

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIVECOR, INC.,
Petitioner

v.

APPLE INC.,
Patent Owner

Case No. IPR2023-00948

U.S. Patent No. 10,866,619 B2

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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LIST OF EXHIBITS

Exhibit	Short Name	Description
Ex. 1001	'619 Patent	U.S. Patent No. 10,866,619 B2 (“the ’619 Patent”)
Ex. 1002	'619 File History	Prosecution History of U.S. Patent No. 10,866,619 B2
Ex. 1003	Berger Declaration	Declaration of Dr. Ronald D. Berger
Ex. 1004	Kim	U.S. Patent No. 10,620,828
Ex. 1005	Jung	U.S. Patent Pub. No. 2016/0100499
Ex. 1006	Dunlap	U.S. Patent No. 9,651,513
Ex. 1007	Myers ¹	U.S. Patent Pub. No. 2015/0071509
Ex. 1008	Evans	U.S. Patent No. 8,694,793
Ex. 1009	Pare	U.S. Patent No. 6,131,464
Ex. 1010	Chaudhri	U.S. Patent No. 9,740,381
Ex. 1011	Choung	U.S. Patent Pub. No. 2015/0245514
Ex. 1012	Hwang	U.S. Patent No. 8,750,919
Ex. 1013	Polany	U.S. Patent No. 7,535,799
Ex. 1014	Choi	U.S. Patent Pub. No. 2017/0099742
Ex. 1015	Chang	U.S. Patent No. 10,133,910
Ex. 1016	Mittleman	U.S. Patent No. 8,367,958

¹ The Petition unintentionally referred to Ex. 1007 as “*Meyers*.” References to both “*Myers*” and “*Meyers*” herein should be understood to refer to Ex. 1007.

Exhibit	Short Name	Description
Ex. 1017	Aapro	U.S. Patent No. 7,486,517
Ex. 1018	Vittu	U.S. Patent No. 9,973,669
Ex. 1019	Wagman	U.S. Patent No. 9,973,840
Ex. 1020	Dave	U.S. Patent Pub. No. 2013/0108082
Ex. 1021	Berger CV	Curriculum vitae of Dr. Ronald Berger
Ex. 1022	Kim-KR	KR 10-2016-0162565 and certified translation thereof
Ex. 1023	Kim-KR-Pub.	KR 10-2018-0062654 and certified translation thereof
Ex. 1024	National Judicial Caseload Profile	U.S. District Courts – National Judicial Caseload Profile (accessed via https://www.uscourts.gov/sites/default/files/cms_na_distprofile0331.2022.pdf)
Ex. 1025	Complaint	Complaint for Patent Infringement, <i>Apple Inc., v. AliveCor, Inc.</i> , Case No. 4:22-cv-07608-HSG (N.D. Cal. 2022)
Ex. 1026	Ducker Declaration	Declaration of Philip Ducker
Ex. 1027	Anthony Transcript	July 11, 2024 Deposition Transcript of Dr. Brian Anthony

Apple's Reply advances legally unsound and factually inaccurate arguments regarding claims 1 and 4 of the '619 Patent. But the Board previously recognized "a reasonable likelihood" the challenged claims are unpatentable (Paper 8, 2), and Apple's Reply does nothing to change that. The Board should thus cancel the Challenged Claims.

I. CLAIM CONSTRUCTION

A. "Biometric Characteristic"

The '619 Patent states that "'biometric characteristic' ... *as used herein*, may refer to a human characteristic that is so distinctive and measureable that a particular human individual may be identified" (Ex. 1001, 5:9-14; Pet., 5-7).² *Abbott Labs. v. Andrx Pharms., Inc.*, 473 F.3d 1196, 1210-11 (Fed. Cir. 2007) ("as used herein" can "unambiguously provide[] definitions of other claim terms"). The term "biometric characteristic" is "set off by quotation marks," which is "a strong indication that what follows is a definition." *Sinorgchem Co. v. ITC*, 511 F.3d 1132, 1136 (Fed. Cir. 2007). AliveCor's proposed construction is clear lexicography.³

² Emphasis added unless otherwise noted.

³ The patentee's use of "may" in defining "biometric characteristic" is irrelevant (*cf.* POR, 10). Apple's position is unsupported, and permissive language does not defeat clear lexicography. *See, e.g., Tele-Publishing, Inc. v. Facebook, Inc.*, 205 F. Supp.

Moreover, construction is necessary to resolve a dispute raised by Apple (POR, 9). As discussed in §II.A.1.ii.b, *infra*, Apple claims “[t]he fingerprint sensor assembly [in *Kim*’s Figure 10(b)] relies on data collected by each of fingerprint sensors 240p1 and 240p2 to generate a composite fingerprint image” (POR, 37 (citing Ex. 1004, 2:63-22:3)). Resolving this dispute turns, in part, on the scope of “biometric characteristic”—namely, whether the “output signal corresponding to a biometric characteristic” must contain a *complete* or *partial* fingerprint image. Construction is necessarily relevant to the dispute.

AliveCor’s proposed construction also does *not* exclude any embodiments (POR, 10-12). Claim 1 recites:

a biometric sensor ... configured to produce an output
signal ... ***corresponding to a biometric characteristic***

(element [1.c.ii]). Apple claims “[t]his limitation can be reasonably interpreted to encompass embodiments of the ***biometric sensor***” where the output signal corresponds to “a biometric characteristic of ‘*heart rate*’” (POR, 11) (emphasis in original). But the ’619 Patent teaches “heart rate” is a “*human physical* characteristic”; *not* a “*biometric* characteristic” (*compare* Ex. 1001, 4:51-59 (a

3d 142, 170 (D. Mass. 2016) (holding the specification provided “a definition” even though it included the permissive phrase “may include”).

different locations in the disclosure, the relevant question [for anticipation] is whether the reference is sufficiently clear in disclosing the combinability of those elements such that a skilled artisan would at once envisage the claimed combination.” *Chamberlain Grp., Inc. v. Techtronic Indus. Co.*, 935 F.3d 1341, 1350 (Fed. Cir. 2019) (internal marks omitted). Here, *Kim*’s Figure 10 illustrates an example of the “combined button” structure (*compare* Ex. 1004, 3:1-3 with 2:62-67, 3:4-6; Ex. 1022, ¶8). Similarly, *Kim*’s Figure 18 illustrates an “example[]” of the “combined button” structure’s location (*see* Ex. 1004, 17:23-30; Ex. 1022, ¶124). Based on this disclosure, a POSITA would have understood *Kim* clearly discloses the combinability of the combined button’s *structure* in Figure 10 and *placement* in Figure 18 (Ex. 1003, ¶¶108-110). Thus, *Kim* discloses a single invention that anticipates elements [1.c] and [1.d]. *See Chamberlain*, 935 F.3d at 1350; *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1344 (Fed. Cir. 2016).

The testimony of AliveCor’s expert, Dr. Berger, does not support Apple (POR, 19). At no point did Dr. Berger “confirm[] that Figure 18 shows ‘a different embodiment’ than Figure 10” (POR, 19). Rather, when questioned about the Figure 18 “embodiment,” Dr. Berger agreed that “Figure 18 is a different embodiment than Figure 7”—meaning the two figures disclosed different examples of button assembly *placement* (APPLE-2004, 68:6-10; *see also id.*, 65:2-68:10). In doing so, Dr. Berger simply acknowledged that in the context of *Kim*, he understood the word

“embodiment” to be synonymous with “example” (*see also* Ex. 1004, 3:29-30 (“[V]arious *example embodiments* of the present disclosure are described”); Ex. 1022, ¶9; Ex. 1027, 42:7-20). Thus, Dr. Berger explained, *Kim*’s combined button (which is structurally described in Figs. 8-11) could be located in *either* of the Figure 7 and 18 locations (APPLE-2004, 65:17-66:1).⁴

Alternatively, if the Board credits Apple’s “multiple embodiments” argument, Ground 1 *still anticipates* claims 1, 5, 9, and 10 of the ’619 Patent. Even without reference to Figure 18, *Kim* teaches its “combined button” can be placed anywhere on the device without modification.⁵ For example, *Kim* discloses “a power button

⁴ The Board should also disregard the *Arkley* decision cited by Apple (POR, 20) because its reasoning and result were subsequently rejected. *See Ex Parte Germeyer*, No. 10/891,554, 2010 WL 4961695, at *6–7 (B.P.A.I. Dec. 1, 2010) (citing *In re Schaumann*, 572 F.2d 312, 317 (C.C.P.A. 1978)) (“anticipation [does] not require an ‘ipsissimis verbis’ test”).

⁵ As would be readily apparent to the POSITA and disclosed in *Kim*, a button could be placed on any face of the device and could take any of a number of shapes (Pet., 13-15, (citing Ex. 1004, 17:10-12; Ex. 1022, ¶120))). Indeed, without providing any details, the ’619 Patent assumes the POSITA understands how to implement a button on any face of the device (Ex. 1001, 6:30-36, 12:40-47).

(not shown) located on the *lateral surface* of the electronic device 600 may also be the combined button” (Pet., 14 (citing Ex. 1004, 17:10-12); Ex. 1022, ¶120). And the “combined button” is provided with various exemplary structures, including the cross-sectional view depicted in Figure 10(b) and relied upon by the petition. This disclosure is divorced from (and makes no reference to) *Kim*’s Figure 18, rendering Apple’s “embodiments” argument moot.

ii. Apple has not shown Kim fails to render obvious elements [1.c] and [1.d].

The Petition’s Grounds 1 and 2 also demonstrated *Kim* renders obvious claims 1-10 of the ’619 Patent (Pet., 10-47). In response, Apple argues (1) a POSITA would not have been motivated to combine *Kim*’s Figures 10 and 18 with a reasonable expectation of success, and (2) *Kim* fails to render obvious the “biometric sensor” of element [1.c.ii]. Apple’s arguments are meritless.

a. A POSITA would have been motivated to combine Kim’s Figures 10 and 18 with a reasonable expectation of success.

As explained in §II.A.1.i, Figures 18 and 10(b) disclose a single invention that satisfies the “button assembly” of elements [1.c] and [1.d]. If the Board credits Apple’s “embodiments” argument, however, it should still find elements [1.c] and [1.d] are obvious because a POSITA would have been motivated to combine *Kim*’s Figures 10 and 18 with a reasonable expectation of success (Pet., 13-15).

Motivation to Combine. Apple’s contention that a POSITA would have lacked motivation to combine *Kim*’s Figures 10 and 18 is baseless. A POSITA is presumed to have been motivated to combine elements in a single prior art reference. *See General Elec. Co. v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1352 (Fed. Cir. 2020) (“[T]he Board’s approach would require a motivation to combine each element of the claim—even those present together in a reference. This analysis unduly dissects prior art references into collections of individual elements, requiring a party showing obviousness to re-do the work already done in the prior art reference.”). Here, Figures 10 and 18 are indisputably present in a single reference: *Kim*. There can be no reasonable dispute that a POSITA would have been motivated to combine the structure and placement disclosed in *Kim*’s Figures 10 and 18.⁶

⁶ Apple contends a POSITA would not have understood *Kim* to disclose placing a button with Figure 10(b)’s cross-sectional structure on the lateral surface of the device (POR, 29 (citing Ex. 1004, 21:23-26)). But this lacks credibility because, as *Kim* explains, Figure “10(b) shows a ... cross-section view of a combined button” which “***may be implemented*** as an example of the combined button in the display 710” (Ex. 1004, 21:20-26; Ex. 1022, ¶¶166-167). Viewed in context, *Kim*’s combined button can be located on the front surface (Figure 7) or the lateral surface (Figure 18) (Ex. 1004, 17:17-30; Ex. 1022, ¶¶122-124).

Apple argues against motivation to combine because it believes *Kim*'s "descriptions of its Figure 10 embodiment confirm that the inclusion of fingerprint sensors 240p1 and 240p2 is **critical** to the specific type of fingerprint detection technique used by this embodiment" (POR 32). As explained in §II.A.1.ii.b, this argument fails because *Kim* does not require simultaneous use of optical fingerprint sensor 240p1 and capacitive fingerprint sensor 240p2. Regardless, the description of Figure 18 recites a fingerprint sensor in the disclosed button, confirming to the POSITA what was already well known: any combined button on a lateral side would include a functional fingerprint sensor (Ex. 1004, 19:26-30; Ex. 1022, ¶146).

Finally, Apple argues against motivation to combine because *Kim* "teaches that fingerprint sensor 240p2 is 'disposed **between** the cover glass 725 and the touch screen panel 732'" (POR, 32 (emphasis in POR)). As explained below in §II.A.1.ii.b, however, *Kim* is plainly referring to *optional* side sensors (Ex. 1004, 22:24-27; Ex. 1022, ¶178) which AliveCor did not rely on for invalidity.

Thus, a POSITA would have been motivated to combine elements of *Kim*'s Figures 10 and 18.

Reasonable Expectation of Success. The Board should reject Apple's argument that a POSITA would have lacked a reasonable expectation of success in combining the relevant elements of *Kim*'s Figures 10 and 18 (POR, 32-35). Apple insists this combination would have raised challenges in the manufacturing process

and fingerprint detection accuracy (*id.*). But these purported concerns are exaggerated⁷ and contradict *Kim*, which explains a POSITA would have understood the “combined button” may be configured in various shapes without impacting its functionality (*compare* Ex. 1004, 19:13-25 with 17:53-61; *id.*, 3:41-44; Ex. 1022, ¶¶9, 127, 145). Moreover, Apple’s own expert (Dr. Anthony) conceded a POSITA would have understood how to implement various buttons in various devices and locations (Ex. 1027, 59:21-60:5).⁸

Apple also argues against reasonable expectation of success based on Dr. Berger’s testimony (POR, 33-35). But Dr. Berger explained that while “a relatively small central home button on that front view in Figure 10a may be advantaged by having additional sensors ... if you had a larger longer, button, ... [such as] in the other embodiment in Figure 18, ... it may not require that” (APPLE-2004, 102:2-

⁷ *Kim*’s description of button assembly placement is similar to the description in ’619 Patent, which states: “The button assembly 110 may be disposed on ***any of several locations of the electronic device 100***” (Ex. 1001, 6:30-48). Like *Kim*, the ’619 Patent recognizes implementing various button locations across various devices would be trivial for a POSITA.

⁸ Apple’s argument regarding physical combinability is also contrary to law. *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983).

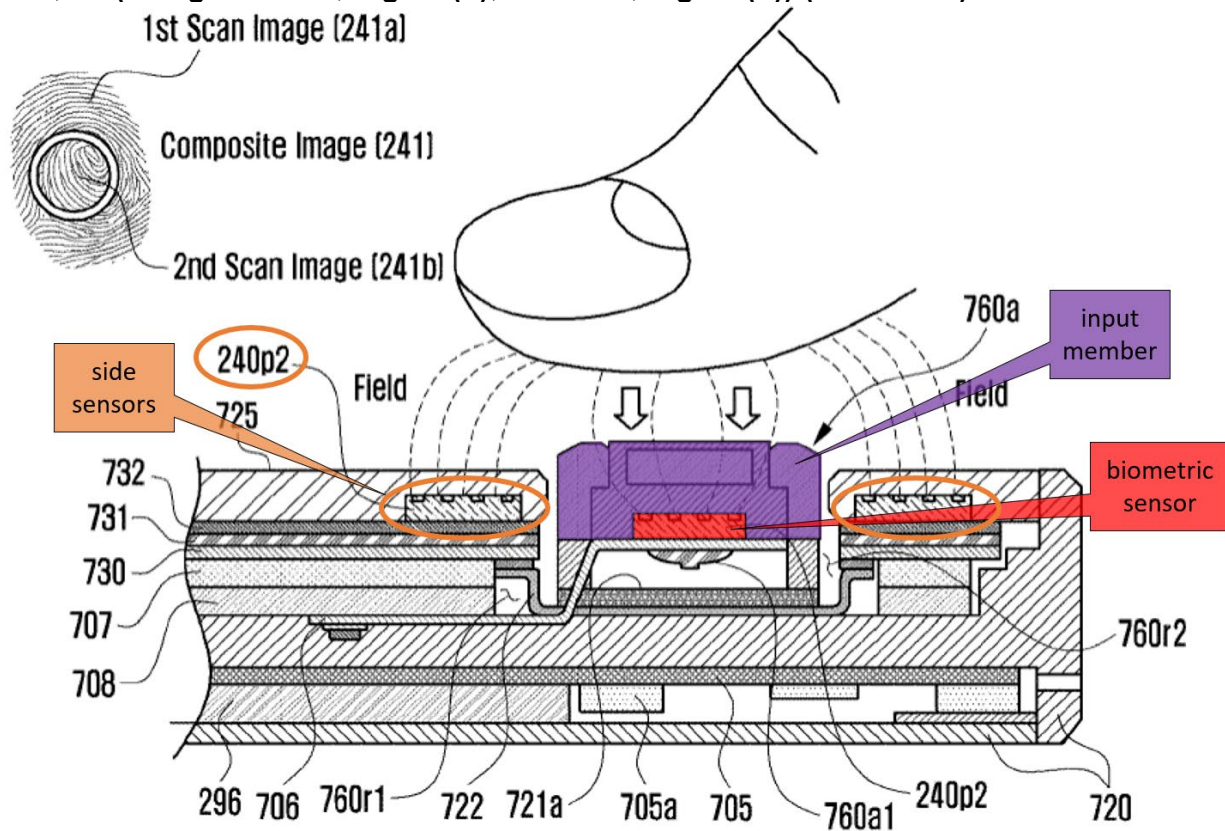
12). Contrary to Apple’s suggestion, Dr. Berger testified a POSITA *would* have had a reasonable expectation of success in implementing a fingerprint sensor in the button assembly of Figure 18; which is confirmed by *Kim* itself (Ex. 1004, 19:26-30; Ex. 1022, ¶146).

Thus, a POSITA would have had a reasonable expectation of success in combining the relevant elements of *Kim*’s Figures 10 and 18.

b. Kim renders obvious the “biometric sensor” of element [1.c.ii].

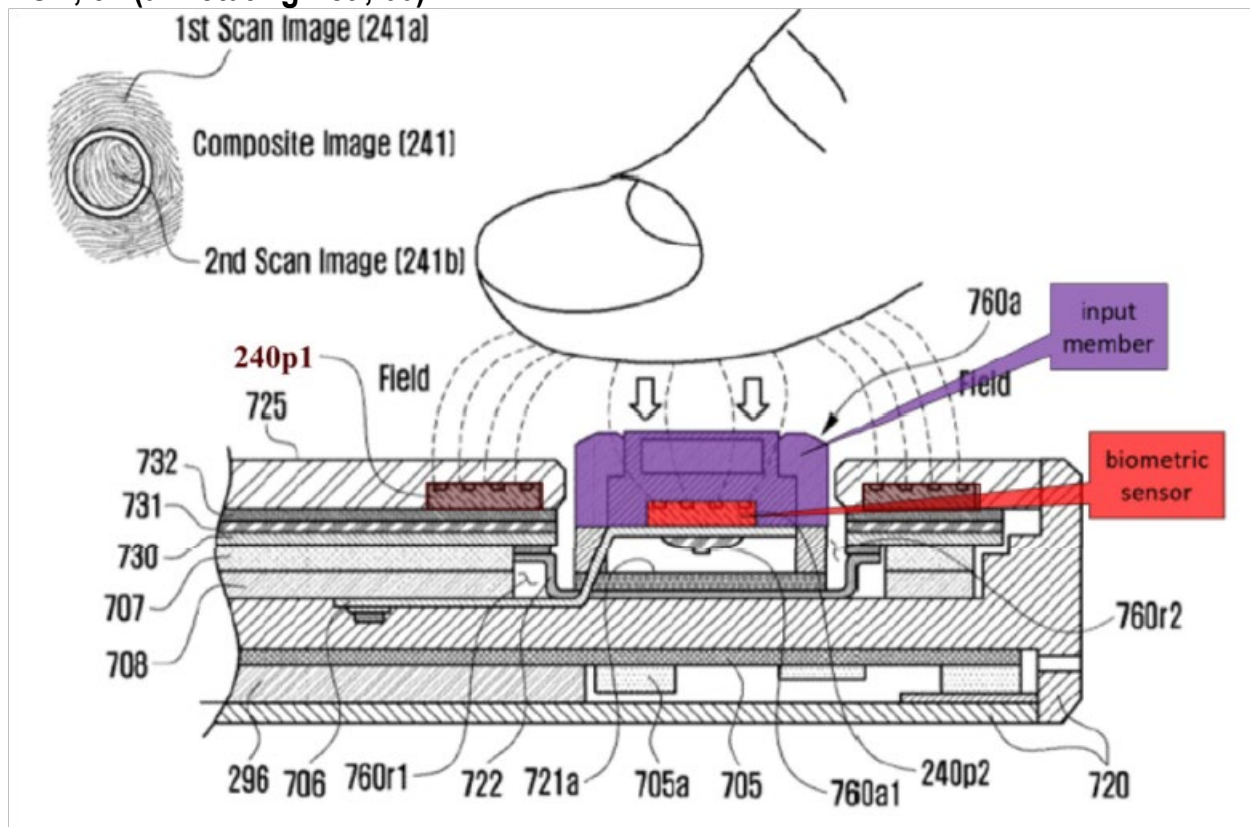
Kim discloses a biometric sensor (capacitive fingerprint sensor 240p2, red) that is “positioned below the input member” as recited in element [1.c.ii] (Pet., 18-21):

Pet., 19 (citing Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)) (annotated)



Apple implicitly concedes the “biometric sensor” (red) is “positioned below the input member” (POR, 35-36 (citing Pet., 60)). Because the claim merely requires a single biometric sensor positioned below the input member, this *should* resolve any dispute on whether element [1.c.ii] is met. Yet Apple manufactures an argument based on two side sensors also labeled 240p2 (orange, above). Apple contends the circled label “240p2” is a typo that should state “240p1” (POR, 35 n.5):

POR, 37 (annotating Pet., 60)



According to Apple, these side sensors are required parts of the “biometric sensor” (POR, 37-38). And when included, says Apple, element [1.c.ii] is not met because the side sensors are not “positioned below the input member” (purple) (POR, 36-37). Apple’s argument is deeply flawed for several reasons.

First, Apple’s assertion that Figure 10(b) includes a purported typo lacks credibility. Apple’s *only* support is *Kim*’s 22:14-17 and 21:63-22:3 (see POR, 35 n.5, 37).⁹ But 22:14-17 explains the sensor(s) in Figure 10(b) can either be a

⁹ Apple’s citation “Ex-1004, 2:63-22:3” presumably refers to 21:63-22:3 (POR, 37).

“capacitive fingerprint sensor 240p2” or, “[a]*lternatively*, [an] optical fingerprint sensor 240p1” (*see also* Ex. 1022, ¶177) And 21:63-22:3 uses permissive “may” language to indicate that the side sensors in Fig. 10(b) are *optional* (*see also* Ex. 1022, ¶174). Neither suggests Figure 10(b) *requires* a “fingerprint sensor assembly” that “relies on data collected by *each of fingerprint sensors 240p1 and 240p2* to generate a composite fingerprint image” (POR, 37).

Apple’s purported typo also contradicts *Kim*’s specification, which is consistent with Figure 10(b) (Ex. 1004, 22:18-27 (“*another capacitive fingerprint sensor 240p2* may be further disposed between the cover glass 725 and the touch screen panel 732”); Ex. 1022, ¶178). Rather than concede this, Dr. Anthony doubled down and testified the specification’s reference to “240p2” was *also* a typo (Ex. 1027, 126:12-127:16). To credit Apple’s misinterpretation of Figure 10(b), therefore, the Board must find *Kim* made the same typo in both Figure 10(b) and the corresponding specification.

Second, the Board should reject Apple’s false premise that the side sensors are required parts of the “biometric sensor” (POR, 37-38). *Kim* consistently indicates those sensors are optional (Ex. 1004, 22:14-17, 22:24-30; Ex. 1022, ¶¶177-179) and the disclosed button assembly *may*—but does not have to—include side sensors. The side sensors are *not* required parts of the “biometric sensor.”

Thus, Apple has not shown *Kim* fails to render obvious elements [1.c] and [1.d].

2. Ground 3

Ground 3 demonstrates the *Jung-Myers* combination renders obvious claims 1 and 3-10 of the '619 Patent (Pet., 47-80). In response, Apple argues (1) a POSITA would not have been motivated to combine *Jung* and *Myers* with a reasonable expectation of success, and (2) the combination fails to render obvious elements [1.a] and [1.c]. The Board should reject these arguments.

i. Apple has not shown lack of motivation or reasonable expectation of success in combining Jung and Myers.

Motivation to Combine. Apple argues against motivation to combine because *Jung* does not explicitly disclose “an apparent reason to combine the known elements” (POR, 38-40). There is no “rule of law that an express, written motivation to combine must appear in prior art references... a court or examiner may find a motivation to combine prior art references in the nature of the problem to be solved.” *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1276 (Fed. Cir. 2004). Here, the Petition and Dr. Berger provided a reasoned, corroborated explanation why the nature of the problem to be solved would have prompted a POSITA to combine *Jung* and *Myers*. Specifically, a POSITA would have known it was important to seal a fingerprint sensor to protect its electronic circuitry (Pet., 50-51 (citing Ex. 1008, Ex. 1003, Ex. 1005)). This analysis was more than sufficient.

Moreover, Apple’s contention that *Jung* “does not contemplate any button assembly with an incorporated fingerprint sensor” is meritless (POR, 39). *Jung* discloses a device with “a body, a display device disposed in the body, a key disposed in the body, and a key-waterproof structure” but does not disclose the structure of the “key disposed in the body” (Pet., 47, 50 (citing Ex. 1005, [0012])). *Jung* does, however, explain that “other keys for performing various functions rather than the home-key may be applied to the key-waterproof structure of the present disclosure” (Pet., 55-56 (citing Ex. 1005, [0123])). The *Myers* button structure is precisely the type of “other key[] for performing various functions” that *Jung* explicitly contemplates being used with its key-waterproof structure. Thus, a POSITA would have looked to *Myers* to disclose the structure of a “key disposed in the body” which can implement “various functions” “to enhance the user’s convenience” such as a “fingerprint sensor” (Pet., 49-51; *see also* APPLE-2004, 119:4-120:10; Ex. 1005, [0060]).

The Board should also reject Apple’s suggestion that AliveCor is employing hindsight bias by alleging that *Myers* (a “secondary” reference) would have been modified to incorporate features of *Jung* (the “primary reference”) (POR, 41-43). Apple is factually wrong because AliveCor contended *Jung* would have been modified to incorporate features of *Myers* (Pet., 50). Regardless, “characterizing references ‘as ‘primary’ and ‘secondary’ is merely a matter of presentation with no

legal significance.” *Schwendimann v. Neenah, Inc.*, 82 F.4th 1371, 1384 (Fed. Cir. 2023) (collecting cases).

Apple’s references to Dr. Berger’s testimony are a red herring (POR, 41-43). Dr. Berger opined that “the waterproofing structure of [*Jung*] is particularly adapted to prevent [fluid and dirt and grime] from getting into the electronics of the device” (APPLE-2004, 124:17-19). Based on that, Apple urges, “Dr. Berger only identified motivations for modifying [*Myers*] in view of [*Jung*]” (POR, 41). Not so. When Apple suggested Dr. Berger would combine “the button structure of Meyers with the seal of [*Jung*]” “to improve its waterproofing” and “its seal characteristics,” Dr. Berger explained (1) that wasn’t a fair characterization of his opinions, (2) *Jung* “provides an understanding of how to create a waterproof seal for a button,” (3) *Jung* “explains what that button is supposed to do,” and (4) “one who wants to manufacture a button that has those function” would turn to *Myers* (APPLE-2004, 119:4-120:10).¹⁰

¹⁰ Apple’s reference to the Petition’s annotations of *Myers*’s Figure 1 and *Jung*’s Figure 10 (POR, 42) are also misleading. The Petition merely depicts the relative location of components when “the button assembly of [*Myers*] is inserted into the opening of the bracket 40” of *Jung* (Pet., 63-64).

Finally, the Board should dismiss Apple’s argument that a POSITA would not combine *Jung* with *Myers* because *Myers* already discloses a gasket, and “[a] POSITA thus would not have perceived any benefit from incorporating [*Jung*’s] key-waterproofing structures into [the *Myers*] button assembly” (POR, 43). “That a particular piece of prior art achieves a desirable goal to some extent hardly means that relevant artisans would have lacked a motivation to achieve the goal to a greater extent.” *L’Oreal USA, Inc. v. Olaplex, Inc.*, 844 F. App’x 308, 319 (Fed. Cir. 2021). Any additional sealing would further achieve the known goal of preventing ingress of potentially damaging moisture and dust (Ex. 1003, ¶242; *see also* APPLE-2004, 120:19-123:16). Moreover, while *Myers* discloses a gasket, *Jung* does not disclose a structure for a button assembly. Thus, a POSITA implementing *Jung*’s waterproof sealing structure would have looked to the *Myers* button assembly.¹¹

¹¹ For similar reasons, the Board should reject Apple’s argument that *Myers* “already discloses a flexible element 116” rendering *Jung*’s “flexible printed circuit board 30 unnecessary” (POR, 44). Specifically, a POSITA “would understand that substituting the button assembly of [*Myers*] in place of home-key H would result in the flexible conduit being coupled (directly or *indirectly*) to the biometric sensor disposed in the [*Myers*] button assembly” (*see, e.g.*, Pet., 65-66 (citing Ex. 1003, ¶¶282-283); Ex. 1027, 160:13-162:8).

Thus, a POSITA would have been motivated to combine *Jung* with *Myers*.

Reasonable Expectation of Success. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.” *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (citation omitted); *see also In re Sneed*, 710 F.2d at 1550. Instead, the proper analysis is “whether ‘a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.’” *Allied Erecting*, 825 F.3d at 1381 (citing *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007)). The Board should disregard Apple’s arguments regarding reasonable expectation of success.

First, Apple argues against a reasonable expectation of success because of purported “disadvantages” (POR, 43-44). As explained in §II.A.1.ii.a, Apple’s concerns are exaggerated. Indeed, Apple’s only support is the testimony of Dr. Anthony (POR, 43 (citing APPLE-2009, ¶¶92-95)). But Dr. Anthony’s analysis regarding purported “disadvantages” and “challenges” is entirely uncorroborated (*see* APPLE-2009, ¶¶92-95 (incorporating ¶¶74-76, which lack corroboration)). This testimony therefore deserves little (if any) weight. *Velandier v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004). Moreover, Apple fails to explain why the use of “non-planar

structures” would have “complicated the manufacturing process” (or even identified what those structures were).¹²

Second, Apple argues against a reasonable expectation of success because *Myers*’s fingerprint sensor is located above its button support plate 122 (POR, 45). But Apple ignored that *Jung*’s PCB 30 explicitly includes a bent “key bonding portion 38” precisely for insertion under the bottom surface of a button assembly (e.g., *Myers*’s button support plate), while still allowing attachment to a higher button assembly (*see, e.g.*, Ex. 1005, Figs. 5, 10). A POSITA would have attached “key bonding portion 38” to *Myers*’s fingerprint sensor, which would have resulted in sandwiching *Jung*’s PCB 30 between *Jung*’s seal and *Myers*’s button support plate 122 (Pet., 65-66 (citing Ex. 1003, ¶¶279-284)). Contrary to Apple’s position, a POSITA would *not* have routed *Jung*’s flexible PCB 30 above *Myers*’s button support plate 122 (POR, 45).

Third, Apple argues against a reasonable expectation of success because it believes a POSITA would have implemented *Jung*’s dome switch, not *Myers*’s dome

¹² Indeed, the ’619 Patent similarly contains no disclosure regarding alleged difficulties with (or proposed solutions for) locating a button assembly, including a non-planar button assembly, in a sidewall (Ex. 1001, 6:30-36, 12:40-47).

switch (POR, 45-46). Ground 3 does not allege the *Jung-Myers* combination renders the dome switch obvious, making Apple’s argument irrelevant (Pet., 47).

Thus, a POSITA would have had a reasonable expectation of success in combining *Jung* with *Myers*.

ii. Apple has not shown that the Jung-Myers combination fails to render obvious elements [1.a] and [1.c].

Apple’s argument that the *Jung-Myers* combination fails to render obvious elements [1.a] and [1.c] because the resultant button assembly would not have been positioned in the sidewall is meritless (POR, 46-47). According to Apple, “the cited portion of [*Jung*] ... fails to disclose, teach, or suggest any particular location of a ‘home-key’” (POR, 46-47). But *Jung* teaches its “key-waterproof structure” can be applied to “other keys for performing various functions” (Pet., 55-56 (citing Ex. 1005, [0037], [0123]; Ex. 1003, ¶¶252-254)). As examples, the Petition identifies other electronic devices described by *Jung*—including a “wrist watch”—which a POSITA would have understood includes a key located in a sidewall (Pet., 55-56; Ex. 1005, [0037]). Apple’s Response ignores this analysis.¹³ Moreover, Apple’s expert agreed a POSITA would understand how to implement various buttons in various locations (Ex. 1027, 57:22-60:13). Based on this disclosure, a POSITA

¹³ Apple references its analysis regarding the “sidewall” limitation in Grounds 1-2 which is meritless as explained in §II.A.1 above.

would have had ample motivation to position *Jung*'s button assembly in an opening formed in the sidewall (Pet., 52-56).

3. Ground 4

i. *Apple has not shown lack of motivation or reasonable expectation of success in implementing Chang's non-annular sealing member.*

As explained in the Petition, a POSITA would have been motivated to implement *Chang*'s non-annular sealing member with a reasonable expectation of success (Pet., 94-101). The Board should reject Apple's arguments to the contrary.

Chang discloses a non-annular sealing member. Apple argues against AliveCor's proposed implementation as purportedly lacking support in *Chang*'s disclosure (POR, 48-51). But *Chang* teaches its "first sealing member 600 [(mapped to element [1.d]'s "seal")], ***may*** be designed in an annular shape" (Pet., 96 (citing Ex. 1015, 14:24-29, Fig. 3)). *Chang* also discloses this as an "***alternative***[]" implementation (Pet., 96 (citing Ex. 1015, 14:24-29)). Based on this disclosure, a POSITA would have understood *Chang* also discloses a "first sealing member 600" *not* in an annular shape (*id.*).¹⁴ And when sealing member 600 is implemented in a

¹⁴ Because *Chang* discloses both annular and non-annular implementations, Ground 4 does not require "altering a structure of sealing member 600" or "changing the annular shape of sealing member 600" (POR, 47).

non-annular shape, there is “sandwich[ing]” (element [1.f]). AliveCor’s proposed implementation *does* have support in *Chang*’s explicit disclosure.

Apple also insists the following *Chang* disclosure does not “seem specifically relevant” (POR, 50):

- 10:13-21 teaches *Chang*’s fingerprint sensor includes “circuit region 453” with “a plurality of contact points” which are “electrically contacted with another printed circuit board”
- 10:32-42 teaches *Chang*’s fingerprint sensor “may have an oval shape” but also “may be variously modified and designed”
- 10:59-11:3 teaches *Chang*’s design is “not limited to the ring shape”
- 11:36-41 teaches *Chang* may implement “various shapes of conductive members”
- Figure 7A depicts a size and shape of “circuit region 453.”

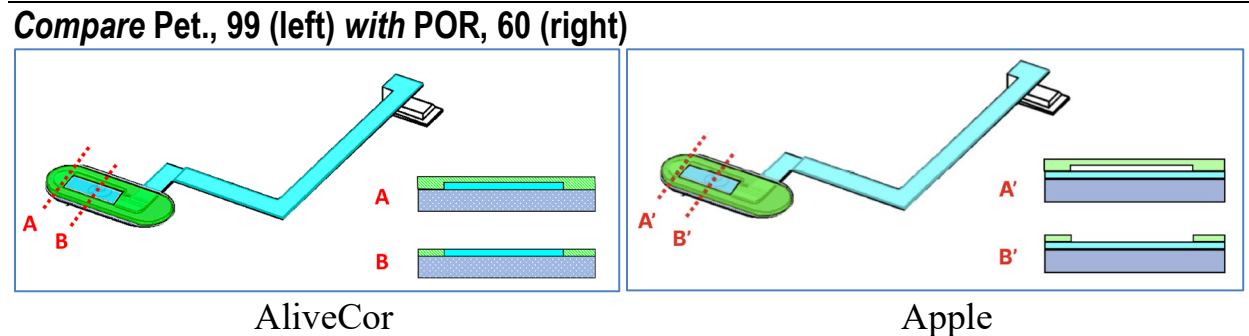
Viewed in context, however, these passages (and others) explain *Chang*’s non-annular seal “would allow for the maximum sealing surface” between *Chang*’s fingerprint sensor (above the seal) and *Chang*’s sealing surface (below the seal), while still allowing for a connection between the circuit region 453 and flexible PCB (Pet., 97).

Thus, a POSITA would have implemented *Chang*’s non-annular sealing member.

Reasonable Expectation of Success. The Board should reject Apple’s argument that a POSITA would not have had a reasonable expectation of success because “the size of the circular portion of conductive member 500 is larger than the size of the rectangular window” depicted in the Petition (POR, 52-58).¹⁵ *Chang* clearly explains “circuit region 453” of fingerprint recognizing member 450 includes “a plurality of contact points ... to be electrically contacted with another printed circuit board” (Pet., 95; Ex. 1015, 10:13-21). So *Chang*’s non-annular sealing member 600 “would have been constructed” such that “the opening is in the shape of the ‘contact points formed on the lower portion [of the fingerprint recognizing member 450] to be electrically contacted with another printed circuit board’ such as flexible conductive member 500” (Pet., 96-97 (citing Ex. 1015, 10:13-21; Ex. 1003, ¶399)). Indeed, Apple’s expert conceded a POSITA would have been “familiar with multiple ways” to electrically connect *Chang*’s conductive member 500 and fingerprint recognizing member 450 (Ex. 1027, 156:21-162:8; *see also* Ex. 1015, 13:1-10). Because the opening in non-annular sealing member 600 is sized to allow electrical contact, Apple’s argument is meritless (POR, 52-58).

¹⁵ Apple’s definition of the “circular portion” of the conductive member 500 is shown at POR, 53.

Apple also argues against reasonable expectation of success because “sealing member 600 would have stacked on top of the conductive member 500” due to alleged “size differences” between the seal and conductive member (POR, 58-60). Accordingly, Apple provides purportedly “corrected” cross-sections (below, right):



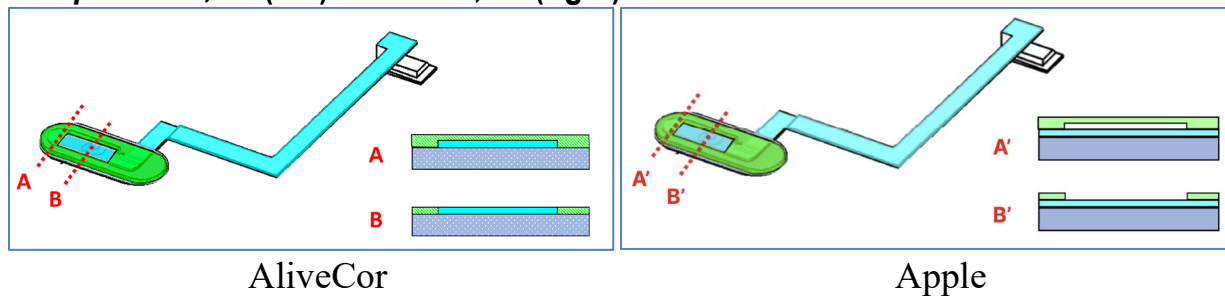
(POR, 60). But Apple’s “corrected” cross-section is incorrect at least because (1) the seal (green) is flexible and, when placed in compression during the assembly process would not result in a cavity around section cut “A”, and (2) conductive member 500 does not span the full width of the lower plate 470 (depicted in dark blue). Thus, Apple’s alleged “stacking” would not prevent a POSITA from implementing *Chang’s* non-annular sealing member.

Thus, a POSITA would have had a reasonable expectation of success in implementing *Chang’s* non-annular sealing member.

ii. Apple has not shown Chang fails to render obvious element [1.f].

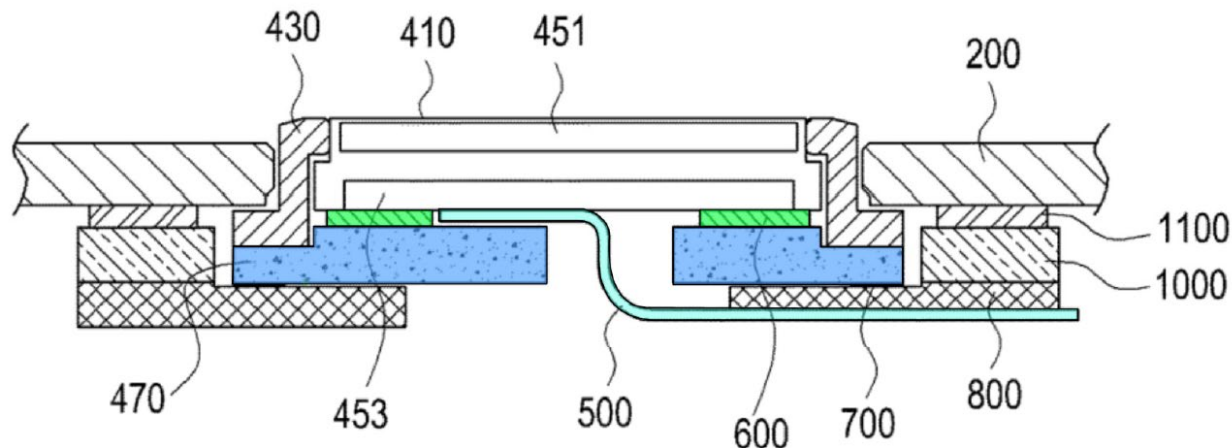
As explained §II.A.3.i above, when *Chang’s* sealing member 600 is implemented in a non-annular shape, there is “sandwich[ing]” (element [1.f]):

Compare Pet., 99 (left) with POR, 60 (right)



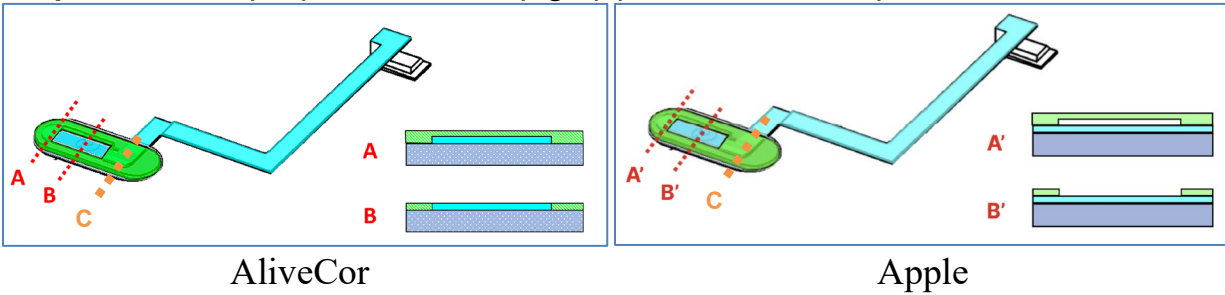
The “sandwich[ing]” occurs at cross-sectional cut “A,” under both AliveCor’s and Apple’s interpretations of *Chang* (*see also* Pet., 98-101). In its response, Apple tries to deny this based on *Chang*’s Figure 10:

POR, 62 (annotating Ex. 1015, Fig. 10)



But Figure 10 is irrelevant because it illustrates a cross-sectional cut occurring at a *different* location, marked “C” below:

Compare Pet., 99 (left) with POR, 60 (right) (further annotated)



The Board should therefore reject Apple’s arguments and find *Chang* renders obvious element [1.f].

B. Claim 4

The Petition explained a POSITA would have known (1) “overmolding refers to a technique in which a material (*i.e.*, epoxy resin) is injected, poured or otherwise loaded into a space to surround another component, then cured so it forms a hard casing or overmold around the component,” (2) “components would have been sealed by an overmolding process so they are liquid-tight,” and (3) “other, mechanical methods” do not “provide[] for a liquid-tight seal” (Pet., 40, 71). Significantly, neither Apple nor its expert dispute AliveCor’s interpretation of overmolding (Ex. 1027, 91:8-93:15, 96:16-17).

1. Ground 2

Ground 2 properly demonstrates *Kim* renders obvious claim 4 by referring to disclosures referenced in elements [1.d], [1.f], and [3.b] (Pet., 40).¹⁶ In relevant part, AliveCor’s expert explained that (1) *Kim* discloses a seal adjacent a portion of the flexible conduit, (2) a POSITA would have known a liquid-tight seal is essential for waterproofing delicate electronic components, and (3) a “common technique to add a seal was to use an overmolding process”¹⁷ (Ex. 1003, ¶¶204-207; *see also* Ex. 1003, ¶¶47-52). And the Petition correctly concludes a POSITA would have

¹⁶ Thus, Apple incorrectly argues the Petition “fails to cite to [*Kim*] in mapping claim 4” (POR, 63-65).

¹⁷ Dr. Berger identified numerous prior art examples of overmolding in §VI.B of his report to corroborate his opinions (Ex. 1003, ¶207 (incorporating §VI.B by reference)). For example, *Wagman* discloses components “can be sealed by an overmolded portion 2830 so they are liquid-tight” (Ex. 1019, 39:44-46) and *Dave* discloses “hard material 46 around a boot of soft material (e.g., overmolded silicon or rubber) ... that engages or forms a friction seal onto the surface” (Ex. 1020, [0052]) (Ex. 1003, ¶52).

understood *Kim*'s seal to be "overmolded around the portion of the flexible conduit in order to enhance the quality of the seal" (Pet., 41).¹⁸

Apple's rejoinders deserve no credence. *First*, according to Apple, if *Kim*'s seal were formed by "overmold[ing]," then *Kim* would not include recess 760r1 (POR, 66-67). But no claim language requires overmolding around *every* component; instead, the claimed seal "is overmolded *around the portion of the flexible conduit*" that is sandwiched (Ex. 1001, Cls. 1, 4). And Figure 10(b) makes clear the seal "surround[s] another component" (i.e., the portion of the flexible conduit), and "forms a hard casing or overmold around the component" (Pet., 40). This is entirely consistent with the undisputed interpretation of "overmolding" applied by AliveCor and Dr. Berger (Pet., 40-41; Ex. 1003, ¶¶203-208). *Second*, Apple suggests Dr. Berger did not opine that overmolding would have been obvious to try by myopically focusing on the word "*could*" (POR, 64-66). But that is undermined by Apple's own admission "that there are several common techniques used to achieve water resistance in electronic devices" including overmolding (POR, 66). Because overmolding was indisputably one among a finite number of identified,

¹⁸ Whether Dr. Berger has "personally been involved in overmolding" is irrelevant (POR, 66). *SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010).

predictable solutions for providing a liquid-tight seal (*see* Ex. 1003, ¶¶47-52), a POSITA would have found it obvious to try. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Thus, Apple has not shown *Kim* fails to render obvious the “overmolded” limitation.

2. Ground 3

Ground 3 properly demonstrates the *Jung-Myers* combination renders obvious claim 4 because *Jung*’s “silicon rubber [is] sealed through insert injection” (Pet., 71 (citing Ex. 1005, [0122])), which a POSITA would have understood as overmolding “around the portion of the flexible conduit to enhance the quality of the seal” (Pet., 71 (citing Ex. 1003, ¶¶309-310)).

Apple does not dispute that *Jung*’s flexible conduit is sandwiched against its seal; that the seal is “sealed through insert injection”; or that AliveCor and its expert have properly interpreted “overmold[ing]” (POR, 67-70). Yet Apple disputes AliveCor’s conclusion because *Jung* discloses that a separate component (the “silicon-not-attached portion”) is applied after the silicon rubber is sealed through insert injection. This misses the point. Because *Jung*’s insert-injected seal (mapped to the silicon rubber 50) is overmolded around the portion of the flexible conduit (mapped to the flexible circuit board 30), it is irrelevant whether the “silicon-not-

attached portion” is applied later. The Board should therefore find the *Jung-Myers* combination renders obvious claim 4.

Thus, Apple has not shown the *Jung-Myers* combination fails to render obvious the “overmolded” limitation.

III. CONCLUSION

Petitioner requests cancellation of the Challenged Claims.

Date: July 24, 2024

By: /Christopher TL Douglas /
Christopher TL Douglas

CLAIMS APPENDIX

Claim	Recitation
[1.pre]	An electronic device comprising:
[1.a]	an enclosure having an enclosed volume and an opening formed in a sidewall;
[1.b]	a processor positioned in the enclosed volume;
[1.c]	a button assembly within the opening, the button assembly comprising: an input member having an input surface; and a biometric sensor positioned below the input member and configured to produce an output signal in response to a touch on the input surface, the output signal corresponding to a biometric characteristic;
[1.d]	a seal positioned between a sealing surface of the button assembly and the enclosure; and
[1.e]	a flexible conduit coupled to the biometric sensor and configured to transmit the output signal to the processor; wherein:
[1.f]	a portion of the flexible conduit is sandwiched between the seal and the sealing surface or between the seal and the enclosure.
[2.pre]	The electronic device of claim 1, wherein the button assembly further comprises:
[2.a]	a tactile dome switch configured to compress in response to a press on the input surface;
[2.b]	a plunger positioned below the biometric sensor and above the tactile dome switch, the plunger displacing and compressing the tactile dome switch in response to the press on the input surface; and
[2.c]	a retainer defining an aperture housing the plunger; wherein
[2.d]	the retainer defines the sealing surface of the button assembly.
[3.pre]	The electronic device of claim 1, wherein:
[3.a]	the seal includes a gasket and a pressure sensitive adhesive (PSA) layer; and
[3.b]	the portion of the flexible conduit is positioned between the gasket and the sealing surface of the button assembly.
4	The electronic device of claim 1, wherein the seal is overmolded around the portion of the flexible conduit.
5	The electronic device of claim 1, wherein the flexible conduit passes through an aperture in the seal.

Claim	Recitation
6	The electronic device of claim 1, further comprising a passage extending from the opening to the enclosed volume, wherein the flexible conduit passes through the passage.
[7.pre]	The electronic device of claim 6, wherein:
[7.a]	an enclosure shelf is defined at the bottom of the opening;
[7.b]	the passage is formed in the enclosure shelf; and
[7.c]	the seal encircles the passage.
8	The electronic device of claim 6, wherein the portion of the flexible conduit encircles the passage.
9	The electronic device of claim 1, wherein the biometric sensor is a fingerprint sensor and the biometric characteristic is a fingerprint.
10	The electronic device of claim 1, wherein: the biometric sensor comprises an array of capacitive sensing elements that are configured to detect either or both of ridges and grooves of a user's finger.

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 5,599 words, which is less than the 5,600 allowed under 37 CFR §42.24(c)(1).

Date: July 24, 2024

By: / Christopher Douglas /
Christopher 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 PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE and all associated exhibits were served via electronic mail to the following attorneys of record for Patent Owner:

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