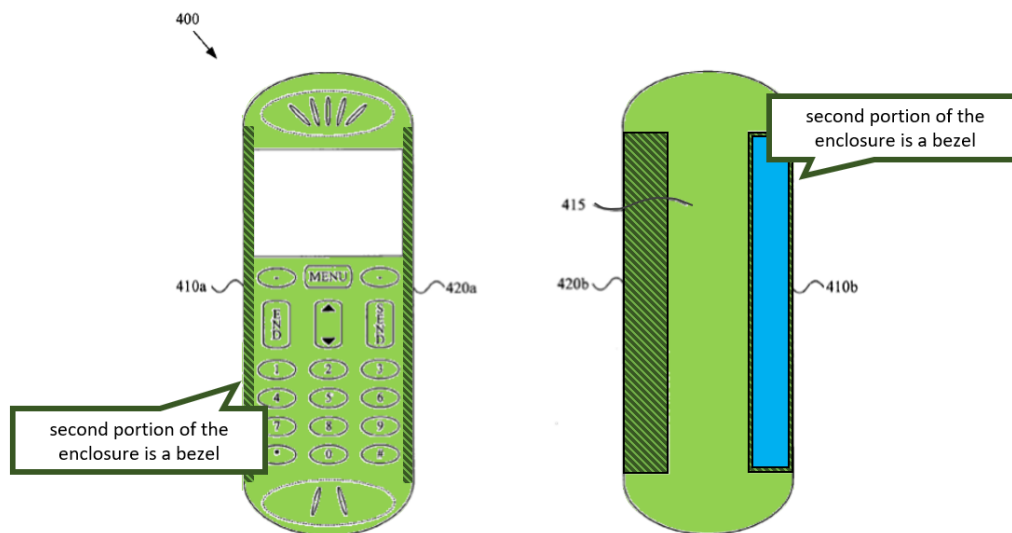
Markel renders obvious [13.pre] (see Claim 1; Ex. 1003, ¶254).

ii. [13.a]: *wherein the second portion of the enclosure is a bezel.*

Markel renders obvious [13.a].

Markel's Figure 4 discloses a “first electrode” comprising a second pad that is embedded in “left side portion 410” of the enclosure (i.e., the second portion of the enclosure) (Ex. 1003, ¶258). *Markel* renders obvious wherein the second portion of the enclosure is a bezel for the same reasons as discussed with regard to the “right side portion 420” in [12.a] (see [12.a]; Ex. 1003, ¶¶258-260).

Ex. 1005, Fig. 4 (annotated)



14. Claim 14

i. [14.pre]: The electronic device of claim 1,

Markel renders obvious [14.pre] (*see* Claim 1; Ex. 1003, ¶262-263).

ii. [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.

Markel renders obvious [14.a] (Ex. 1003, ¶264-266).

A POSITA would have understood that *Markel*'s "second electrode" comprises a first pad that is embedded in the "audio output portion 610" (i.e., a first portion of the enclosure) (*see* [1.c.i]; Ex. 1003, ¶265). A POSITA would have placed the pad of the "second electrode" underneath the conductive plastic of the "audio output portion 610" so that the electrode pad is conductively coupled to the user via the conductive plastic of the "audio output portion 610" (*see* [1.c.i]; Ex. 1003, ¶265). Thus, in order to detect a user's cardiac activity through a molded component of the electronic device, a POSITA would have known to position the first pad of the "second electrode" inside the "main body portion" on an interior surface of the "audio output portion" so as to conductively couple the first pad, the "audio output portion," and the user's skin (*see* Ex. 1005, [0035]; Ex. 1003, ¶265).

15. Claim 15

- i. ***[15.pre]: An electronic device for detecting a user's cardiac signal, comprising:***

Markel renders obvious [15.pre] for the same reasons it renders obvious [1.pre] (*see* [1.pre]; Ex. 1003, ¶¶267-268).

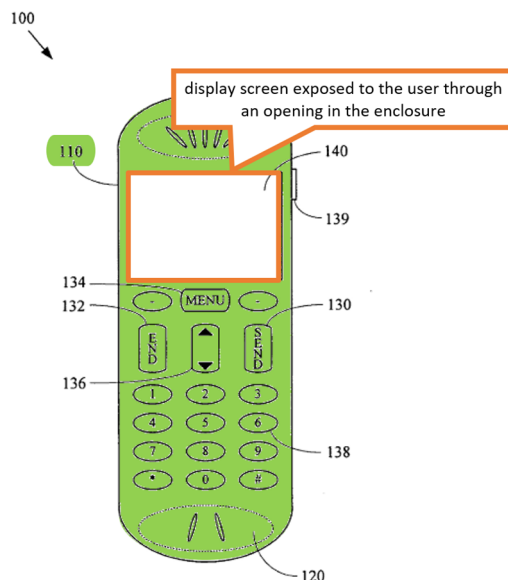
- ii. ***[15.a]: an enclosure;***

Markel renders obvious [15.a] for the same reasons it renders obvious [1.a] (*see* [1.a]; Ex. 1003, ¶¶269-270).

- iii. ***[15.b]: a display screen exposed to the user through an opening in the enclosure;***

Markel renders obvious [15.b] (Ex. 1003, ¶¶271-273; *see also* Ex. 1005, Fig. 1 annotated).

Ex. 1005, Fig. 1 (annotated)



Markel discloses a “main body portion 110,” which corresponds to the claimed “enclosure” (see [15.a]; Ex. 1003, ¶272). *Markel* further discloses that the electronic device “may also comprise . . . a ***display 140 (which may also function as a touch screen input feature)***” (Ex. 1005, [0034]; Ex. 1003, ¶272). Figure 1 of *Markel* discloses a “display 140” (orange) exposed to the user through an opening in the enclosure (Ex. 1003, ¶272).

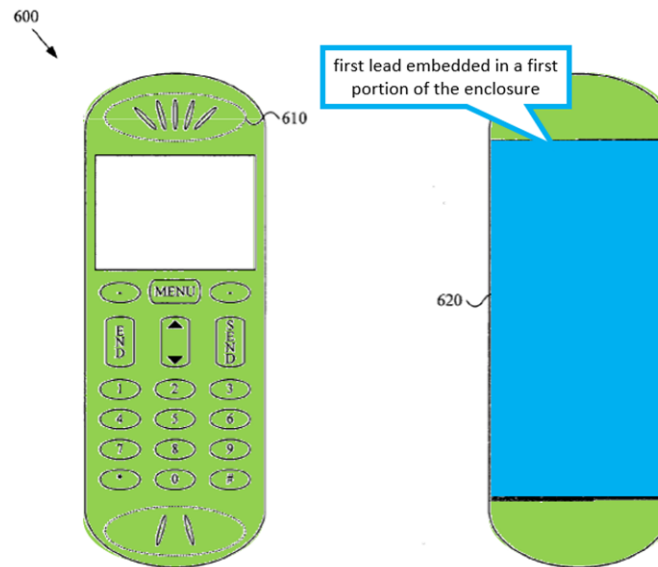
iv. [15.c]: a heart sensor configured to detect the user’s cardiac signal,

Markel renders obvious [15.c] for the same reasons it renders obvious [1.b] (see [1.b]; Ex. 1003, ¶274-275).

v. [15.d.i]: the heart sensor comprising: a first lead embedded in a first portion of the enclosure of the electronic device,

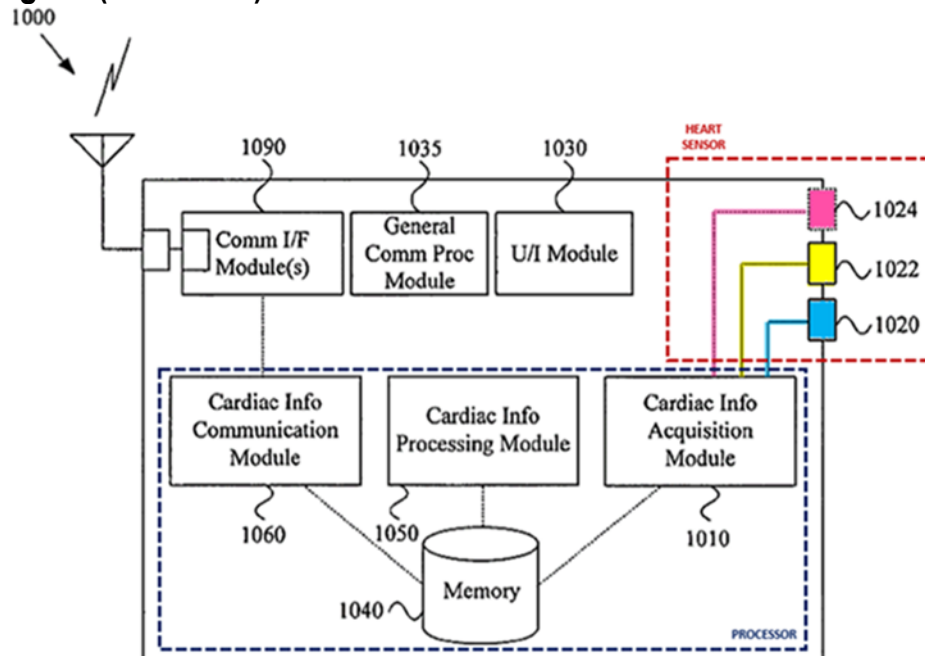
Markel renders obvious [15.d.i] (Ex. 1003, ¶¶276-282; see also Ex. 1005, Fig. 6 annotated).

1005, Fig. 6 (annotated)



Markel discloses components that correspond to the claimed “a heart sensor configured to detect the user’s cardiac signal” (see [15.c]; Ex. 1003, ¶278).

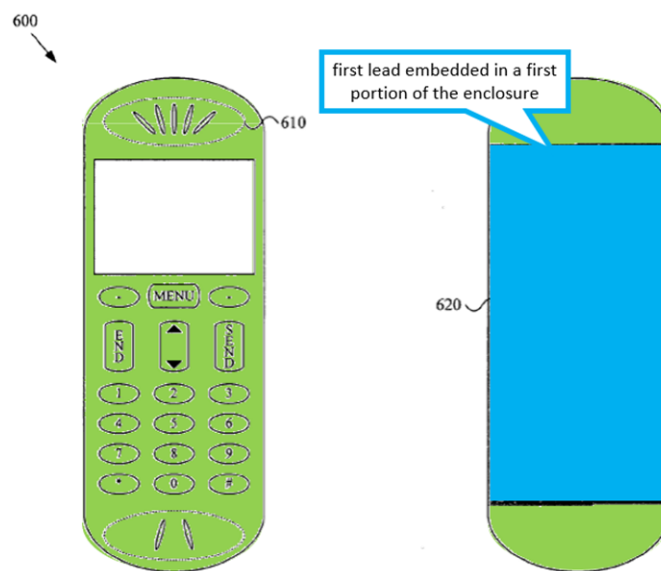
Ex. 1005, Fig. 10 (annotated)



One of those components is a “first electrode 1020” and associated wiring (blue), which correspond to the claimed “first lead” (Ex. 1005, [0058]; Ex. 1003, ¶279). *Markel* discloses that the first electrode is “coupled” to the cardiac acquisition module (Ex. 1005, [0059]; Ex. 1003, ¶279). A POSITA would thus have understood that *Markel*’s “first electrode” and associated wiring is a “first lead” (Ex. 1003, ¶279).

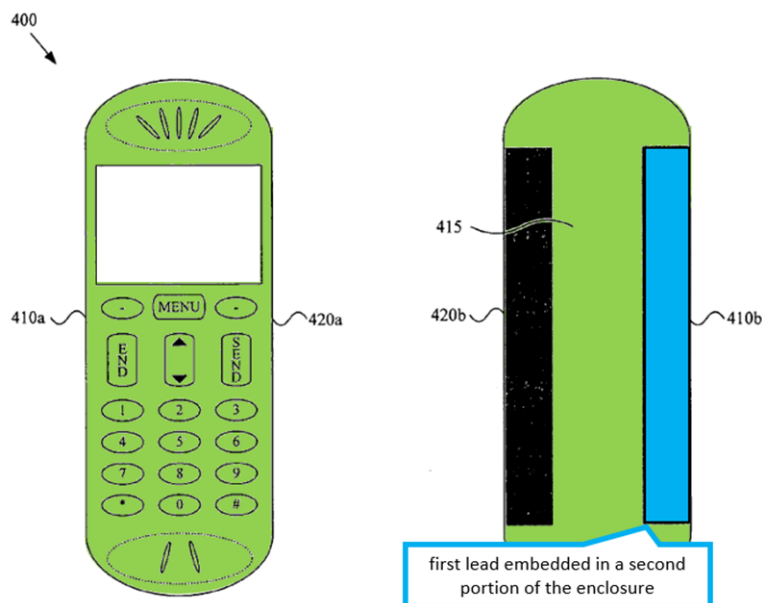
In *Markel*’s Figure 6 configuration, the “first electrode” is “disposed on the main body portion 620 (e.g., *molded into the main body portion 620 or positioned on the main body portion 620*)” (Ex. 1005, [0050]; Ex. 1003, ¶280). A POSITA would thus have understood that *Markel*’s “first electrode” is “molded into the main body portion 620” (i.e., embedded in a first portion of the enclosure) (Ex. 1003, ¶280).

Ex. 1005, Fig. 6 (annotated)



Additionally, *Markel* discloses a configuration in Figure 4 wherein the “first electrode” is “placed on the left side portion 410 (e.g., *placed on or molded into region 410b*)” (Ex. 1005, [0045]; Ex. 1003, ¶281). A POSITA would thus have understood that Figure 4’s “first electrode” is embedded into the “left side portion 410,” (i.e., a second portion of the enclosure) in the Figure 4 configuration (Ex. 1003, ¶281).

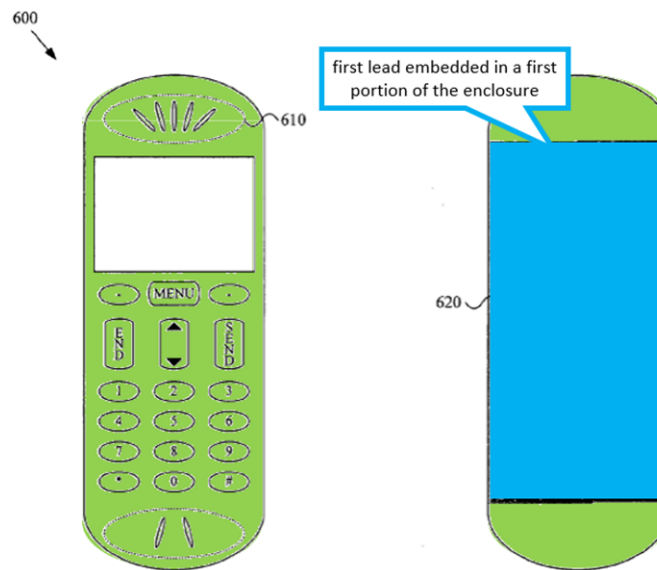
Ex. 1005, Fig. 4 (annotated)



- vi. *[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*

Markel renders obvious [15.d.ii] (Ex. 1003, ¶283-292; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel discloses a “main body portion 110” which corresponds to the claimed “enclosure” (*see* [15.a]; Ex. 1003, ¶284). Furthermore, a POSITA would have understood that *Markel*’s “first electrode” is embedded in the “main body portion 620” (i.e., a first portion of the enclosure) (*see* [15.d.i]; Ex. 1003, ¶284).

First, *Markel* renders obvious that the “first electrode” is configured to detect a first electrical signal of a cardiac signal via the user’s contact with the first lead for

the same reasons as discussed with regard to the “first electrode” in [1.d.i] (*see* [1.d.i]; Ex. 1003, ¶286).

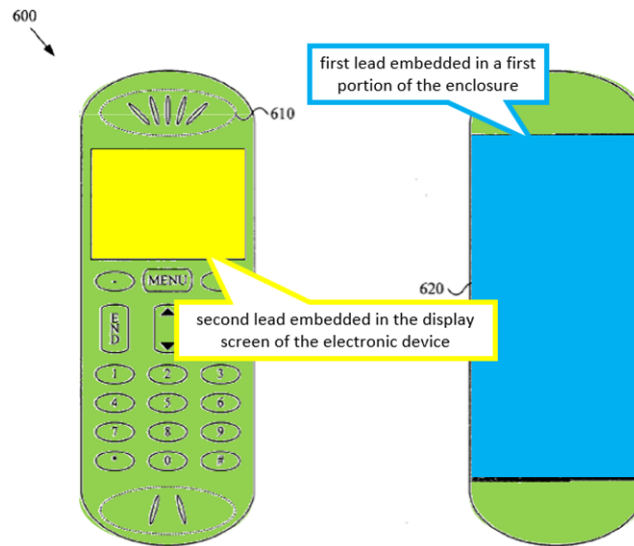
Second, and in the alternative, *Markel* renders obvious that the “first electrode” is configured to detect a second electrical signal of a cardiac signal via the user’s contact with the first portion of the enclosure of the electronic device for the same reasons as discussed with regard to the “first electrode” in [1.d.ii] (*see* [1.d.ii]; Ex. 1003, ¶287-290).

A POSITA would have understood that *Markel*’s “first electrode” in Figure 4 is embedded in the “left side portion 410” (*see* [15.d.i]; Ex. 1003, ¶291). Similarly, a POSITA would have placed the pad of the “first electrode” in *Markel*’s Figure 4 underneath the conductive plastic of the “left side portion 410” (Ex. 1003, ¶291). In that configuration, that second pad would have been configured to detect a second electrical signal of a cardiac signal via the user’s skin’s contact with the exterior surface of the electronic device’s “left side portion” (i.e., the second portion of the enclosure) (Ex. 1003, ¶291).

vii. [15.e.i]: the heart sensor comprising: . . . a second lead embedded in the display screen of the electronic device,

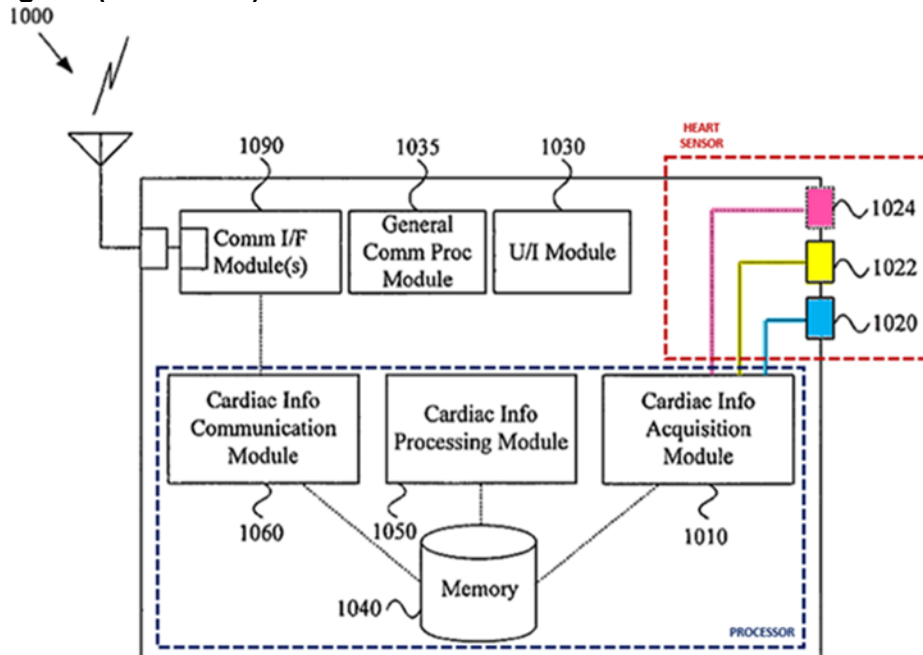
Markel renders obvious [15.e.i] (Ex. 1003, ¶¶293-298; *see also* Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



Markel discloses components that correspond to the claimed “a heart sensor configured to detect the user’s cardiac signal” (see [15.c]; Ex. 1003, ¶294).

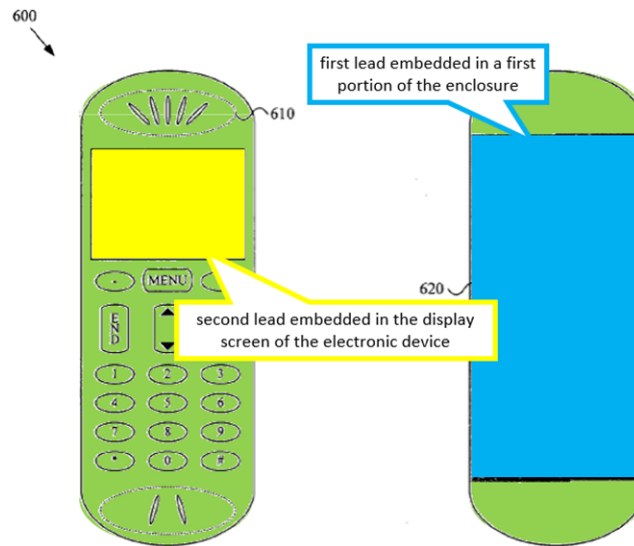
Ex. 1005, Fig. 10 (annotated)



One of those components is a “second electrode 1022” and associated wiring (yellow), which corresponds to the claimed “second lead” (Ex. 1005, [0058]; Ex. 1003, ¶295). *Markel* discloses that the second electrode is “coupled” to the cardiac information acquisition module (Ex. 1005, [0059]; Ex. 1003, ¶295). A POSITA would thus have understood that *Markel*’s “second electrode” and associated wiring is a “second lead” (Ex. 1003, ¶295).

Markel discloses “a display 140 (*which may also function as a touch screen input feature*),” which corresponds to the claimed display (see Element [15.b]; Ex. 1003, ¶296). *Markel* discloses 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]; Ex. 1003, ¶296). A POSITA would have known that an electrode pad that is “integrated into a touch screen” is embedded in “display 140” (Ex. 1003, ¶296). A POSITA would thus have understood that *Markel*’s “second electrode” may be embedded in the “display 140” (Ex. 1003, ¶296).

Ex. 1005, Fig. 6 (annotated)

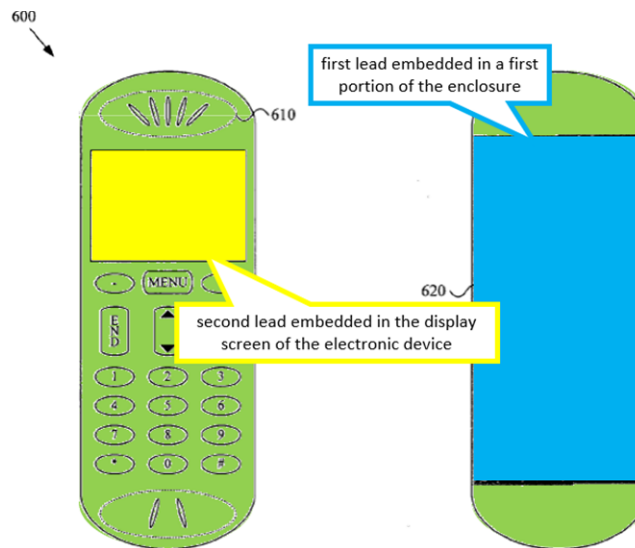


A POSITA would have implemented the electrode placement embedded in the display because it would have allowed a user to use the touch screen with one hand while contacting the electronic device with their other hand, allowing the device to record a real-time ECG measurement (Ex. 1003, ¶297). Because *Markel* teaches that electrodes “may be disposed in any of a variety of locations” (Ex. 1005, [0045]), a POSITA would be motivated to combine *Markel*’s teaching of an electrode embedded in “display 140” with the placement of the first electrode in the either of the Figure 4 and Figure 6 configurations (Ex. 1003, ¶297).

viii. [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

Markel renders obvious [15.e.ii] (Ex. 1003, ¶299-304; see also Ex. 1005, Fig. 6 annotated).

Ex. 1005, Fig. 6 (annotated)



First, *Markel* renders obvious that “second electrode” is configured to detect a second electrical signal of a cardiac signal via the user’s contact with the second lead (Ex. 1003, ¶302). *Markel* discloses that electrodes “*detect cardiac activity of a user that is conductively coupled to the electrodes (e.g., by touching the electrodes)*” (Ex. 1005, [0035]; Ex. 1003, ¶302). *Markel* also discloses that “electrodes contact a user during normal (or typical) use of the [electronic device].” (Ex. 1005, [0041]; Ex. 1003, ¶302). *Markel*’s electrodes also “may comprise a metallic surface exposed for *user contact*” (Ex. 1005, [0037]; Ex. 1003, ¶302).

Second, and in the alternative, *Markel* renders obvious that the “second electrode” is configured to detect a second electrical signal of a cardiac signal via the user’s contact with the display screen of the electronic device. *Markel* teaches that the pad of an electrode can be conductively coupled to a user through an

intermediate conductive material (*see* [1.c.iii]; Ex. 1005, [0035]; Ex. 1003, ¶303). *Markel* further teaches that the “second electrode” may be “***integrated into a touch screen***” (Ex. 1005, [0044]; Ex. 1003, ¶303). Consequently, *Markel* renders obvious that the “second electrode” that is “integrated into a touch screen” is configured to detect a second electrical signal of a cardiac signal via the user’s contact with the display screen of the electronic device (Ex. 1003, ¶303).

- ix. ***[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.***

Markel renders obvious [15.f] for the same reasons it renders obvious [1.e] (*see* [1.e]; Ex. 1003, ¶305-306).

16. Claim 16

- i. ***[16.pre]: The electronic device of claim 15,***

Markel renders obvious [16.pre] (*see* Claim 15; Ex. 1003, ¶307-308).

- ii. ***[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.***

Markel renders obvious [16.a] (Ex. 1003, ¶¶309-311).

Markel discloses a “first electrode” embedded in the “main body portion 620,” which corresponds to the claimed “first lead” (*see* [15.d.i]; Ex. 1003, ¶310). Furthermore, the “first electrode” may be configured to detect a cardiac signal via direct contact with the user’s skin (*see* [15.d.ii]; Ex. 1003, ¶310). Consequently, the

first lead is configured to detect the first electrical signal of a signal via the user's contact with the first lead (Ex. 1003, ¶310).

17. Claim 17

i. [17.pre]: The electronic device of claim 16,

Markel renders obvious claim element [17.pre] (see Claim 16; Ex. 1003, ¶312-313).

ii. [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.

Markel renders obvious [17.pre] (Ex. 1003, ¶¶314-316).

Markel discloses a "second electrode" embedded in the "display 140," which corresponds to the claimed "second lead" (see [15.e.i]; Ex. 1003, ¶315). Furthermore, the "second electrode" may be configured to detect a cardiac signal via direct contact with the user's skin (see [15.e.ii]; Ex. 1003, ¶315). Consequently, the second lead is configured to detect the second electrical signal of a cardiac signal via the user's contact with the second lead (Ex. 1003, ¶315).

18. Claim 18

i. [18.pre]: The electronic device of claim 16,

Markel renders obvious [18.pre] (see Claim 16; Ex. 1003, ¶317-318).

ii. [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.

Markel renders obvious [18.a] (Ex. 1003, ¶¶319-321).

Markel discloses a “second electrode” embedded in the “display 140,” which corresponds to the claimed “second lead” (*see* [15.e.i]; Ex. 1003, ¶320). Furthermore, the “second electrode” may be configured to detect a cardiac signal via the user’s contact with “display 140” (*see* [15.e.ii]; Ex. 1003, ¶320). Consequently, the second lead is configured to detect the second electrical signal of a cardiac signal via the user’s contact with the display screen of the electronic device (Ex. 1003, ¶320).

19. Claim 19

i. [19.pre]: The electronic device of claim 15, wherein:

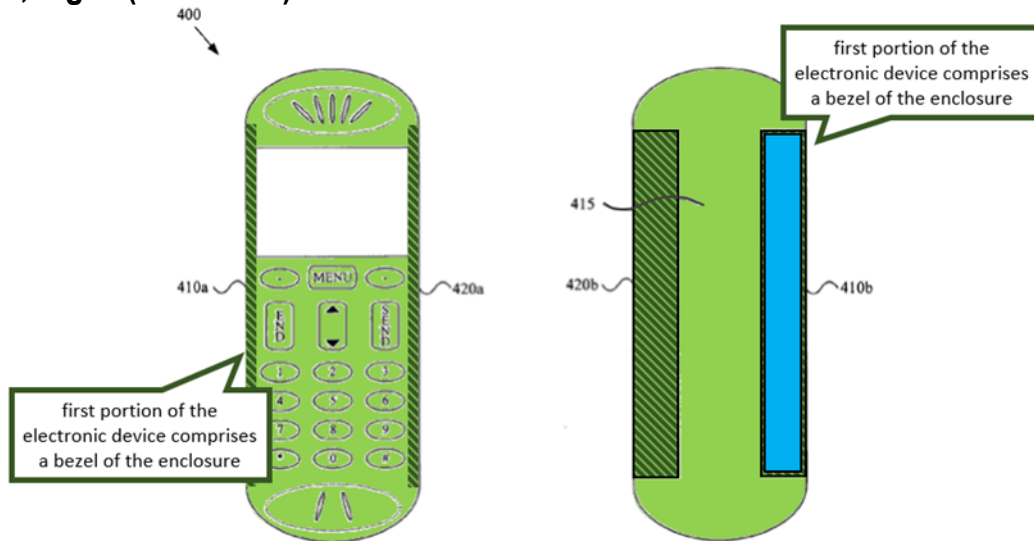
Markel renders obvious [19.pre] (*see* Claim 15; Ex. 1003, ¶322-323).

ii. [19.a]: the first portion of the electronic device comprises a bezel of the enclosure;

Markel renders obvious [19.a] (Ex. 1003, ¶¶324-329).

Markel discloses a “first electrode” coupled to a cardiac acquisition module, which corresponds to the claimed “first lead” (*see* [15.d.i]; Ex. 1003, ¶326). That lead is embedded in a first portion of the enclosure (Ex. 1003, ¶326). *Markel* renders obvious a first portion of the electronic device comprising a bezel of the enclosure for the same reasons as discussed with regard to the “second electrode” and the “second portion” in [12.a] (*see* [12.a]; Ex. 1003, ¶¶326-328).

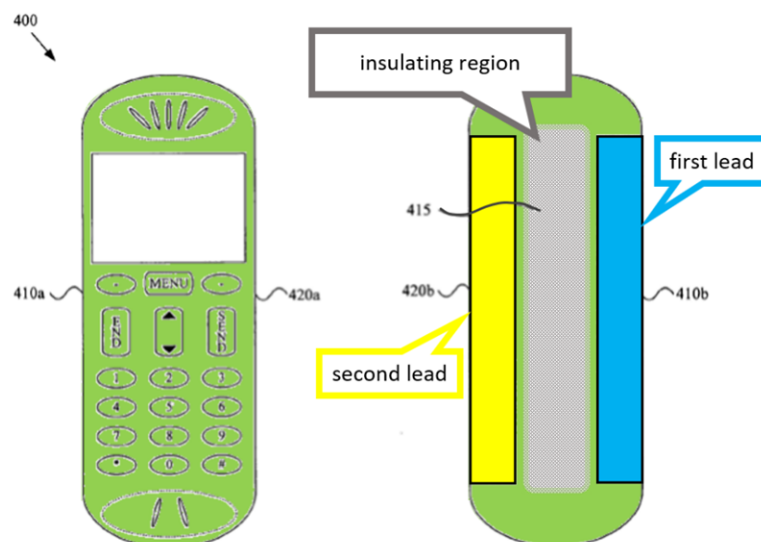
Ex. 1005, Fig. 4 (annotated)



- iii. *[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.*

Markel renders obvious [19.b] (Ex. 1003, ¶¶330-334; see also Ex. 1005, Fig. 4 annotated).

Ex. 1005, Fig. 4 (annotated)



Markel discloses a “first electrode” embedded in a “left side portion 410,” which corresponds to the claimed “bezel” (*see* [19.a]; Ex. 1003, ¶331). Furthermore, *Markel* discloses a “second electrode” embedded in the “display 140,” which corresponds to the claimed “second lead” (*see* [15.e.i]; Ex. 1003, ¶331).

Markel further teaches that its electrodes would be electrically isolated (*see* Claim 3; Ex. 1003, ¶332). A POSITA would thus have known that an “insulating region” would electrically isolate the “bezel” from the “display 140” (Ex. 1003, ¶333). A POSITA would have known that in order to measure the potential difference as part of an ECG, *Markel*’s electrodes would be electrically isolated as taught in *Markel*’s Figure 4 (Ex. 1003, ¶333).

20. Claim 20

i. [20.pre]: The electronic device of claim 15,

Markel renders obvious [20.pre] (*see* Claim 15; Ex. 1003, ¶335-336).

ii. [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.

Markel renders obvious [20.a] (Ex. 1003, ¶¶337-339).

Markel discloses a “first electrode” embedded in the “main body portion 620,” which corresponds to the claimed “first lead” (*see* [15.d.i]; Ex. 1003, ¶338). Furthermore, the “first electrode” may be configured to detect a cardiac signal via the user’s contact with the “main body portion 620” (*see* [15.d.ii]; Ex. 1003, ¶338).

Consequently, the first lead is configured to detect the first electrical signal of a cardiac signal vis the user's contact with the first portion of the enclosure (Ex. 1003, ¶338).

21. Claim 21

i. [21.pre]: The electronic device of claim 20,

Markel renders obvious [21.pre] (see Claim 20; Ex. 1003, ¶340-341).

ii. [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.

Markel renders obvious [21.a] (Ex. 1003, ¶¶342-344).

Markel discloses a "second electrode" embedded in the "display 140," which corresponds to the claimed "second lead" (see [15.e.i]; Ex. 1003, ¶343). Furthermore, the "second electrode" may be configured to detect a cardiac signal via direct contact with the user's skin (see [15.e.ii]; Ex. 1003, ¶343). Consequently, the second lead is configured to detect the second electrical signal of a cardiac signal via the user's contact with the second lead (Ex. 1003, ¶343).

22. Claim 22

i. [22.pre]: The electronic device of claim 20,

Markel renders obvious [22.pre] (see Claim 20; Ex. 1003, ¶345-346).

ii. [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.

Markel renders obvious [22.a] (Ex. 1003, ¶¶347-349).

Markel discloses a “second electrode” embedded in the “display 140,” which corresponds to the claimed “second lead” (*see* [15.e.i]; Ex. 1003, ¶348). Furthermore, the “second electrode” may be configured to detect a cardiac signal via direct contact with the user’s skin (*see* [15.e.ii]; Ex. 1003, ¶348). Consequently, the second lead is configured to detect the second electrical signal of a cardiac signal via the user’s contact with “display 140” (Ex. 1003, ¶348). Consequently, the second lead is configured to detect the second electrical signal of a signal via the user’s contact with the display screen of the electronic device (Ex. 1003, ¶348).

B. Ground 2: Claims 1-22 Are Unpatentable Under 35 U.S.C. §103 over *Markel* in View of *Nissilä*

Markel in view of *Nissilä* renders obvious claims 1-22 of the ’257 Patent (Ex. 1003, ¶¶350-395). Ground 1 (§VII.A) analyzes how *Markel* renders obvious claims 1-22 of the ’257 Patent. Ground 1 is incorporated herein. For brevity, only the limitations that are further rendered obvious by *Nissilä* are addressed below.

1. Motivation to Combine

Markel and *Nissilä* are directed to the same technical field of personal heart sensors (Ex. 1003, ¶352). *Markel* is directed to “mobile communication device[s] . . . with cardiovascular monitoring capability” (Ex. 1005, [0004]; Ex. 1003, ¶352). And *Nissilä* is directed to “a device for non-invasive measurement of heart rate information” (Ex. 1006, 1:7-10, 2:17-20; Ex. 1003, ¶352).

Markel and *Nissilä* share similar goals (Ex. 1003, ¶353). *Markel* is directed to an electrode that is “substantially concealed (or hidden) from a user,” (Ex. 1005, [0040]; Ex. 1003, ¶353). And *Nissilä* is directed to accomplishing an “inconspicuous” electrode structure (Ex. 1006, 4:21-24; Ex. 1003, ¶353).

Markel and *Nissilä* share relevant similarities in electrode structure (Ex. 1003, ¶354). *Nissilä*’s electrode structure having an external layer of “metal, electrically conductive plastic or a similar conductive material” (Ex. 1006, 5:32-37; Ex. 1003, ¶354) is similar to *Markel*’s “hidden” electrode, which includes a “main body portion 110” that is “formed from conductive plastic (or another material)” (Ex. 1005, [0037]; Ex. 1003, ¶354). A POSITA would therefore have understood that the teachings of *Nissilä* were specifically applicable to the teachings of *Markel* (Ex. 1003, ¶354).

A POSITA would be motivated to combine *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) from a user . . . with little or no visible indication*** of the electrode presence” (Ex. 1005, [0040]; Ex. 1003, ¶355). *Markel*’s hidden electrode is desirable because it increases aesthetics of the device while protecting the electrode from bumps or other damage (Ex. 1003, ¶354). Indeed, by concealing the electrode from the user, the user is able to obtain the benefits of having an ECG capability without a ***visible indication*** of the electrode

presence that takes away from the device’s appearance (Ex. 1003, ¶354). A POSITA would have reasonable expectation of success in combining *Markel* and *Nissilä* because both references disclose an intermediate conductive material made of conductive plastic (Ex. 1005, [0037]; Ex. 1006, 5:32-37; Ex. 1003, ¶354).

2. *Claim 1*

- i. [1.c.i]
- ii. [1.c.ii]
- iii. [1.c.iii]

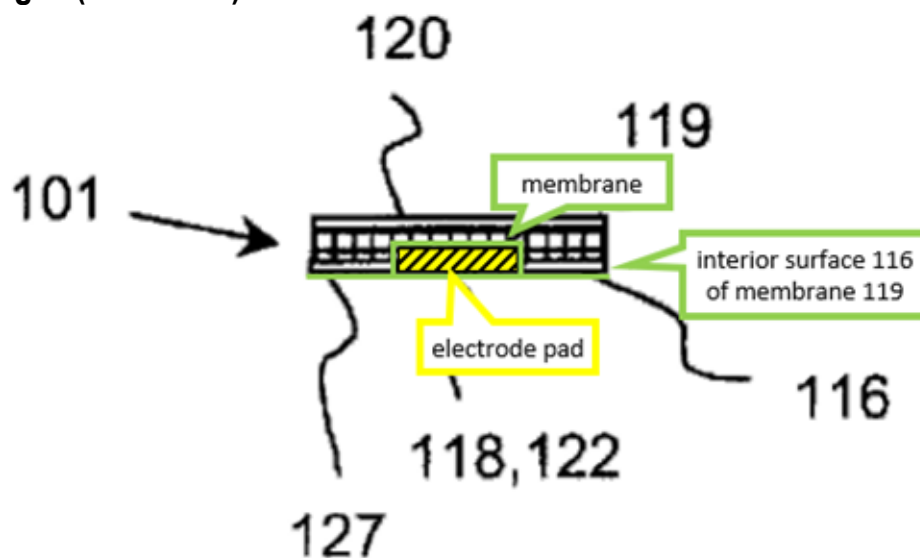
Markel in view of *Nissilä* renders obvious [1.c.i], [1.c.ii], and [1.c.iii] under the correct interpretation of the claim language (Ex. 1003, ¶356-362).

Markel discloses an electrode “may be ***substantially concealed (or hidden)*** ***from a user . . . with little or no visible indication*** of the electrode presence” (see Ground 1, [1.c.i]-[1.c.iii]; Ex. 1005, [0040]; Ex. 1003, ¶357). To the extent that a POSITA sought additional detail on how to implement *Markel*’s “hidden” electrode, that POSITA would have turned to *Nissilä*, which expressly teaches a cross-sectional view of an “improved electrode structure” having a pad that is positioned underneath the exterior surface of an enclosure (Ex. 1006, 2: 17-20, Fig. 5; Ex. 1003, ¶357). A POSITA would have combined the teachings of these references in order to accomplish construction of *Markel*’s “hidden” electrode (Ex. 1003, ¶357).

Nissilä discloses “a second electrode 122” (Ex. 1006, 5:6-9; Ex. 1003, ¶358). *Nissilä* further discloses an electrode comprising a “membrane 119” that “is made

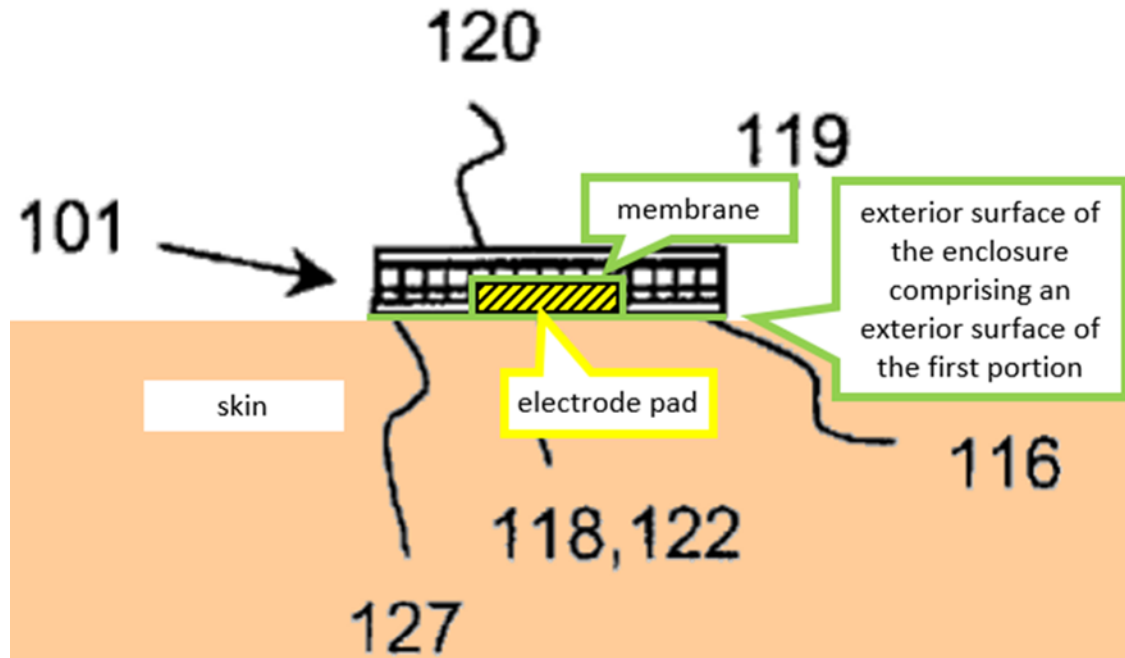
of metal, electrically conductive plastic or a similar conductive material” (Ex. 1006, 5:32-37; Ex. 1003, ¶358). Thus, the electrode pad is *underneath* the “membrane 119,” which includes an “exterior surface of the enclosure” and “exterior surface of the first portion” (Ex. 1003, ¶358). *Nissilä* discloses a “second electrode” embedded in and enclosed by “membrane 119” (i.e., a first portion of the enclosure) (Ex. 1003, ¶358).

Ex. 1006, Fig. 5 (annotated)



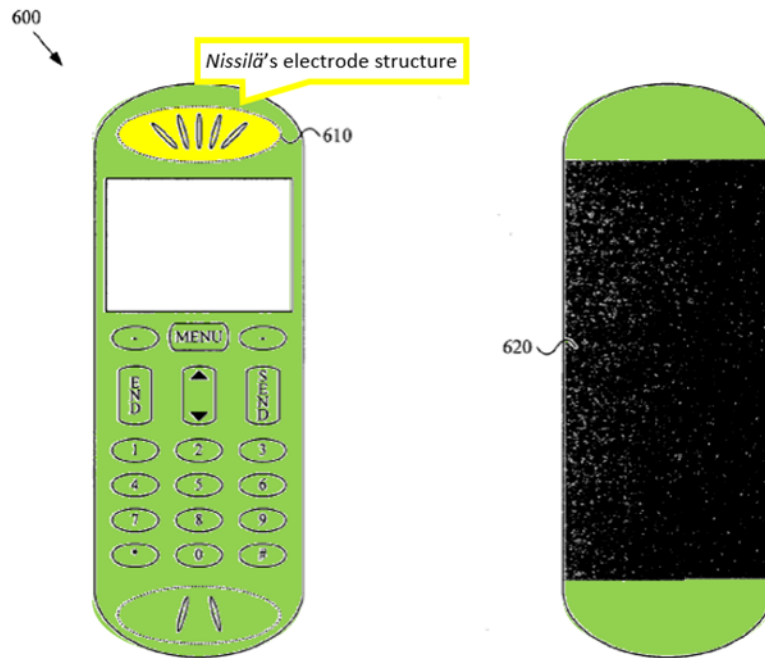
Nissilä discloses that the “membrane 119 can [] come into contact with the person’s skin surface 102” (Ex. 1006, 5:39-43; Ex. 1003, ¶359). Thus, *Nissilä* discloses an electrode pad that is configured to “detect a first electrical signal of the user’s cardiac signal” via the user’s contact with the “membrane 119” (i.e., via the user’s skin’s contact with the exterior surface of the first portion of the enclosure) (Ex. 1003, ¶359).

Ex. 1006, Fig. 5 (annotated)



A POSITA would thus have been motivated to implement *Nissilä*'s electrode structure in at least *Markel*'s "audio output portion 610" (Ex. 1003, ¶360). This construction would have accomplished *Markel*'s stated goal of a "hidden" electrode (Ex. 1005, [0040]; Ex. 1003, ¶360).

Ex. 1005, Fig. 6 (annotated)



Thus, *Markel* in view of *Nissilä* renders obvious claim elements [1.c.i], [1.c.ii], and [1.c.iii] (Ex. 1003, ¶361).

- iv. [1.d.i]
- v. [1.d.ii]

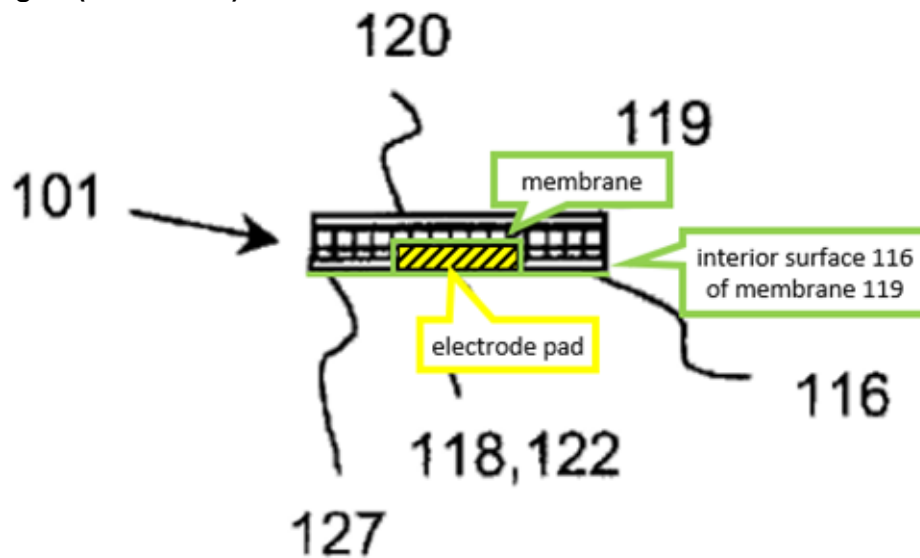
Markel in view of *Nissilä* renders obvious [1.d.i] and [1.d.ii] (Ex. 1003, ¶362-367).

For the same reasons as discussed with regard to the “second electrode” in [1.c.i]-[1.c.iii], a POSTIA would have combined the teachings of *Markel* and *Nissilä* in order to accomplish construction of *Markel*’s “hidden” electrode (Ex. 1003, ¶363).

Nissilä discloses “a **first electrode 118**” (Ex. 1006, 5:6-9; Ex. 1003, ¶364).

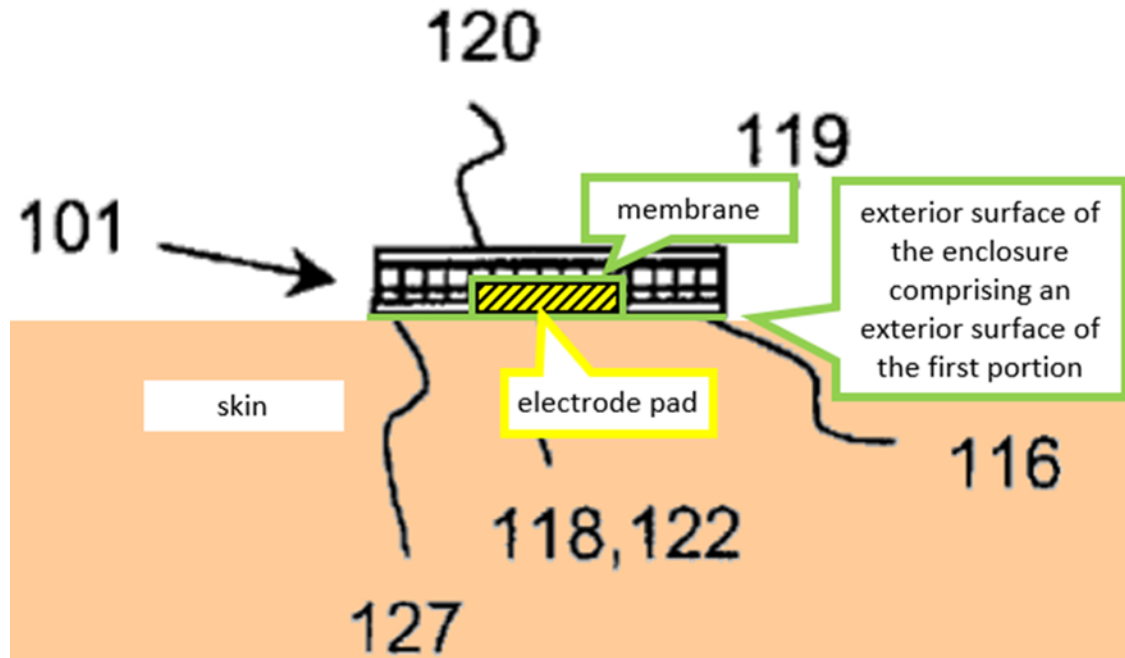
For the same reasons as discussed with regard to the “second electrode” in [1.c.i]-[1.c.iii], *Nissilä* discloses a “first electrode” embedded in and enclosed by “membrane 119” (i.e., a second portion of the enclosure) (*see* [1.c.i]-[1.c.iii]; Ex. 1003, ¶364).

Ex. 1006, Fig. 5 (annotated)



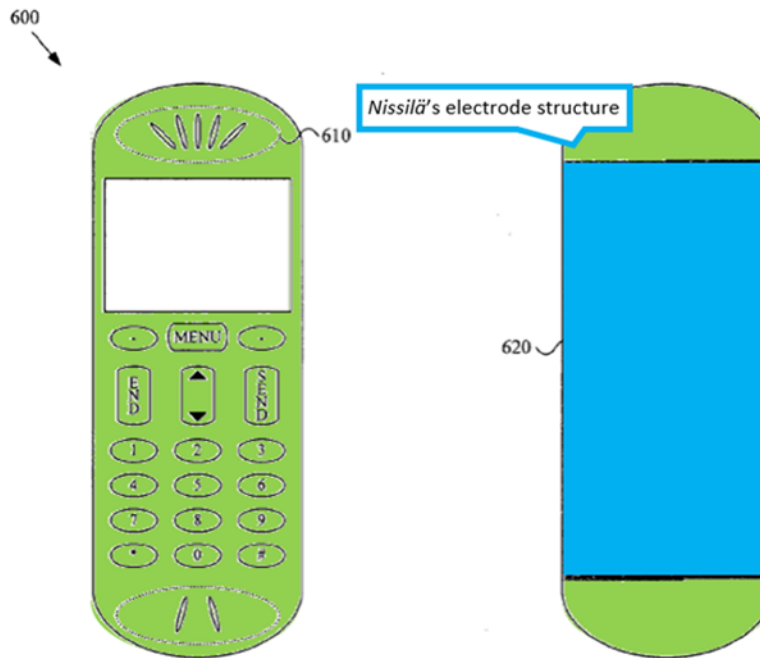
Nissilä renders obvious a second pad configured to detect a second electrical signal of a cardiac signal via the user’s skin’s contact with the second portion of the enclosure for the same reasons as discussed with regard to the first pad and the “second electrode” in [1.c.i]-[1.c.iii] (*see* [1.c.i]-[1.c.iii]; Ex. 1003, ¶365).

Ex. 1006, Fig. 5 (annotated)



A POSITA would thus have implemented *Nissilä*'s electrode structure in at least *Markel*'s "main body portion 620" (Ex. 1003, ¶366). This construction would have accomplished *Markel*'s stated goal of a "hidden" electrode (Ex. 1005, [0040]; Ex. 1003, ¶366).

Ex. 1005, Fig. 6 (annotated)



3. Claim 6

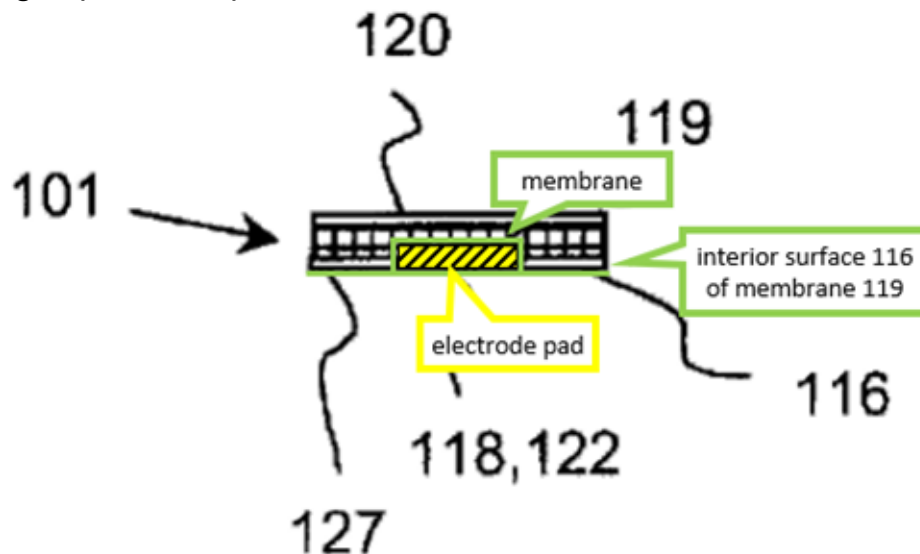
- i. [6.a]
- ii. [6.b]

Markel in view of *Nissilä* renders obvious [6.a] and [6.b] (Ex. 1003, ¶¶368-373).

For the same reasons as discussed with regard to the “first electrode” in [1.d.i] and [1.d.ii], a POSITA would have combined the teachings of *Markel* and *Nissilä* in order to accomplish construction of *Markel*’s “hidden” electrode (*see* Ground 2, [1.d.i]-[1.d.ii]; Ex. 1003, ¶369).

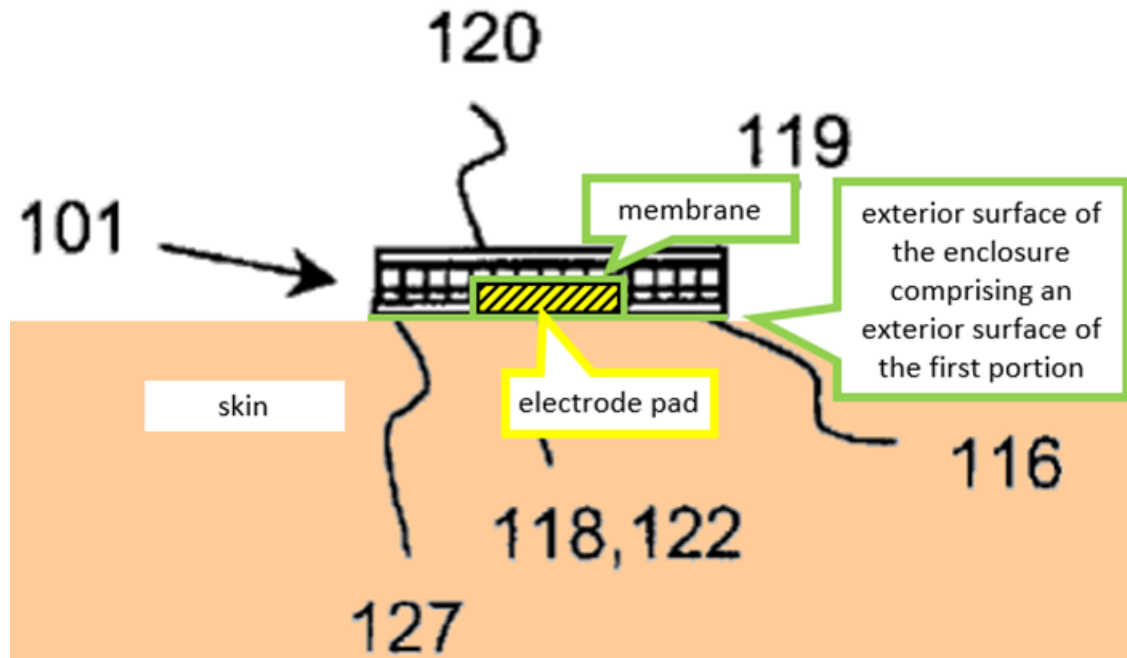
For the same reasons as discussed with regard to *Nissilä*'s "first electrode" in [1.d.i]-[1.d.ii], *Nissilä* discloses a "first electrode" embedded in and enclosed by "membrane 119" (see [1.d.i]-[1.d.ii]; Ex. 1003, ¶370).

Ex. 1006, Fig. 5 (annotated)



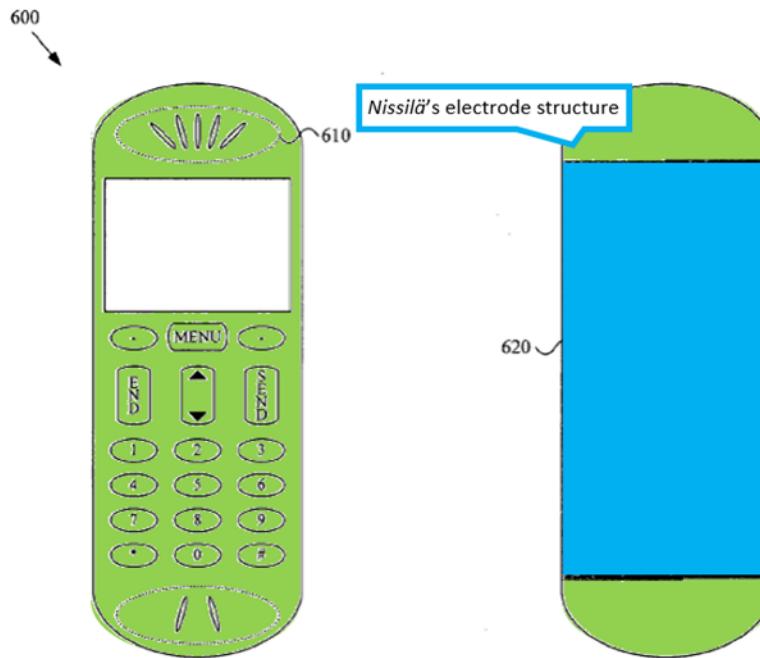
Nissilä renders obvious a second pad configured to detect the second electrical signal of a cardiac signal via the user's contact with the exterior surface of the second portion for the same reasons as discussed with regard to the second pad in *Nissilä*'s "first electrode" in [1.d.i] and [1.d.ii] (see [1.d.i], [1.d.ii]; Ex. 1003, ¶371).

Ex. 1006, Fig. 5 (annotated)



A POSITA would thus have been motivated to implement *Nissilä*'s electrode structure in at least *Markel*'s "main body portion 620" (Ex. 1003, ¶372). This construction would have accomplished *Markel*'s stated goal of a "hidden" electrode (Ex. 1005, [0040]; Ex. 1003, ¶372).

Ex. 1005, Fig. 6 (annotated)



4. Claim 8

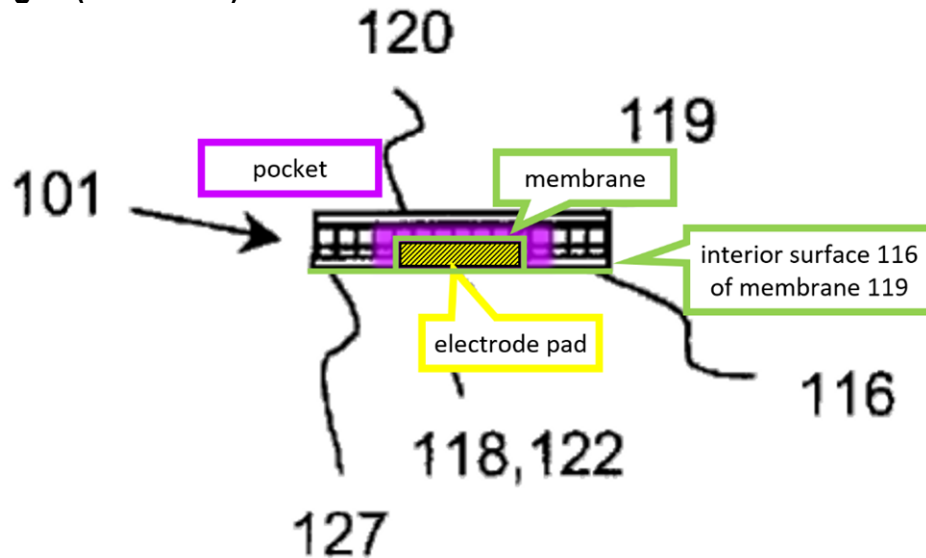
- i. ***[8.a]: the enclosure further comprises at least one pocket underneath the exterior surface of the enclosure; and***
- ii. ***[8.b]: at least one of the first pad and the second pad is placed within the at least one pocket.***

Markel in view of *Nissilä* renders obvious [8.a] and [8.b] (Ex. 1003, ¶¶374-377).

A POSITA would have implemented *Nissilä*'s electrode structure in at least the "audio output portion 610" of *Markel*'s Figure 6 (*see* Ground 2, [1.c.i]-[1.c.iii]; Ex. 1003, ¶375). That implementation would have further rendered obvious [8.a] and [8.b] (Ex. 1003, ¶375).

Nissilä discloses a pad placed within a pocket underneath the exterior surface of the enclosure, illustrated in at least *Nissilä*'s Figure 5 (Ex. 1003, ¶376).

Ex. 1006, Fig. 5 (annotated)



5. Claim 10

i. [10.a]

Markel in view of *Nissilä* renders obvious [10.a] (Ex. 1003, ¶¶378-383).

As explained in Ground 2 with respect to [1.d.i] and [1.d.ii], *Nissilä* further renders obvious a second lead configured to detect the second electrical signal of a cardiac signal via the user's contact with the second portion of the enclosure.

6. Claim 15

i. [15.d.i]

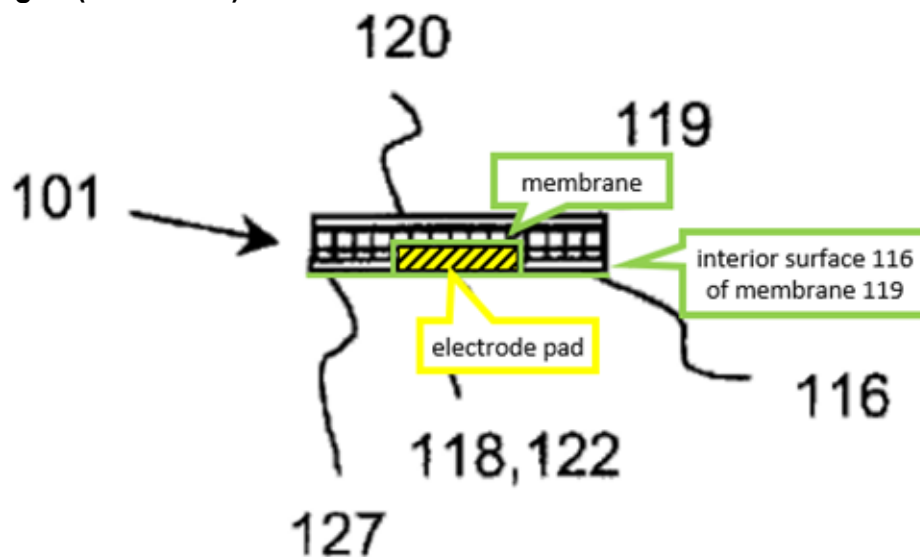
ii. [15.d.ii]

Markel in view of *Nissilä* renders obvious [15.d.i] and [15.d.ii] (Ex. 1003, ¶¶384-389).

For the same reasons as discussed with regard to the “first electrode” in [1.d.i]-[1.d.ii], a POSTIA would have combined the teachings of *Markel* and *Nissilä* in order to accomplish construction of *Markel*’s “hidden” electrode (*see* Elements [1.d.i], [1.d.ii]; Ex. 1003, ¶385).

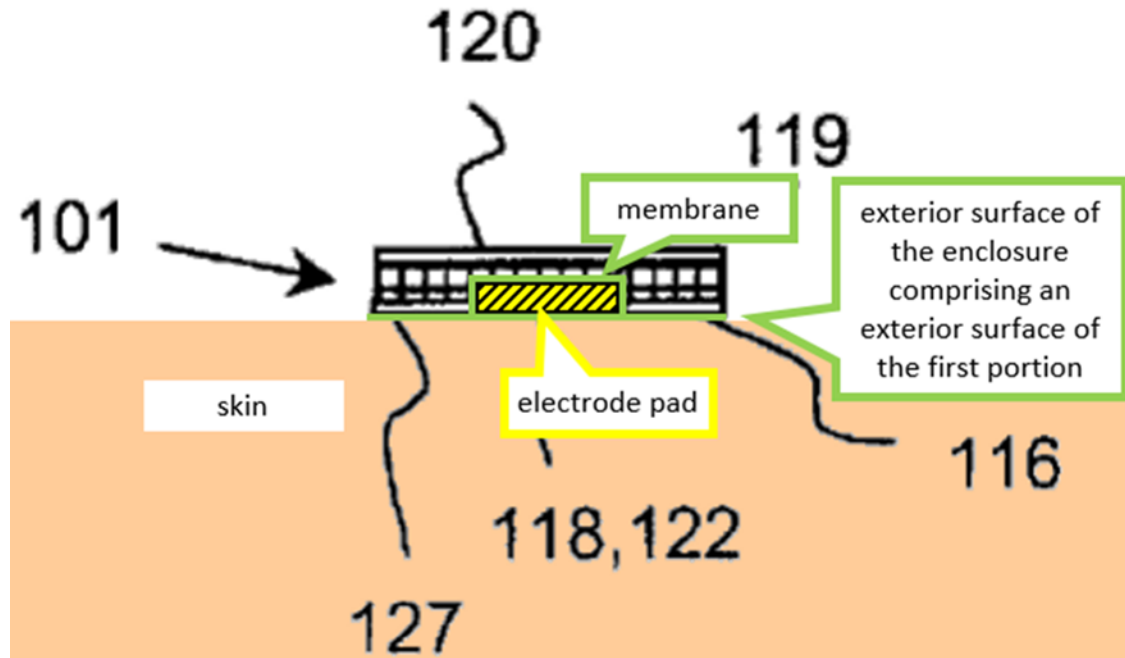
For the same reasons as discussed with regard to *Nissilä*’s “first electrode” in [1.d.i]-[1.d.ii], *Nissilä* discloses an electrode embedded in and enclosed by “membrane 119” (i.e., the first portion of the enclosure of the electronic device) (*see* Elements [1.d.i], [1.d.ii]; Ex. 1003, ¶386).

Ex. 1006, Fig. 5 (annotated)



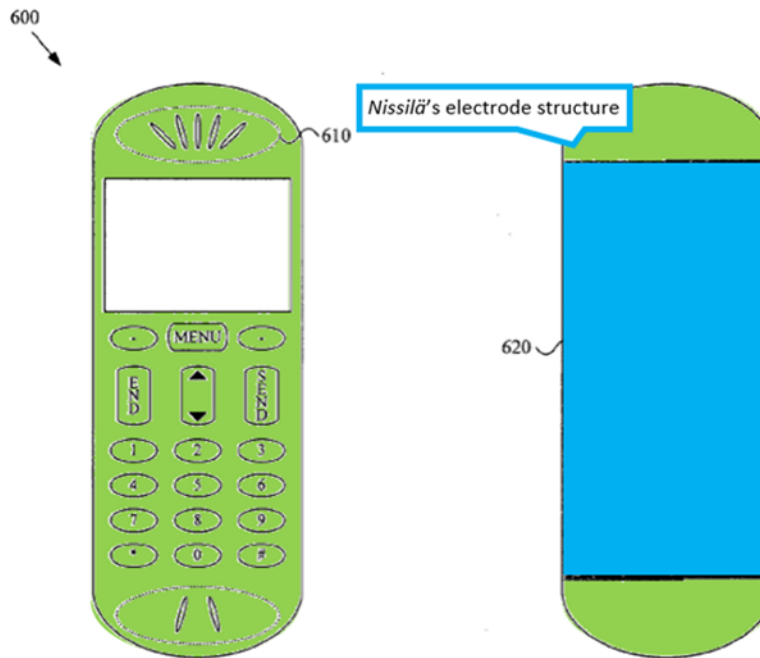
Nissilä renders obvious a first lead configured to detect a first electrical signal of a cardiac signal via the user’s contact with the first portion of the enclosure for the same reasons as discussed with regard to the “first electrode” in [1.d.i]-[1.d.ii] (*see* Elements [1.d.i], [1.d.ii]; Ex. 1003, ¶387).

Ex. 1006, Fig. 5 (annotated)



A POSITA would thus have been motivated to implement *Nissilä*'s electrode structure in at least the “main body portion 620” of *Markel*'s Figure 6 (Ex. 1003, ¶388). This construction would have accomplished *Markel*'s stated goal of a “hidden” electrode (Ex. 1005, [0040]; Ex. 1003, ¶388).

Ex. 1005, Fig. 6 (annotated)



7. *Claim 20*

i. *[20.a]*

Markel in view of *Nissilä* renders obvious [20.a] (Ex. 1003, ¶¶390-395).

As explained in Ground 2 with respect to [15.d.i] and [15.d.ii], *Nissilä* further renders obvious a first lead configured to detect the second electrical signal of a cardiac signal via the user's contact with the first portion of the enclosure.

C. Ground 3: Claims 12-13 and 19 Are Unpatentable as Obvious Under 35 U.S.C. §103 Over *Markel* in View of *Nissilä* and/or *Righter*

Markel in view of *Nissilä* and/or *Righter* renders obvious claims 12-13 and 19 of the '257 Patent (Ex. 1003, ¶¶396-415). Ground 1 (§VII.A) analyzes how *Markel* renders obvious claims 1-22 of the '257 Patent, and Ground 2 (§VII.B) analyzes how

Nissilä further renders obvious certain limitations. Grounds 1 and 2 are incorporated herein. For brevity, only the limitations that are further rendered obvious by *Righter* are addressed below.

1. Motivation to Combine

The reasons for combining *Markel* and *Nissilä* are set forth in §VII.B.1, which is incorporated herein. Furthermore, a POSITA would have been further motivated to combine these references with *Righter* for the reasons below (Ex. 1003, ¶397-400).

Righter is directed to the same technical field of personal heart sensors (Ex. 1005, [0004]; Ex. 1006, 1:7-10, 2:17-20; Ex. 1003, ¶398). *Righter* is directed to “a self-contained, portable ECG monitor/recorder” (Ex. 1007, 1:6-9; Ex. 1003, ¶398).

Righter is directed to solving a similar problem as *Markel* and *Nissilä* (i.e., monitoring of ECG signals in a mobile device) (Ex. 1005, [0002]; Ex. 1006, 1:6-9; Ex. 1003, ¶399). *Righter* is directed to “an apparatus that records medical-grade ECG data” (Ex. 1007, 1:65-68; Ex. 1003, ¶399).

A POSITA would have been motivated to combine the electrode placement of *Righter* with the electronic device of *Markel* in order to make heart monitoring more convenient and comfortable for the user (Ex. 1003, ¶400). *Righter* is directed to “an apparatus that records medical-grade ECG data and yet is convenient and

comfortable for a user to wear” (Ex. 1007, 1:65-68; Ex. 1003, ¶399). The electronic device disclosed in *Righter* can be a watch or “can be easily adapted so that it can be worn by the user as a pendant” or other wearable (Ex. 1007, 3:32-37; Ex. 1003, ¶399). One of *Righter*’s stated goals is that the “two electrodes 15*b*, 15*c* can [] be easily grasped by the user at the on-set of a cardiac event” (Ex. 1007, 3:44-45; Ex. 1003, ¶399). Thus, a POSITA would be motivated to implement the convenient placement of the electrodes on *Righter* on the electronic device of *Markel* so as to encourage user use and to further make it easier and more likely that a user will successfully use the device to provide ECG data (Ex. 1003, ¶399).

A POSITA would have reasonable expectation of success in combining the electrode placement in *Righter* with *Markel* and/or *Nissilä* because (1) *Markel* discloses that “electrodes may be *incorporated into the [electronic device] in any of a variety of manners*” and “in any of a *variety of locations*,” (Ex. 1005, [0035], [0045]; Ex. 1003, ¶401), and (2) the watch in *Righter* “can be easily adapted” (Ex. 1007, 3:32–37; Ex. 1003, ¶401).

2. Claim 12

i. [12.a]

Markel in view of *Nissilä* and/or *Righter* renders obvious [12.a] (Ex. 1003, ¶402-406).

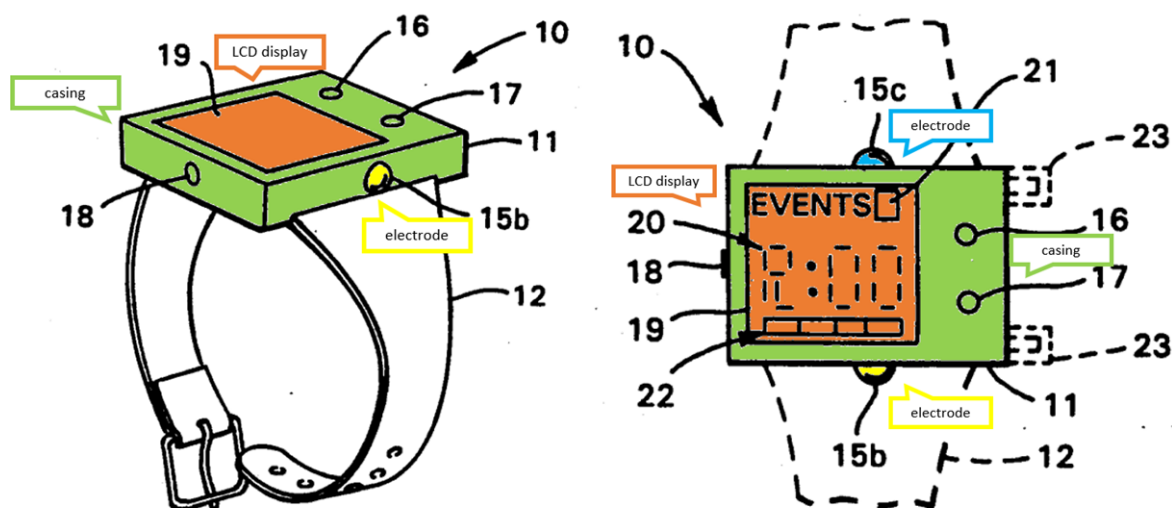
Markel discloses a “second electrode” embedded in the “right side portion 420” (see Ground 1, [1.c.i]; Ex. 1003, ¶403). *Markel* discloses that an electrode “may be ***substantially concealed (or hidden) from a user***” (see Ground 1, [1.c.iii]; Ex. 1005, [0040]; Ex. 1003, ¶403). *Righter* discloses “an apparatus that records medical-grade ECG data and yet is ***convenient and comfortable*** for a user to wear” (Ex. 1007, 1:65-68; Ex. 1003, ¶403). A POSITA would have combined the electrode placement teachings of *Righter* on the electronic device of *Markel* because the electrode placement in *Righter* is convenient and comfortable (Ex. 1003, ¶403).

First, *Righter* renders obvious a first lead comprising a first pad embedded in a first portion of the enclosure (Ex. 1003, ¶404). *Righter* discloses a “***pair of conductive electrodes 15b, 15c*** [] provided on ***opposing side surfaces of the casing 11***, where they can be easily contacted by the thumb and forefinger, respectively, of the user’s right hand (assuming the unit is being worn on the left wrist)” (Ex. 1007, 2:65-3:2; Ex. 1003, ¶404). Thus, *Righter* discloses a first lead comprising a first pad embedded in a “side surface[] of the casing 11” (i.e., the first portion of the enclosure) (Ex. 1003, ¶404).

Second, *Righter* renders obvious that the first portion of the enclosure is a bezel. A POSITA would have understood the plain and ordinary meaning of “bezel” to include a rim that encircles an electronic device (see Ground 1, [12.a]; Ex. 1003, ¶405). *Righter* discloses that “[a]n LCD display 19 is also provided on the top

surface of the casing” (Ex. 1007, 3:25-26; Ex. 1003, ¶405). Because the “side surfaces of the casing 11” encircle the top surface of the casing, including an LCD display, the “side surfaces” are a bezel (Ex. 1003, ¶405). Thus, *Righter* renders obvious an electrode pad embedded in a “side surface[] of the casing 11” (i.e., the first portion of the enclosure) which is a bezel (Ex. 1003, ¶405).

Ex. 1007, Figs. 1A, 1B (annotated)



3. Claim 13

i. [13.a]

Markel in view of *Nissilä* and/or *Righter* renders obvious [13.a] (Ex. 1003, ¶¶407-411).

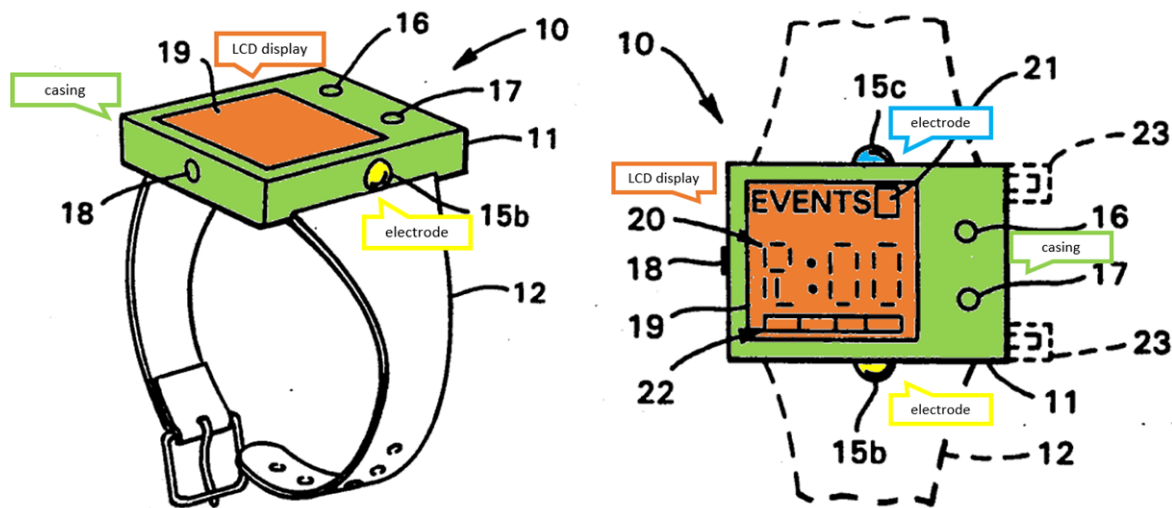
Markel discloses a “first electrode” embedded in the “left side portion 410” (see Ground 1, [1.d.i]; Ex. 1003, ¶407). A POSITA would have combined electrode placement teachings of *Righter* on the electronic device of *Markel* because the

electrode placement in *Righter* is convenient and comfortable (*see* Ground 3, [12.a]; Ex. 1003, ¶408).

First, *Righter* renders obvious a second lead comprising a second pad embedded in a second portion of the enclosure (Ex. 1003, ¶409). For the same reasons as discussed with regard to the first lead in [12.a], *Righter* discloses a second lead comprising a second pad embedded in a “side surface[] of the casing 11” (i.e., the second portion of the enclosure) (*see* Ground 3, [12.a]; Ex. 1003, ¶409).

Second, *Righter* renders obvious that the second portion of the enclosure is a bezel. A POSITA would have understood the plain and ordinary meaning of “bezel” to include a rim that encircles an electronic device (*see* Ground 1, [12.a]; Ex. 1003, ¶410). For the same reasons as discussed with regard to the first portion in [12.a], *Righter* renders obvious an electrode pad embedded in a “side surface[] of the casing 11” (i.e., the second portion of the enclosure) which is a bezel (*see* Ground 3, [12.a]; Ex. 1003, ¶410).

Ex. 1007, Figs. 1A, 1B (annotated)



4. Claim 19

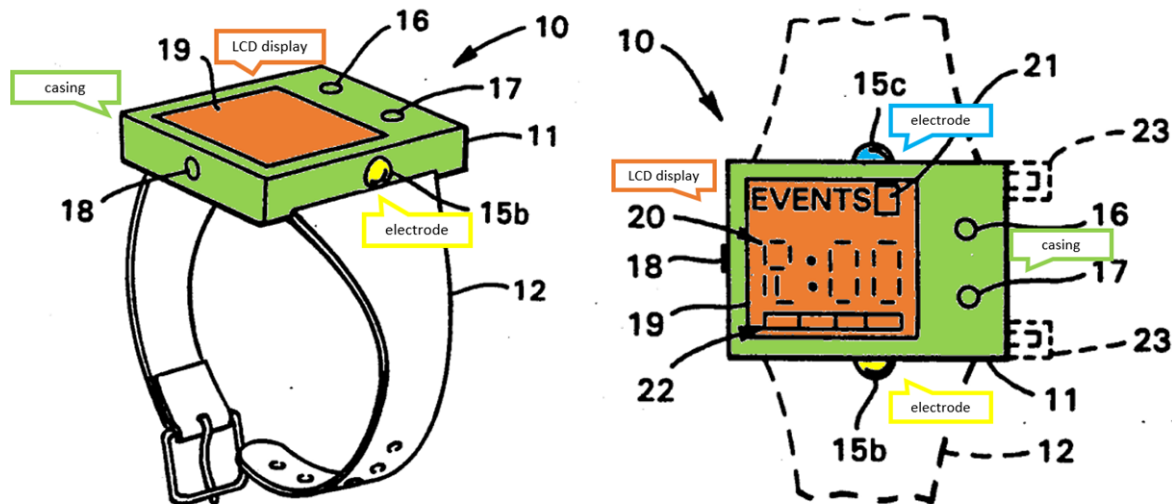
i. [19.a]

Markel in view of *Nissilä* and/or *Righter* renders obvious [19.a] (Ex. 1003, ¶¶412-416).

Markel discloses a “first electrode” embedded in the “left side portion 410” (see Ground 1, [15.d.i]; Ex. 1003, ¶413). *Markel* further discloses that an electrode “disposed on a video display device 140 (e.g., a *border of the display* or integrated into a touch screen)” (see Ground 1, [15.e.i]; Ex. 1005, [0044]; Ex. 1003, ¶413), and *Righter* discloses an “LCD display 19” (Ex. 1007, 3:25-31) (Ex. 1003, ¶413). Aa POSITA would have combined electrode placement teachings of *Righter* on the electronic device of *Markel* because the electrode placement in *Righter* is convenient and comfortable (see Ground 3, [12.a]; Ex. 1003, ¶413).

For the same reasons as discussed with regard to the first lead in [12.a], *Righter* discloses a first lead embedded in a “side surface[] of the casing 11” (i.e., the first portion of the enclosure of the electronic device) which is a bezel (see Ground 3, [12.a]; Ex. 1003, ¶414-415).

Ex. 1007, Figs. 1A, 1B (annotated)



VIII. PRIOR ART NOT PREVIOUSLY PRESENTED TO THE OFFICE

The prior art here was not previously cited. As a result, none of the grounds rely on the same or substantially the same prior art previously considered during prosecution. Therefore, the Board should not exercise its discretion under 35 U.S.C. §325(d). *Adobe, Inc. v. Realtime Adaptive Streaming LLC*, IPR2019-00712, Paper 9 at 18-19 (PTAB Sept. 12, 2019).

IX. THE *FINTIV* FACTORS FAVOR INSTITUTION

The Board balances six factors in considering discretionary denial when parallel litigation exists. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). Here, the factors (“*Fintiv* factors”) favor institution.

Fintiv Factor 1 (potential for stay) is at least neutral given that no stay motion has yet been filed *See Sand Revolution II, LLC v. Cont’l Intermodal Grp. - Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative).

Fintiv Factor 2 (timing of trial) favors institution. It is a practical impossibility that a trial would occur before the Final Written Decision because these Petitions are being filed prior to the District Court’s case management conference, and no schedule or trial date has been set. The median-time-to-trial for civil cases in N.D. Cal. is 31.1 months (Ex. 1018 (National Judicial Caseload Profile), 66). Assuming that timing from the original filing date of December 2, 2022, the trial date is July 7, 2025, over 7 months after the final written decision.

Fintiv Factor 3 (litigation investment) favors institution. The district court case is at the very outset, and although the parties have served preliminary discovery requests, discovery has not yet begun in earnest. More importantly, the parties have not yet served infringement contentions, invalidity contentions, or begun claim construction briefing. In short, Petitioner acted promptly in response to Patent Owner’s filing of the Complaint.

Fintiv Factor 4 (overlap of issues) favors institution. At the time of filing this Petition, Patent Owner has not served infringement contentions. This Petition nonetheless addresses all claims of the '257 Patent. Moreover, Petitioners stipulate herein that if this IPR proceeding is instituted, they will withdraw any identical grounds from the District Court litigation, eliminating any overlap in issues. The Board has found that such stipulations weigh in favor of institution. *See Sand Revolution II, LLC v. Continental Intermodal Grp - Trucking LLC*, IPR2019-01393, Paper 24 at 12 n.5 (PTAB June 16, 2020).

Fintiv Factor 5 (overlap in parties) weighs against institution because Petitioners are parties in this Petition as well as in the parallel district court litigation.

Fintiv Factor 6 (other circumstances) favors institution because this Petition “plainly lead[s] to a conclusion that one or more claims are unpatentable” because it is “highly likely...[to] prevail with respect to at least one challenged claim.” *CommScope Technologies LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4 (PTAB Feb. 27, 2023) (precedential).

As discussed, the '257 Patent was only granted after the applicant twice amended the claims to identify an allegedly unique electrode placement on an electronic device (§IV.B). Each of Ground 1-3 are highly likely to prevail with respect to at least one challenged claim, insofar as they each set out a distinct configuration which meets the point of alleged novelty found in the '257 Patent.

X. CONCLUSION

Petitioner respectfully requests cancellation of the Challenged Claims.

XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Party in Interest Under 37 C.F.R. §42.8(b)(1)

The real party-in-interest is Petitioner AliveCor, Inc.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

A claim of infringement of the '257 Patent was asserted in *Apple Inc. v. AliveCor, Inc.*, Case 4:22-cv-07608-HSG, filed on December 2, 2022. Petitioner is simultaneously filing petitions for IPR of related U.S. Patent No. 10,866,619 under the case headings IPR2023-00948 and IPR2023-00949.

C. Designation of Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

| Lead Counsel | Backup Counsel |
|---|--|
| Christopher TL Douglas (Reg. No. 56,950) ALSTON & BIRD LLP Vantage South End 1120 South Tryon Street, Suite 300 Charlotte, NC 28203-6818 Christopher.Douglas@alston.com | Scott M. Stevens Reg. No. 54,762 Alston & Bird LLP Vantage South End 1120 South Tryon Street, Suite 300 Charlotte, NC 28203-6818 Phone: 704.444.1000 Fax: 704.444.1111 Email: scott.stevens@alston.com Philip Ducker (<i>pro hac vice</i> to be requested) Alston & Bird LLP 560 Mission Street Suite 2100 San Francisco, CA 94105 Phone: 415.243.1059 Fax: 415.243.1001 Email: phil.ducker@alston.com |

| | |
|--|---|
| | <p> J. Ravindra Fernando Reg. No. 73,762 Alston & Bird LLP Vantage South End 1120 South Tryon Street, Suite 300 Charlotte, NC 28203-6818 Phone: 704.444.1000 Fax: 704.444.1111 Email: ravi.fernando@alston.com </p> <p> Thomas F. Finch (<i>pro hac vice</i> to be requested) Alston & Bird LLP One Atlantic Center 1201 West Peachtree Street, Suite 4900 Atlanta, Georgia 30309 Tel: 404.881.7000 Fax: 404.881.7777 Email: thomas.finch@alston.com </p> <p> Erin Beaton Reg. No. 79,218 Alston & Bird LLP Vantage South End 1120 South Tryon Street, Suite 300 Charlotte, NC 28203-6818 Phone: 704.444.1000 Fax: 704.444.1111 Email: erin.beaton@alston.com </p> |
|--|---|

Pursuant to 37 C.F.R §42.10(b), a Power of Attorney is being submitted with this Petition.

D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service directed to apple-alivecor-ndcal@alston.com.

Date: June 7, 2023

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> |
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| 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> |
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| 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> |
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| 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> |
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| 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. |

CERTIFICATION UNDER 37 C.F.R. §42.24

Under the provisions of 37 CFR §42.24, the undersigned hereby certifies that the word count for the foregoing Petition for inter partes review totals 13,992 words (Sections I-X), which is less than the 14,000 allowed under 37 CFR §42.24(a)(i).

Date: June 7, 2023

By: / Christopher TL Douglas /
Christopher TL Douglas

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 PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,866,257, all associated exhibits, and Petitioner's Power of Attorney were served in their entirety on June 7, 2023, upon the following parties via UPS Next Day Air[®]:

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