UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIVECOR, INC.,
Petitioner

v.

APPLE INC.,
Patent Owner

Case No. IPR2023-00949
U.S. Patent No. 10,866,619

PATENT OWNER'S NOTICE OF APPEAL

Patent Owner Apple Inc. hereby provides notice of its appeal to the United States Court of Appeals for the Federal Circuit from the Final Written Decision of the Patent Trial and Appeal Board entered on January 7, 2025, in IPR2023-00948 (Paper No. 29) ("Final Written Decision"), and from all underlying findings, determinations, rulings, opinions, orders, issues, and decisions regarding the *inter partes* review of U.S. Patent No. 10,866,619 (the "'619 patent"). *See* 35 U.S.C. §§ 141–142, 319; 37 C.F.R. §§ 90.2–90.3; Fed. R. App. P. 15; Fed. Cir. R. 15. This notice is timely under 37 C.F.R. § 90.3, having been filed no later than 63 days after the Final Written Decision.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Apple states that the issues on appeal include, but are not limited to: the Board's conclusion that claims 11–14 and 16–20 of the '619 patent are unpatentable; and any findings, analysis, or determinations supporting or related to that issue, including on motivation to combine, as well as all other issues decided adversely to Apple Inc. in any orders, decisions, rulings, or opinions in this proceeding.

This notice is being electronically filed with the clerk's office for the United States Court of Appeals for the Federal Circuit, along with payment of the required docketing fee. In addition, a true and correct copy of this notice is being filed simultaneously with the Director of the United States Patent and Trademark Office.

Dated: March 10, 2025

Respectfully submitted,

/Ryan Chowdhury/

W. Karl Renner, Reg. No. 41,265
Jeremy Monaldo, Reg. No. 58,680
Ryan Chowdhury, Reg. No. 74,466
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
Tel: (202) 783-5070
Fax: (877) 769-7945

Attorneys for Patent Owner

CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on March 10, 2025, a complete and entire copy of this Patent Owner's Notice of Appeal was provided via email to the Petitioner by serving the correspondence address of record as follows:

Christopher TL Douglas
Scott M. Stevens
J. Ravindra Fernando
Thomas F. Finch
Erin Beaton
Alston & Bird LLP
christopher.douglas@alston.com
scott.stevens@alston.com
ravi.fernando@alston.com
thomas.finch@alston.com
erin.beaton@alston.com

Pursuant to 37 C.F.R. §§ 90.2(a)(1), I hereby certify that in addition to being filed electronically through the Board's P-TACTS System, this Patent Owner's Notice of Appeal is being provided to the Director of the USPTO on March 10, 2025, by electronically filing to the email address as follows:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
efileSO@uspto.gov

I hereby certify that on March 10, 2025, a true and correct a copy of the foregoing Patent Owner's Notice of Appeal, along with a copy of the Final Written Decision, was filed electronically with the Clerk's Office of the United States Court of Appeals for the Federal Circuit, at the following address:

United States Court of Appeals for the Federal Circuit
717 Madison Place, N.W., Suite 401
Washington, DC 20005

Dated: March 10, 2025

Respectfully submitted,

/Ryan Chowdhury/

W. Karl Renner, Reg. No. 41,265
Jeremy Monaldo, Reg. No. 58,680
Ryan Chowdhury, Reg. No. 74,466
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
Tel: (202) 783-5070
Fax: (877) 769-7945

Attorneys for Patent Owner

Trials@uspto.gov
571-272-7822

Paper 29
Date: January 7, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIVECOR, INC.,
Petitioner,

v.

APPLE INC.,
Patent Owner.

Case IPR2023-00949
Patent 10,866,619 B1

Before KEN BARRETT, SCOTT A. DANIELS, and ROBERT L. KINDER, *Administrative Patent Judges.*

DANIELS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

AliveCor, Inc., ("AliveCor" or "Petitioner"), filed a Petition requesting *inter partes* review ("IPR") of claims 11–20 of U.S. Patent No. 10,866,619 B1 (Ex. 1001, "the '619 patent"). Paper 2 ("Pet."). Concurrently with this proceeding, and in accordance with guidance in our Consolidated Trial Practice Guide, ("Trial Practice Guide" or "CTPG"), Petitioner filed a parallel petition, IPR2023-00948, challenging claims 1–10 in the '619 patent.[1] Paper 3 ("Pet. Reasons"). Apple Inc., ("Apple" or "Patent Owner"), filed a Preliminary Response to the Petition, mainly objecting to Petitioner's parallel petitions. Paper 7 ("Prelim. Resp.").

Following our Institution Decision, (Paper 8, "Inst. Dec."), in which we declined to exercise our discretion not to institute trial, Patent Owner filed a Response (Paper 16 ("PO Resp.")). *See* Inst. Dec. 22–31. Petitioner subsequently filed a Reply. Paper 21 ("Pet. Reply"). Patent Owner then filed a Sur-Reply. Paper 24 ("PO Sur-Reply"). An oral hearing was held on Sept 25, 2024. A transcript of the hearing has been entered as Paper 28. ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons explained below, we determine that Petitioner has met its burden of showing by a preponderance of the evidence that claims 11–14 and 16–20 are unpatentable. Petitioner has not met its burden of showing that claim 15 is unpatentable.

[1] Our CTPG is available at https://www.uspto.gov/about-us/news-updates/consolidated-trial-practice-guide-november-2019

A. Real Parties in Interest

Petitioner states that AliveCor, Inc. is the real party in interest. Pet. 111. Patent Owner states that Apple, Inc. is the sole real party in interest. Paper 4, 1.

B. Related Matters

The parties indicate that the '619 patent is at issue in *Apple Inc. v. AliveCor, Inc.*, Case No. 4:22-cv-07608, in the U.S. District Court for the Northern District of California. Pet. 114; Paper 4, 1. Petitioner filed another request for *inter partes* review including the '619 patent which the Board instituted, namely IPR2023-00948. Pet. 114. Petitioner indicates it has also filed a request for *inter partes* review of U.S. Patent No. 10,076,257 in IPR2023-00950. *Id.*

C. The '619 Patent (Ex. 1001)

The '619 patent issued December 15, 2020 and is titled "Electronic Device Having Sealed Button Biometric Sensing System." Ex. 1001, code (54). The '619 patent describes a biometric button assembly having an input member, e.g., a button, that is configured to receive inputs, for example a fingerprint and finger press from a user of the electronic device. *Id.* at code (57). Figure 1 of the '619 patent is reproduced below as annotated by the Board.

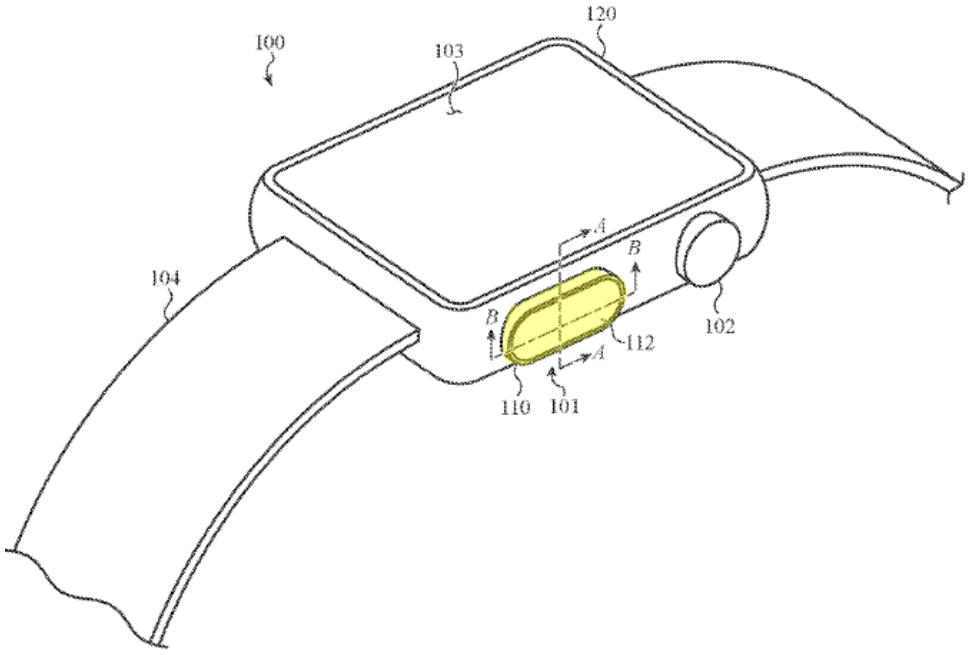


FIG. 1

Annotated Figure 1 illustrates electronic device 100, e.g., a watch, including biometric button assembly 110 highlighted in yellow. Figure 2 B, as highlighted by the Board, is reproduced below.

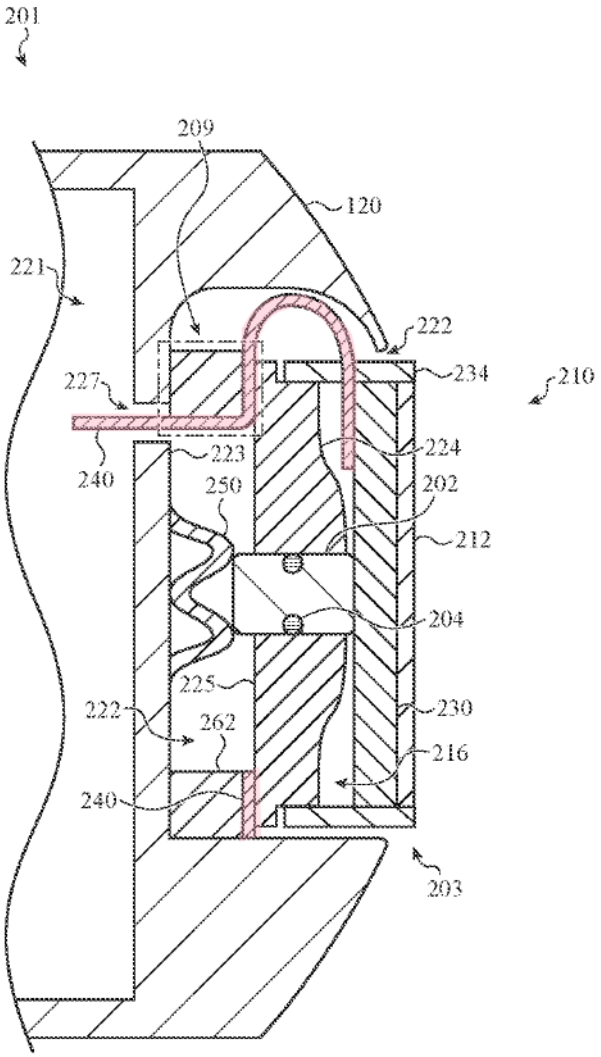


FIG. 2B

Annotated Figure 2B illustrates a cross sectional view of biometric button assembly 210 including button housing 203 in a depressed state. *Id.* at 8:41–45. Button housing 203 includes biometric sensor 230 and flexible conduit 240, highlighted in pink, that "receives the output signal of the biometric sensor 230 and provides the output signal to the processor of the electronic device 100." *Id.* at 9:11–13. Button housing 203 can be depressed by a user pressing on input surface 212 which "displaces into the opening 222 of the enclosure 120 to activate tactile switch 250." *Id.* at 8:27–29.

The '619 patent explains further that

> the biometric sensor 230 may be a fingerprint sensor of an array of capacitive sensing elements. Upon a user touch to the input surface 212, the biometric sensor 230 senses a change in capacitance or a value of capacitance of the array of capacitive sensing input surface 212. The biometric sensor 230 produces an output signal that includes the sensor measurements. The output signal corresponds to a fingerprint of the user. The output signal may be processed to determine the user fingerprint. The output signal is processed by a processor positioned in an enclosed volume 221 of the electronic device.

Id. at 9:1–10.

To prevent contaminants and liquids from entering into the watch, annotated Figure 2B also illustrates a sealing structure where "[t]he flexible conduit 240 portion [is] stacked on top of the seal 262 [and] is disposed below a sealing surface 225 of the button assembly 210." *Id.* at 9:30–32. Given this sealing structure, and with respect to claim 1, and specifically limitation [1f] as reproduced below, the '619 patent describes that the "flexible conduit or flexible connector [240] that transmits an output signal from the biometric sensor [230] to the processor may form part of a seal that blocks or inhibits the ingress or entry of foreign debris or contaminants into the enclosure 120." *Id.* at 5:56–60.

D. Illustrative Claim

Claims 11 and 16 are independent.[2, 3] Each of dependent claims 12–15 and 17–20 ultimately depends from independent claims 11 and 16

[2] For consistency we use Petitioner's references [11.pre]–[11.g] corresponding to the same claim limitations.
[3] Unlike claims 1 and 16, independent claim 11 does not require "an opening formed in a sidewall" of an electronic device.

respectively. Claim 11 illustrates the claimed subject matter and is reproduced below with limitations [11.c.ii] and [11.g] highlighted in italics:

> [11.pre] A fingerprint sensing system for a wearable device comprising:
>
> [11.a] an enclosure defining an enclosed volume and an opening along an exterior surface;
>
> [11.b] a processor disposed in the enclosed volume;
>
> [11.c] a button assembly positioned in the opening and defining an input surface, the button assembly comprising:
>
> [11.c.i] *a fingerprint sensor positioned inward from the input surface*;
>
> [11.c.ii] a retainer positioned inward from the input surface and defining a sealing surface;
>
> [11.d] a seal disposed between the sealing surface of the retainer and a surface of the opening;
>
> [11.e] a passage extending from the opening to the enclosed volume;
>
> [11.f] a flexible conduit electrically connecting the fingerprint sensor to the processor;
>
> wherein:
>
> [11.g] *a portion of the flexible conduit is sandwiched between the seal and the sealing surface of the retainer or between the seal and the surface of the opening*.

Ex. 1001, 27:54–28:9 (emphases added).

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 11–20 would have been unpatentable based on the following grounds:[4]

[4] Petitioner supports its challenge with a declaration of Ronald D. Berger, M.D., Ph.D. (Ex. 1003). *See infra*. Patent Owner relies on the declaration of Brian W. Anthony, Ph.D. (Ex. 2009).

Ground	Claim(s) Challenged	35 U.S.C. §[5]	Reference(s)/Basis
1	11, 14, 16, 19	102/103	Kim[6]
2	11–14, 16–20	103	Kim
3	11–14, 16–17, 19–20	103	Jung[7] and Meyers[8]
4	11–17, 19	102/103	Chang[9]

II. ANALYSIS—CHALLENGED CLAIMS

A. Legal Standards

To prevail in its challenge to Patent Owner's claims, Petitioner must demonstrate that the claims are unpatentable, and that burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). To establish anticipation, "all of the elements and limitations of the claim must be shown in a single prior reference, arranged

[5] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Pub. L. No. 112-29, §§ 3(b)–3(c), 3(n)(1), 125 Stat. 284, 285–87, 293 (2011). Because there is no dispute that the challenged claims have effective filing dates after March 16, 2013, we apply the AIA versions of the statutes. We would reach the same outcome, however, under the pre-AIA versions.
[6] Ex 1004, US Patent No. 10,620,828 B2 (Apr. 14, 2020).
[7] Ex. 1005, US Patent Appl'n Pub. No. 2016/0100499 A1 (Apr. 7, 2016).
[8] Ex. 1007, US Patent Appl'n Pub. No. 2015/0071509 A1 (Mar. 12, 2015).
[9] Ex. 1010, US Patent No. 10,133,910 B2 (Nov. 20, 2018).

as in the claim." *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). "[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness, i.e., secondary considerations.[10] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art for a challenged patent, we look to "1) the types of problems encountered in the art; 2) the prior art solutions to those problems; 3) the rapidity with which innovations are made; 4) the sophistication of the technology; and 5) the educational level of active workers in the field." *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 666–667 (Fed. Cir. 2000). "Not all such factors may be present in every case, and one or more of them may predominate." *Id.* at 667.

[10] Patent Owner does not present objective evidence of nonobviousness.

In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Additionally, the Supreme Court informs us that "[a] person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR*, 550 U.S. at 421.

Petitioner asserts that a person of ordinary skill in the art at the time of the '619 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. Pet. 9 (Ex. 1003 ¶¶ 37–38). Petitioner also asserts that "[m]ore education can supplement practical experience and vice versa." *Id.*

Patent Owner contends that

> a POSITA would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with capture and processing of data or information, including but not limited to physiological information, or equivalents thereof. APPLE-2009, ¶¶24-25. Less work experience may be compensated by a higher level of education and vice versa.

PO Resp. 8–9.

Patent Owner's asserted level of ordinary skill in the art is essentially the same as Petitioner's, for example requiring a bachelor's degree in science or engineering and "at least two years of relevant work experience with capture and processing of data or information, including but not limited to physiological information." *Id.*; Pet. 9. In view of the similarity, our

analysis is not affected by choosing one over the other. On the complete record now before us, and as we did in our Institution Decision, we rely on Petitioner's proposed level of ordinary skill in the art as it is essentially the same as that proposed by Patent Owner. Petitioner's asserted level of ordinary skill in the art is consistent with our review and understanding of the technology and descriptions in the '619 patent and the asserted prior art references. *Okajima*, 261 F.3d at 1355.

C. Claim Construction

We interpret a claim "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b)." 37 C.F.R. § 42.100(b) (2020). Under this standard, we construe the claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." *Id.* Furthermore, "we need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Neither Patent Owner nor Petitioner indicate that any claim terms require construction. *See generally* Petition; PO Resp. For purposes of this Decision where no claim terms are in dispute, we need not explicitly construe any claim terms.

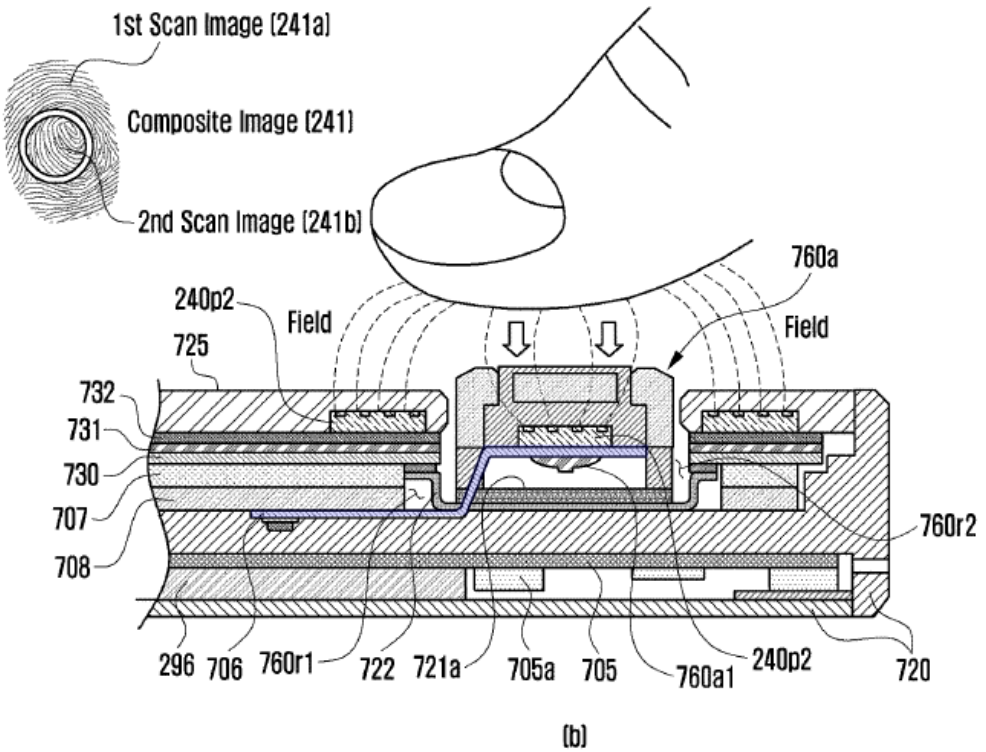
D. Ground 1: Claims 11, 14, 16, and 19 — Anticipation by, or, Alternatively, Obviousness over Kim (Ex. 1004)

For the reasons below, and on the complete record before us, Petitioner has shown by a preponderance of the evidence that claims 11, 14,

16, and 19 are anticipated by, or alternatively, would have been obvious over Kim.

1. Kim (Ex. 1004)

Titled "Electronic Device Having Combined Button," Kim teaches an electronic device such as a mobile phone or tablet including housing 720, a physical button 760a located in an opening of housing 720, and a processor located within housing 720 connected to button 760a. *See* Ex. 1004, code (57) ("[A] processor located inside the housing and electrically coupled to the display and the mechanical button."), 4:19–21. Kim explains that the "combined button" is "implemented as a combination of a physical button and a virtual button." *Id.* at 2:39–41. Kim's Figure 10(b) is reproduced below, as annotated by the Board.



Annotated Figure 10(b) illustrates physical button 760 and capacitive finger print sensor 240p2 as well as flexible printed circuit board ("PCB") 706 (highlighted blue) sandwiched between sealing rubber 722 and the housing 720.Kim describes that "[w]hen the fingerprint sensor is the capacitive fingerprint sensor 240p2, the capacitive fingerprint sensor 240p2 may be located inside the physical button 760a and mounted on the flexible PCB 706." *Id.* at 20:62–65. *Id.*

Kim describes that the combined button can be, for example, a "home button" or "power button." *Id.* at 18:19–21, 19:13–15. In Figure 18, reproduced below, Kim discloses an embodiment of electronic device 701 where "power button 764 which is the combined button may include a physical button 764a and a virtual button 764b." Ex. 1004, 19:15–17.

FIG. 18

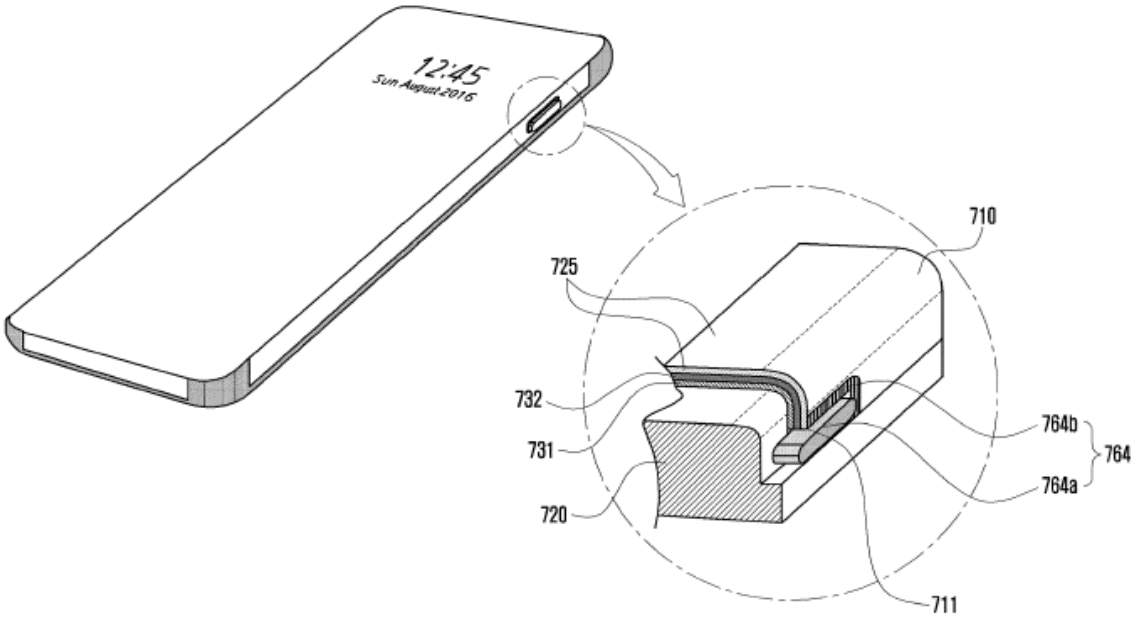


Figure 18 "shows a perspective view of an electronic device and a partially enlarged view of an area of the electronic device including a combined

button" located on the lateral or side surface of the electronic device 701. *Id.* at 3:22–24, 17:23–25.

2. Independent claim 11

We initially consider the elements of claim 11. At the outset we note that Patent Owner does not dispute that Kim discloses many—that is mostly all—the elements of claim 11. What Patent Owner mainly argues with respect to anticipation is that Kim "fails to identify a single embodiment that discloses each of the distinct requirements of the ***button assembly***. Instead, it improperly mixes teachings from distinct embodiments in a manner inconsistent with the law of anticipation." PO Resp. 2. As for obviousness, Patent Owner argues, at least in part, that Petitioner fails to "demonstrate that a person of ordinary skill in the art ('POSITA') would have been (1) sufficiently motivated to combine the relevant prior art teachings, and (2) expected to reasonably succeed in doing so.**"** *Id.* We address these arguments in particular, and others, in our analysis that follows.

a) The Parties' Arguments

(1) Preamble – [11.pre] A fingerprint sensing system for a wearable device comprising:

Petitioner argues that Kim's various embodiments teach an electronic device such as a mobile phone "disclos[ing] a '***capacitive fingerprint sensor*** 240p2 embedded in the physical button 760a.'" Pet. 10 (quoting Ex. 1004, 20:57–59). Petitioner argues that Kim teaches the electronic device can be "a wearable device," such as a smart watch. *Id.* at 9 (citing Ex. 1004, 4:19–31; Ex. 1022 ¶¶ 12–13; Ex. 1003 ¶¶ 98–99)). According to Petitioner, "*Kim* also teaches '[t]he electronic device 701 may compose fingerprint images.'" *Id.* at 10 (quoting Ex. 1004, 21:67–22:1).

Patent Owner does not argue that Kim's embodiments, for example the embodiments shown in Figures. 4–5, 6A, and 6B fail to disclose a fingerprint sensing system as recited in the preamble of claim 1. *See generally* PO Resp.; PO Sur-Reply. Based on the full record, and regardless of whether the preamble is limiting, we find Petitioner's arguments and evidence persuasive that Kim discloses limitation [11.pre].

(2) Limitation [11.a] – an enclosure defining an enclosed volume and an opening along an exterior surface;

Providing an annotated version of Kim's Figure 18 reproduced below, Petitioner argues that "*Kim* discloses an enclosure having an enclosed volume, teaching a 'housing 720' and 'cover glass 725.'" Pet. 11 (citing Ex. 1004, 22:4–27; Ex. 1022 ¶¶ 175–178; Ex. 1003 ¶¶ 105–107).

FIG. 18

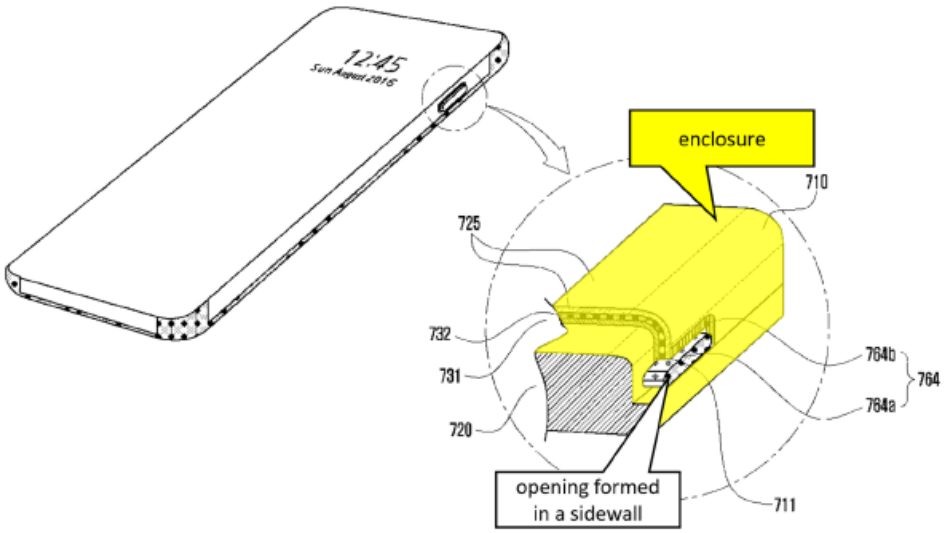


Figure 18 of Kim, as annotated by Petitioner, illustrates a mobile phone having housing or "enclosure," 720 and button 764a positioned in the

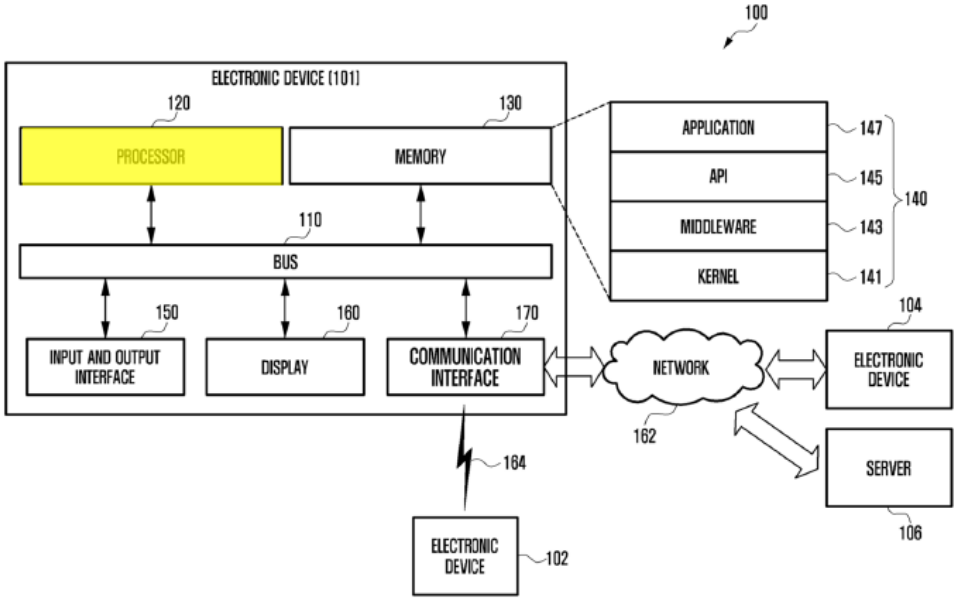
enclosure sidewall and an opening formed in the enclosure to accommodate the button.

Patent Owner disputes that a person of ordinary skill in the art would "combine[] two distinct embodiments, e.g., Kim's Figure 10 and Figure 18 embodiments, and the Petition fails to address why a POSITA would have combined these embodiments to achieve the ***button assembly*** recited in claims 11 and 16." PO Resp 16. However, Patent Owner does *not* argue that Kim's Figure 18 embodiment fails to disclose an enclosure with an opening as recited in claim 1. *See generally* PO Resp.; PO Sur-Reply. We address the issue of Kim's various embodiments below, but preliminarily, on the full record, we find Petitioner's arguments and evidence persuasive that Kim's Figure 18 discloses limitation [11a].

(3) Limitation [11.b] – a processor disposed in the enclosed volume;

Petitioner argues that "*Kim* discloses 'a processor located ***inside*** the housing.'" Pet. 14 (quoting Ex. 1004, 2:7–11; citing Ex. 1004, code (57), Figs. 1–3, 1:38–2:38, 5:1–28; Ex. 1022 ¶¶ 5–7, 17–19). Kim illustrates in Figure 1, as annotated by Petitioner and reproduced below, processor 120 within electronic device 101.

FIG. 1



Kim's Figure 1, as annotated by Petitioner, illustrates in diagrammatic form electronic device 101 including, *inter alia*, processor 120 (highlighted yellow), memory 130, and communication interface 170. Petitioner argues that a person of ordinary skill in the art "would have located the processor in the enclosed volume to protect it from debris, impact, and other potentially damaging external stimuli." *Id.* (citing Ex. 1003 ¶¶ 116–117).

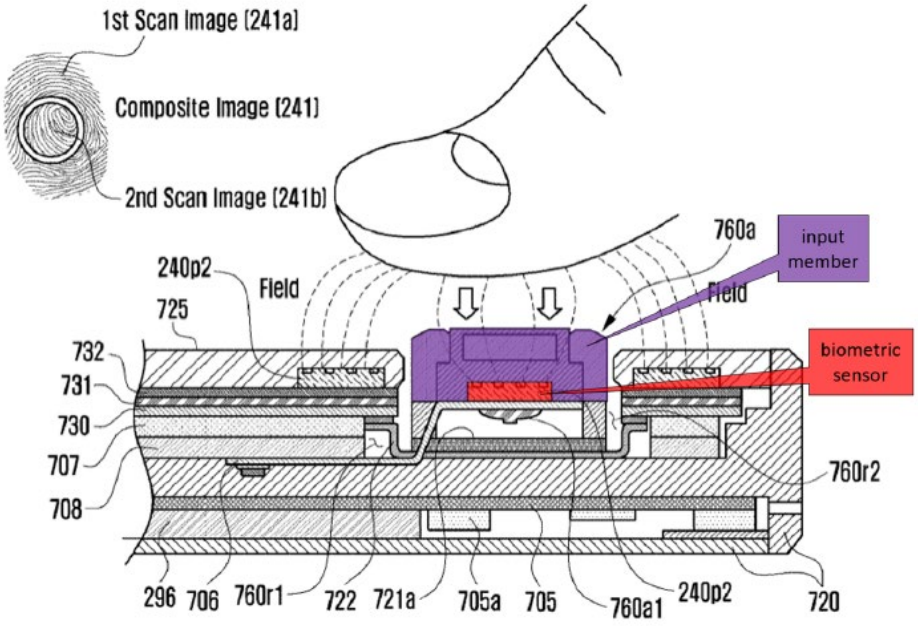
Patent Owner does not argue that Kim's Figure 1 fails to disclose a processor within Kim's enclosure. *See generally* PO Resp.; PO Sur-Reply. Based on the full record, we find Petitioner's arguments and evidence persuasive that Kim discloses limitation [11b].

(4) Limitation [11.c]– a button assembly positioned in the opening and defining an input surface, the button assembly comprising:

[1.c.i] a fingerprint sensor positioned inward from the input surface; and

[1.c.ii] a retainer positioned inward from the input surface and defining a sealing surface;

For limitations [11.c], [11.c.i], and [11.c.ii] Petitioner points to Kim's combined button in Figure 10(b) illustrating a person's finger in close proximity to physical button, i.e., input member 760a incorporating biometric sensor 240p2. Figure 10(b) as annotated by Petitioner is reproduced below.



Annotated Figure 10(b) illustrates in cross section capacitive fingerprint sensor 240p2 located inside and below physical button 760a and an input surface on the top of the button where a user's finger is applied. *Id.* at 20:62–65. Capacitive fingerprint sensor 240p2 is additionally located in a region of the enclosure surrounding physical button 760a.

Petitioner's declarant, Dr. Berger, testifies as to limitation [11.c] that "*Kim* discloses 'button assembly positioned in the opening and defining an input surface' the same way as the '619 patent's specification." Ex. 1003 ¶ 122 (quoting Ex. 1001, 27:59–60). Petitioner contends that "Figure 10(b) shows a 'cross-sectional view of [the] ***combined button***' located in an opening of the enclosure." Pet. 15 (citing Ex. 1004, 21:20–22; Ex. 1022 ¶ 166). And, Petitioner argues, "[b]ecause *Kim* discloses a 'combined button' with a surface that similarly may pressed by a user, *Kim* discloses this limitation the same way as the '619 Patent." *Id.* at 16 (citing Ex. 1004, 13:42–67, 16:48–17:12; Ex. 1022 ¶¶ 89–92, ¶¶ 118–120; Ex. 1003 ¶¶ 122–124).

As for limitation [1.c.i], Petitioner argues "*Kim* discloses that the 'combined button' includes a fingerprint sensor positioned inward from the input surface, as illustrated in at least *Kim*'s Figure 10(b)." *Id.* citing Ex. 1003 ¶ 126). And for limitation [1.c.ii] Petitioner argues that the '619 patent explains that "multiple 'configurations of the retainer 224 are possible,'" and "it provides 'a stop to displacement of the button housing' and 'forms a sealing surface 225 for the button assembly 310.'" *Id.* at 20 (quoting Ex. 1001, 16:54–60; Ex. 1003 ¶ 134). Considering Kim's Figure 10(b), Petitioner argues that a person of ordinary skill in the art "would have understood support fixture 721a constitutes a retainer," and includes a sealing surface as recited in claim 11. *Id.* (citing Ex. 1003 ¶ 134).

Patent Owner's main argument is that "all grounds fail because the asserted prior art does not disclose or render obvious the *button assembly*

recited in claims 11 and 16."[11] PO Resp. 15. Patent Owner argues that Petitioner's "anticipation challenge fails as a matter of law because it combines two distinct embodiments, e.g., Kim's Figure 10 and Figure 18 embodiments." PO Resp. 16. According to Patent Owner, "[Petitioner]'s anticipation theory based on Kim requires each of the Figure 10 and Figure 18 embodiments, because neither embodiment—alone—satisfies every requirement of the ***button assembly***." *Id.* at 16–17. Patent Owner argues that the proper anticipation analysis "demands that an asserted prior art reference 'clearly and unequivocally' direct 'those skilled in the art to the [invention] without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.'" *Id.* at 18 (quoting *In re Arkley*, 455 F.2d 586, 587 (C.C.P.A. 1972)). Patent Owner disputes that Kim's combined button "equate[s] . . . to a button assembly with specific components (e.g., fingerprint sensor) with a specific positioning configuration within an electronic device (e.g., in an opening formed on a lateral surface)." *Id.* at 19

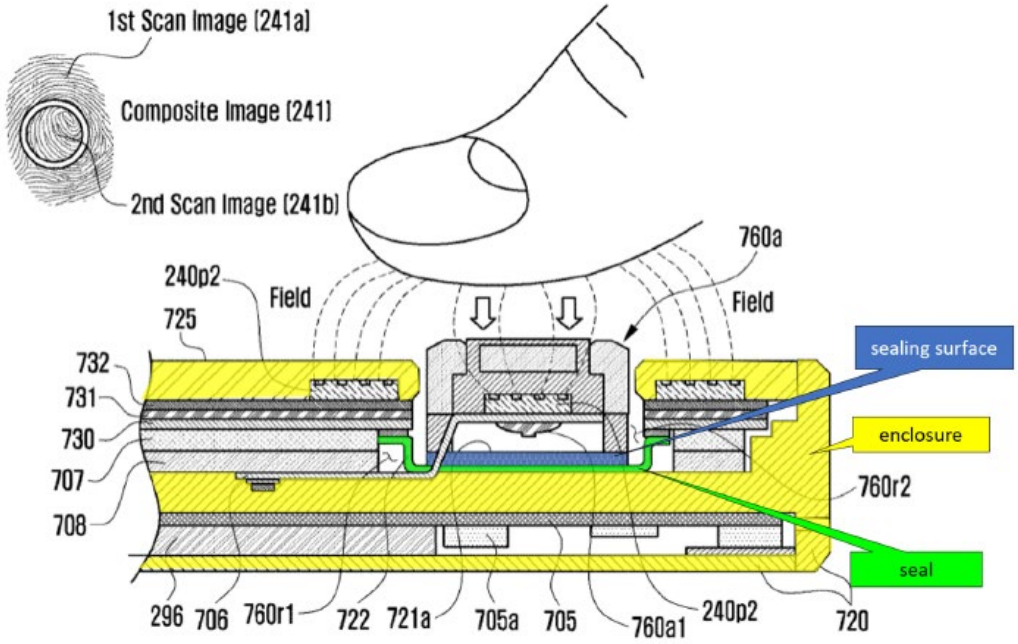
With respect to obviousness, Patent Owner argues that Kim's combined button "does not itself suggest that Kim contemplates combining the teachings of each embodiment. And it certainly would not have led a POSITA to combine their teachings to purportedly arrive at the ***button assembly***." *Id.* (citing Ex. 2009 ¶¶ 38–39).

We address the parties' anticipation and obviousness arguments in detail in our analysis section below.

[11] For readability, we have removed the capitalization and bolding in this quote from Patent Owner's heading V.A.

(5) Limitation [11.d] – a seal positioned between a sealing surface of the button assembly and the enclosure;

Petitioner argues that "*Kim* discloses use of 'sealing rubber 722' . . . which creates the claimed 'seal.'" Pet. 21 (citing Ex. 1004, 22:35–40; Ex. 1022 ¶¶ 156–159, 179–181). To demonstrate what Petitioner refers to as the claimed "seal," we reproduce below Petitioner's annotated version of Kim's Figure 10(b).



Petitioner asserts that "Figure 10(b) (annotated above) discloses that 'sealing rubber 722' (green) is positioned between a sealing surface of the retainer (blue) and the enclosure (yellow)." *Id.* at 22 (citing Ex. 1003 ¶ 140).

Patent Owner does not substantively dispute that Kim's Figure 10(b) discloses a seal between a sealing surface of the button and the enclosure. *See generally* PO Resp.; PO Sur-Reply. Based on the full record, we find Petitioner's arguments and evidence persuasive that Kim discloses limitation [11.d.].

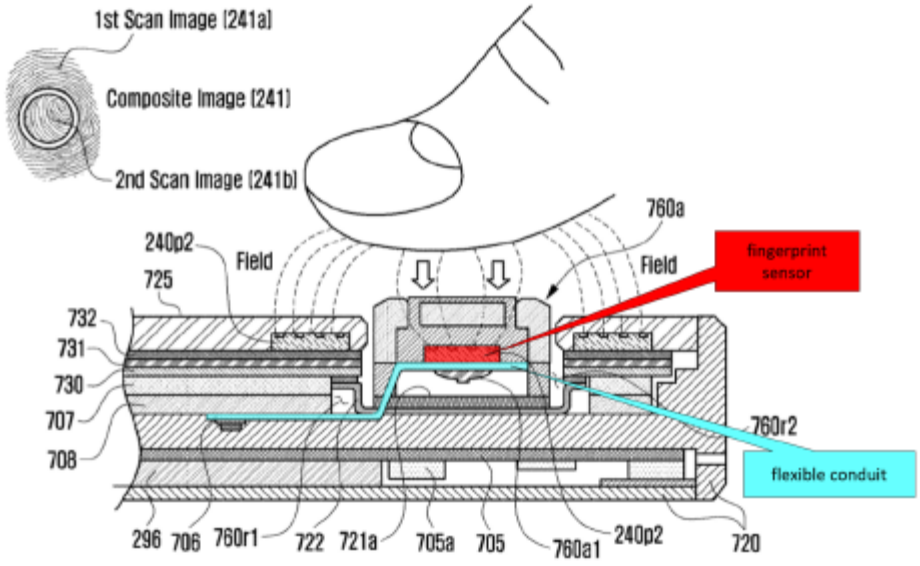
(6) Limitation [11.e] – a passage extending from the opening to the enclosed volume;

Petitioner argues that "because *Kim* includes electrical components located in the opening of the enclosure which are separated from a power supply by the enclosure wall, a POSITA would have understood that the claimed passage is necessary to connect the components to the power supply." Pet. 23–24 (citing Ex. 1003 ¶ 146). Petitioner argues further that a person of ordinary skill in the art "would have known a fingerprint sensor outputs an electrical signal that should be electrically connected to a processor disposed within the enclosure." *Id.* at 24. Dr. Berger testifies that "[i]n order for these connections to occur, *Kim* discloses a passage between the opening and the enclosed volume." Ex. 1003 ¶ 146.

Patent Owner does not argue that Kim fails to disclose a passage extending from the opening to the enclosed volume. *See generally* PO Resp.; PO Sur-Reply. Based on the full record, we find Petitioner's arguments and evidence persuasive that Kim discloses limitation [11.e].

(7) Limitation [1.f] – a flexible conduit electrically connecting the fingerprint sensor to the processor; wherein

Considering Petitioner's annotated version of Kim's Figure 10(b), below, Petitioner argues that "Figure 10(b) shows 'flexible PCB 706' (teal) coupled to the biometric sensor (red)." Pet. 25 (citing Ex. 1003 ¶ 152).

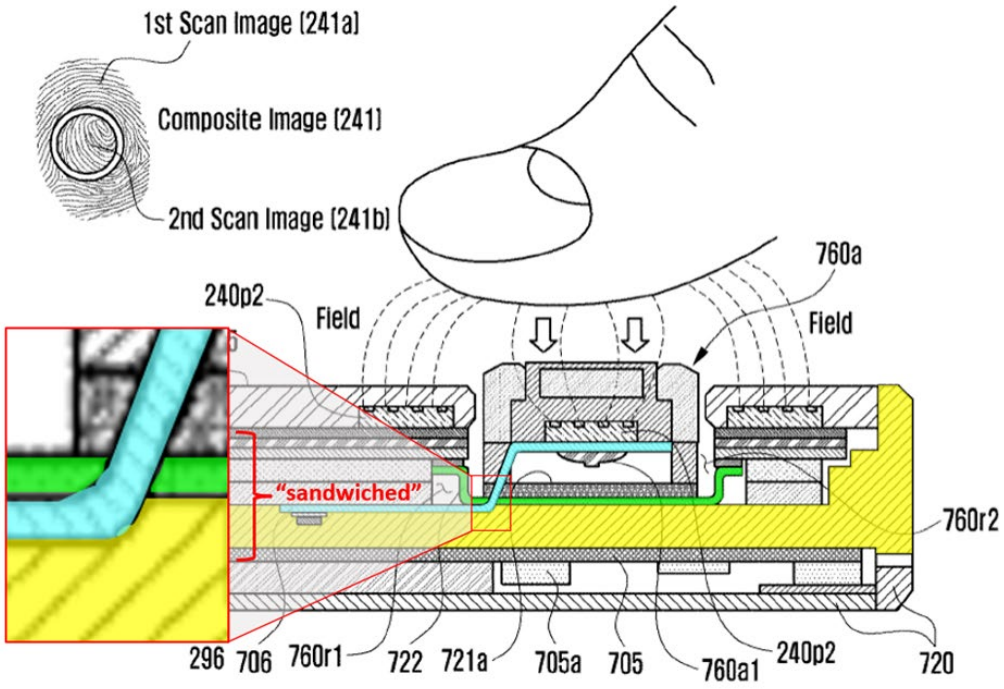


Kim's Figure 10(b), as annotated by Petitioner, illustrates in cross section a portion of Kim's flexible conduit connected from the biometric sensor through the seal and into enclosure 720. Considering also Kim's Figure 2, Dr. Berger testifies that a person of ordinary skill in the art "would have understood the purpose of the electrical connection between 'flexible conduit 706' and 'fingerprint sensor 240p2' was to transmit an output signal from 'fingerprint sensor 240p2' to the 'application processor.'" Ex. 1003 ¶ 153.

Patent Owner does not argue that Kim's Figures 2 and 10(b) fail to disclose the flexible conduit electrically connecting the fingerprint sensor to the processor. *See generally* PO Resp.; PO Sur-Reply.

> *(8) Limitation [11.g] – a portion of the flexible conduit is sandwiched between the seal and the sealing surface of the retainer or between the seal and the surface of the opening.*

Petitioner's annotated version of Kim's Figure 10(b) is reproduced below.



With annotated Figure 10(b), Petitioner argues that "a portion of the flexible conduit (*i.e.*, *Kim*'s 'flexible PCB 706,' teal) is sandwiched between the seal (*i.e.*, *Kim*'s 'sealing rubber 722,' green) and the surface of the opening (*i.e.*, *Kim*'s 'housing 720,' yellow)." Pet. 27–28 (citing Ex. 1003 ¶ 157). Dr. Berger testifies that Kim discloses the recited sandwiched configuration and also that a person of ordinary skill in the art "would have been motivated to provide the seal by [] *sic* sandwiching existing, known components, such as the enclosure and flexible conduit, so as to provide additional protection to potential ingress points, such as the pathway between the flexible conduit and delicate electronic components such as the processor." Ex. 1003 ¶¶ 159–160.

Patent Owner does not argue that Kim's Figure 10(b) fails to disclose the flexible conduit between the seal and the surface of the opening. *See generally* PO Resp.; PO Sur-Reply.

b) Anticipation by Kim – Analysis of the Parties' Arguments and Evidence

Patent Owner's primary contention is that Petitioner's anticipation analysis improperly combines elements from the different embodiments shown in Kim's Figures 10(a) and 18 as meeting the limitations of the claimed "button assembly" in claim 1. *See* PO Resp. 15–16 (Patent Owner arguing that "Kim does not teach a single embodiment that satisfies each of the requirements of the ***button assembly*** recited in claims 11 and 16."). Petitioner cites two Federal Circuit cases in particular, *Net MoneyIN v. Verisign*, 545 F.3d 1359 (Fed. Cir. 2008) and *In re Arkley*, 455 F.2d 586, 587 (C.C.P.A. 1972). *Id.* at 15, 18.

Additionally, we keep in mind that anticipation is assessed from the perspective of a person of ordinarily skill in the art. *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003) ("'[T]he dispositive question regarding anticipation [i]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching' that every claim element was disclosed in that single reference." (quoting *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991))). Thus, a relevant issue presented here is whether a person of ordinary skill in the art would reasonably understand or infer by reading Kim's disclosure that the "combined button" embodiment in Figure 10(b) could be implemented along with the "enclosure" and "an opening along an exterior surface," on the sidewall of an electronic device as disclosed in Figure 18.[12]

We consider the *Net MoneyIN* and *Arkley* cases asserted by Patent Owner before delving into the specific facts of this case.

[12] As noted above, different from claim 11, claim 16 requires "an opening formed in a sidewall" of an electronic device.

(1) Relevant Case Law and Legal Standards for Anticipation for Different Embodiments

Net MoneyIN is relied on by Patent Owner because it explains for anticipation that "it is not enough that the prior art reference discloses part of the claimed invention, which an ordinary artisan might supplement to make the whole, or that it includes multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention." *Net Moneyin*, 545 F.3d at 1371. Patent Owner contends that the embodiments in Kim's Figures 10(b) and 18 are "distinct embodiments" and thus cannot be combined. PO Resp. 2, 18. According to Patent Owner, it is improper to consider the combined button placement in the sidewall as shown in Figure 18, together with the structure of the combined button as shown positioned on the front face of the phone as shown for example in Figures 10a–*b*. *Id.* Patent Owner also relies on *Arkley* which explains that to anticipate, the prior art "reference must clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference." *In re Arkley*, 455 F.2d at 587.

In *Arkley*, the Court of Customs and Patent Appeals reversed the Board and determined that the appellants claimed cephalosporin C_A-type compound for an antibiotic was not anticipated by two examples in the prior art of "exact precursors" of appellants' compound. *Id.* at 588. The Court explained that these exact precursors, cephalosporin C-type compounds, were relevant "only to the extent that appellants have discovered that cephaloridine will be formed *if* the acid [disclosed in example 10] is first selected and *then* carefully reacted with a particular tertiary amine *which*

also must be selected." Id. The Court further explained that "there is nothing in the teachings relied upon by the Patent Office which 'clearly and unequivocally' directs those skilled in the art to make this selection nor any indication that Flynn ever made the selection himself." *Id.* Overall, the Court found that the different examples in the anticipating reference provided insufficient disclosure and teachings for a skilled artisan to recognize that a "particular tertiary amine," namely pyridine, was effective in converting cephalosporin C-type precursers into compounds of the cephalosporin C_A-type compound, as claimed by appellants. *See id.* at 589 (The Court explaining that "[w]e do not read into references things that are not there.").

In *Net MoneyIN*, the Federal Circuit explained that the anticipating reference must disclose "all of the limitations arranged or combined in the same way as recited in the claim," otherwise, "it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102." *Net MoneyIN, Inc.*, 545 F.3d at 1371. The Court provided some helpful discussion and examples of prior art that was insufficient for purposes of anticipation:

> The meaning of the expression "arranged as in the claim" is readily understood in relation to claims drawn to things such as ingredients mixed in some claimed order. In such instances, a reference that discloses all of the claimed ingredients, but not in the order claimed, would not anticipate, because the reference would be missing any disclosure of the limitations of the claimed invention "arranged as in the claim."

Net MoneyIN, 545 F.3d at 1370. In one example, the Court explained that a reference describing a hydraulic scrap shearing machine failed to anticipate because "[a]lthough the prior art reference could be said to contain all of the elements of the claimed invention, it did not anticipate under 35 U.S.C.

§ 102 because it 'disclose[d] an entirely different device, composed of parts distinct from those of the claimed invention, and operating in a different way to process different material differently.'" *Id.*

In another example, the Court reversed a district court determination of anticipation involving prior art that contained a figure and accompanying text disclosing the use of hydrogen with a mixed bed to deoxygenate water, and a separate passage discussing deoxygenating water with, among other things, hydrazine. *Id.* The Federal Circuit explained that "the reference could not anticipate the claimed invention because there was no link between that figure and the general discussion of hydrazine as a deoxygenating agent." *Id.* The Court "concluded that although the reference taught all elements of the claim, it did not contain a discussion suggesting or linking hydrazine with the mixed bed in the figure, and thus did not show the invention arranged as in the claim." *Id.*

What these cases and examples clearly articulate, is that whether there is sufficient description in an anticipation reference for linking different disclosures, elements, and embodiments, is particularly case and fact dependent. Moreover, a finding of anticipation resting upon a reference's disclosures of elements in different embodiments turns on whether an ordinarily skilled artisan would understand that the reference suggests arranging the elements of the embodiments to one another in the same way as the challenged claims.

For the reasons that follow, we determine that there is sufficient description and teaching in Kim such that the "combined button" disclosed by Kim, for example in Figure 10(b), can be the same "combined button" as discussed in the embodiment of Figure 18.

Patent Owner argues that Kim describes Figure 10(b) as "'a cross-sectional view of ***a*** combined button of an electronic device **according to still another embodiment**'—not the embodiment of Figure 18." PO Resp. 16 (quoting Ex. 1004, 21:20–22). But this emphasis on the ubiquitous language in Kim's specification of "one embodiment" and "another embodiment" is superficial. Interpreting "one embodiment" and "another embodiment," as entirely distinct embodiments misreads the written description which, in context, explains the actual relationship between embodiments. For example, for Figure 6 Kim describes minor differences as separate embodiments:

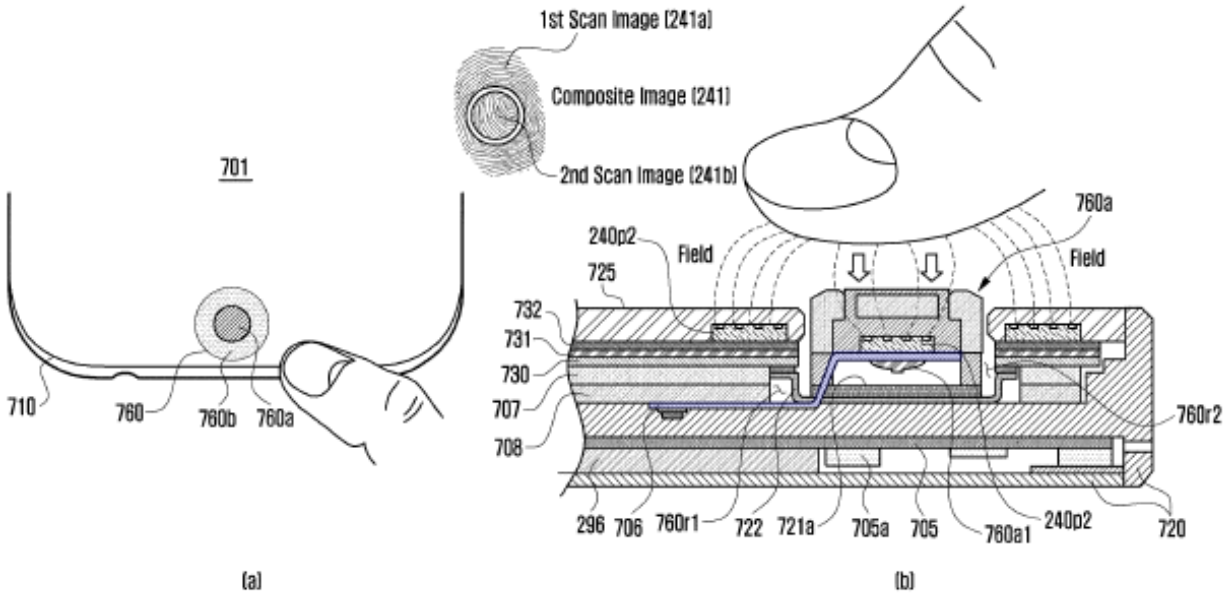
> According to one embodiment, the camera module 640 may be disposed to be exposed through the center of an upper portion of the cover glass 620.
>
> According to one embodiment, the camera module 640 may be disposed as close as possible to the outermost of the front surface.

Ex. 1004, 16:24–29. By way of another example, Kim explains as to Figure 4 that "[a]ccording to *another embodiment*, the display 410 may be extended to a lateral surface of the electronic device 401. According to *still another embodiment*, the display 410 may be formed on only a part of the front surface of the electronic device 401." *Id.* at 14:5–9 (emphases added). "Another embodiment" can simply mean that there is a related alternative, or minor deviation in the arrangement, positioning, or function of a feature compared to another embodiment. Or, it could be that there are, in fact, significant, material differences between the embodiments. In other words, how distinct, "different embodiments" are in a reference, is contextual, certainly requiring a deeper analysis and consideration beyond Kim's use of "another embodiment" when discussing its button assembly.

Considering the different embodiments and the relationships between them as described in Kim, we turn first to the question of the "combined button" raised by Patent Owner. *See* PO Resp. 19–20 (Patent Owner arguing that "[t]his description does not equate the term [combined button] to a button assembly with specific components (e.g., fingerprint sensor) with a specific positioning configuration within an electronic device (e.g., in an opening formed on a lateral surface)).

It is clear from a plain reading of Kim, as well as the figures, that the combined button is a combination of a physical button and a virtual button and is described with respect to most, if not all, the embodiments and Figures in Kim. *See, e.g.*, Ex. 1004, code (54), 1:1–2, 1:15, 2:30–33, 13:54–56, 13:61–64. For example, Kim describes with respect "to FIG. 10(a), a circular home button 760 including a physical button 760a and a virtual button 760b may be implemented as an example of the combined button." *Id.* at 21:23–25. Kim's Figures 10(a)-(b) are reproduced below.

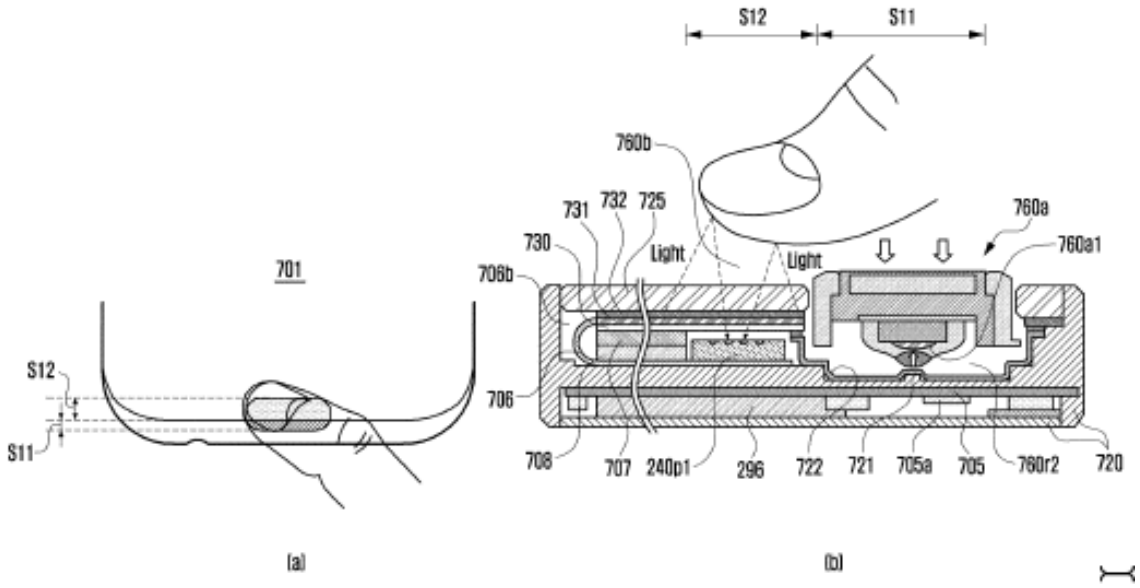
FIG. 10



Figures 10(a)-(b) illustrate physical button 760a and virtual button 760b positioned on the front face of an electronic device, (Fig. 10(a)), and a cross-section of physical button 760a and virtual button 760b, (Fig. 10(b)).

Figures 8(a)–(b), reproduced below, illustrate another embodiment of the combined button. Ex. 1004, 19:31–33.

FIG. 8



Kim describes with respect to Figures 8(a)–(b) that "an optical fingerprint sensor 240*p*l[] positioned under the virtual button 760*b* of the home button 760 can detect a user fingerprint contacted (or non-contacted) on a cover glass 725. There may be a gap between the physical button 760*a* and the virtual button 760b." *Id.* 19:48–53.

Kim explains that the various embodiments of the physical and virtual "combined button" can be structurally and, perhaps, functionally different in certain respects, but we disagree that they are entirely distinct. For example, the physical button 760*a* in the embodiment of Figures 8(a)–(b) shown above, has a dome switch 760*a*1 which, when pushed down, contacts tact point 721. *Id.* at 20:34. The embodiment shown in Figure 10(b) does not have a tact point, instead "[t]he dome switch 760*a*1 of the physical button 760*a* may move downward by a user's click (or selection) and then come in contact with a support fixture 721*a* located on the sealing rubber 722." *Id.* at 22:31–33.

As for the embodiment in Figure 18, Kim describes that "[t]he power button 764 which is the combined button may include a physical button 764a and a virtual button 764b." *Id.* at 19:15–17. Kim's Figure 18 is reproduced below.

FIG. 18

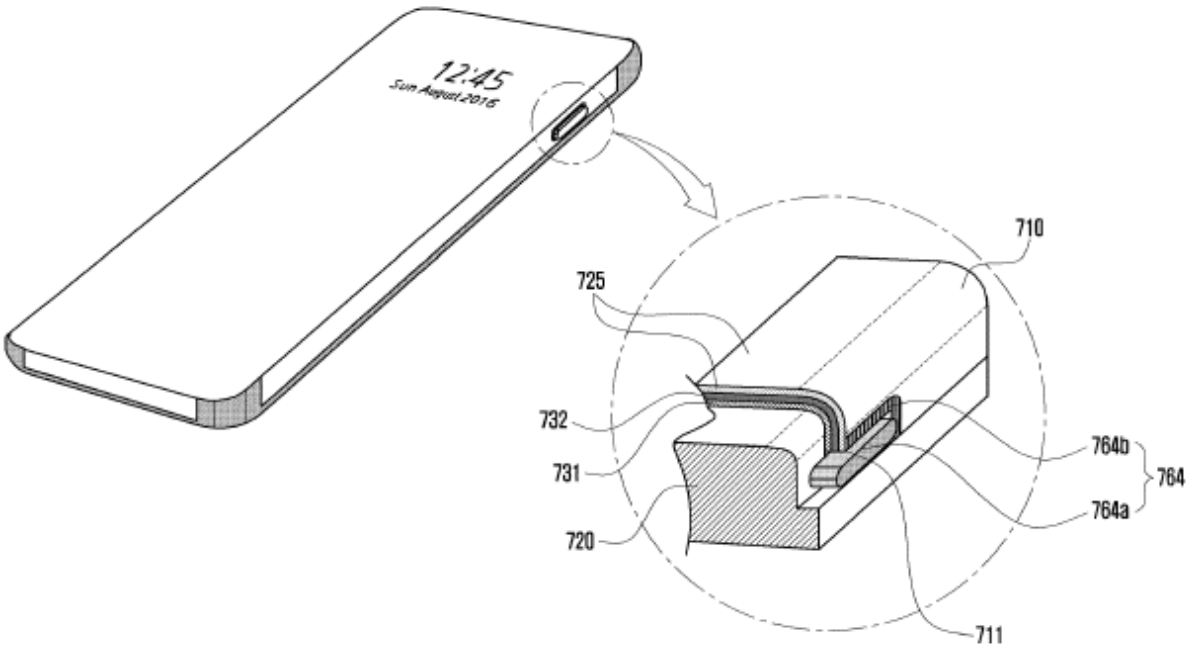


Figure 18 illustrates "the combined button located on the lateral surface of the electronic device 701." *Id.* at 19:13–14. For Figure 18, Kim describes that "[t]he display 710 (or a display panel) may include an opening 711 (or a cutout). In the opening 711, a part of the home button 760-1 which is the combined button may be positioned." *Id.* at 18:21–24.

Kim states that "FIGS. 7 and 18 *show examples* of the combined button located on the front surface *or* the side surface of the electronic device 701." *Id.* at 17:23–25 (emphases added). In Figures 7(a)–(d), the combined button is located on the front of the device. Kim's written

description of Figure 18 showing the combined button on the lateral or side surface of the device immediately follows the discussion of the embodiment in Figures 7(a)-(b), and immediately precedes the discussion of the embodiments in Figures 8, 9, and 10. *Id.* at 19:13–29. The Figure 18 discussion thus reads as inter-related to these embodiments. The Figure 18 discussion is not long or detailed as to the actual physical structure of any particular "combined button" but identifies generally the "combined button." *Id.* Kim does explain for Figure 18 that "the combined button located on the lateral surface of the electronic device 701 may be implemented as a power button 764 (or a power/hold button)." *Id.* at 19:13–15. And, as in the other embodiments, Kim describes that "the combined button may include a physical button 764a and a virtual button 764b." *Id.* at 19:15–17.

In context, reading Kim's written description and considering as a whole the disclosed embodiments of the "combined button," a person of ordinary skill in the art can understand that the embodiment in Figure 18 is simply showing that the various disclosed embodiments of the "combined button" could be implemented not just on the front of the device, but also on the lateral surface, in "opening 711." The combined button is described consistently throughout Kim as including a physical button surrounded by a virtual button. *Compare, e.g.*, *id.* at 21:23–26 (Kim describing for "FIG. 10(a), a circular home button 760 including a physical button *760a* and a virtual button *760b* may be implemented as an example of the combined button 25 in the display 710"), *with id.* at 19:21–23 (For Figure 18 Kim describing that "the physical button 764*a* may be located in the display 710, and the virtual button 764*b* may surround the physical button 764*a*."). Indeed, Kim's Figure 6 illustrates a combined button on the front face of a device, and alternatively, expressly describes "a power button (not shown)

located on the lateral surface of the electronic device 600 may also be the combined button." *Id.* at 17:30–32 (emphasis added). *See In re Arkley*, 455 F.2d at 588 (The Court explaining the necessity that the anticipating prior art "'clearly and unequivocally' directs those skilled in the art to make this selection.").

Considering all the arguments and evidence in this case and a plain reading of Kim, there is a recognizable contextual link and relationship between these various embodiments that a person of ordinary skill in the art would understand to describe the implementation of the "combined button" on the front or lateral, i.e., side surface of an electronic device, such as a mobile phone as illustrated in Figure 18. Dr. Berger confirmed this during his deposition. When questioned about Kim's embodiments illustrating the "combined button" shown on the front face of the device, Dr. Berger responded "[b]ut, in Figure 18, it clearly shows it on the side. And Kim makes clear that the same button could be, could be in other locations than the front." Ex. 2004, 68:2–5. We find Dr. Berger's testimony persuasive and consistent with a plain reading of Kim's disclosure, regardless of Kim's various combined button embodiments. *See* Ex. 1004 17:23–25 (Kim explaining that "FIGS. 7 and 18 show examples of the combined button located on the front surface or the side surface of the electronic device 701.").

We determine that a person of ordinary skill in the art reading the explanations for Figure 18 would understand that a combined button can be arranged in Kim in an opening 711 on the front of the device as shown in the various embodiments, and including the enclosure and an opening in a sidewall surface as shown in the Figure 18 embodiment, which is the same arrangement as recited in the challenged independent claim 16. *Net*

MoneyIN, 545 F.3d at 1371 (The Court explaining "the importance of the requirement that the reference describe not only the elements of the claimed invention, but also that it describe those elements 'arranged as in the claim.'").

We address below Patent Owner's additional arguments with respect to Kim's combined button disclosure, arguments which are not consistent with the facts and evidence in this case.

(2) Whether the Petition Identifies a Teaching in Kim to Combine the Figure 10(b) and Figure 18 embodiments

Patent Owner argues that the Petition itself does not identify any suggestion in Kim to combine the teachings relating to the combined buttons shown in Figures 10 and 18. PO Resp. 18–19 (citing Ex. 2009 ¶¶ 56–63). We disagree. We acknowledge that Kim does not explicitly state that the embodiments of Figures 10 and 18 are combinable. However, as we discussed above, the suggestion to use the combined button of Figure 10 in the location shown in Figure 18 is evident to a person of ordinary skill in the art given a plain reading of Kim's written description. The Petition explicitly points to Kim's Figure 18 showing a combined button in opening 711 in the sidewall of the device. Pet. 12 (citing Ex. 1004, 18:19–24). Petitioner also relies on the testimony of Dr. Berger who explains that "*Kim* discloses that the enclosure has an opening along an exterior surface, which could include a sidewall. For example, *Kim* discloses an 'opening 711' (Ex-1004, 18:19–24; Ex-1022 ¶ 132), which corresponds to the claimed 'opening' of element [11.a]." Ex. 1003 ¶ 111.

(3) Whether the term "combined button" discussed in Figures 10 and 18 contemplates the combined teachings of the embodiments

Patent Owner argues that Kim's description of "the 'combined button' as a button 'implemented as a combination of a physical button and a virtual button' . . . does not equate the term to a button assembly with specific components (e.g., fingerprint sensor) with a specific positioning configuration within an electronic device (e.g., in an opening formed on a lateral surface)." PO Resp. 19. Patent Owner's declarant, Dr. Anthony testifies that "Kim's Figure 6 embodiment, for example, includes an example of the "combined button" without a fingerprint sensor. Ex. 2009 ¶ 38 (citing Ex. 1004, 16:48–54 (identifying "button 660" as the "combined button")).

Patent Owner's argument is unavailing for several reasons. For one thing, Kim's Figure 6 embodiment optionally includes a fingerprint sensor. *See* Ex. 1004, 16:48–17: 5 ("The home button 660, i.e., the combined button, may be formed of a physical button 660*a* in part and a soft or virtual button 660*b* . . . [w]hen a part of the home button 660 is the soft button 660*b*, a fingerprint sensor may be disposed under the home button 660.").

For another thing, the embodiment of Figure 18 does not exclude any of the other structural embodiments of the "combined button." In other words, the embodiment of Figure 18 does not specify any particular detailed structure for a "combined button" implemented in the sidewall of a device. *See* Ex. 1004, 19:13–30. As Dr. Anthony testifies, the embodiments of the "combined button" can have different structures and functions. Ex. 2009 ¶ 38. However, the fact that Figure 18 *does not* recite specific structure is important because it suggests that all of Kim's "combined button"

embodiments, for example that shown in Figures 6, 7, and 8, and including Figure 10, can be implemented on the sidewall of the device.

Moreover, Petitioner's declarant, Dr. Berger, provides unrebutted testimony that "*Kim* discloses an electronic device with a housing, a mechanical button located in an opening of the housing, and a processor located within the housing and connected to the mechanical button." Ex. 1003 ¶ 70 (citing Ex. 1004, Abstract; Ex. 1022, Abstract).

We acknowledge that Patent Owner's declarant, Dr. Anthony, testifies that

> a POSITA would have understood that button 760 shown in Figure 10(b) cannot simply be taken and used as the button 764 in Figure 18. The buttons have different shapes and sizes, and the surface area of the device at the front (Figure 10(b)) and lateral (Figure 18) surfaces of the device is significantly different.

Ex. 2009 ¶ 53. However, Dr. Anthony does not address whether an ordinarily skilled artisan would have had any difficulty relocating front-mounted button of Figure 10(b) to the lateral sidewall of a phone as shown in Figure 18. Here, Dr. Anthony's testimony that for the sidewall location, the shape and surface area of the combined button "is significantly different," does not undercut Dr. Berger's testimony as to the background knowledge and skill of a person or ordinary skill in the art. *Id.*

Dr. Anthony testifies further that "[t]he arrangement of enclosure 720 at each button is significantly different with the enclosure 720 in Figure 18 extending to a location adjacent the lower side of the button 764, whereas the enclosure 720 in Figure 10(b) is oriented below and spaced apart from the button 760." *Id.* ¶ 54. We appreciate that in Figure 18 the combined button is now located on the edge of the cover glass 725 as opposed to be

completely surrounded by the cover glass 725 as shown in Figure 10(b). *Compare* Ex. 1004, Fig. 18 *with id.*, Fig. 10(b). Because of this difference, according to Patent Owner, other structures would also be different, for instance "[t]he recesses 760*r*1 and 760*r*2 separated by the sealing rubber 722 are missing in Figure 18 and could not be formed in the same way as in Figure 10(b) given the different orientations of the components at the different locations." Ex. 2009 ¶ 54. However what Dr. Anthony's testimony *does not* say is important. Dr. Anthony does not say that relocating the combined button would be difficult, only that the structure of the button would be different. *Id.* Dr. Anthony summarizes his testimony on this point, explaining that "[a]s such, modifications would be needed in terms of the size and shape of the components of the button assembly, how you seal the button, and how you route electrical connections to the button." *Id.* ¶ 55.

We credit Petitioner's declarant, Dr. Berger, in this case. Dr. Berger testifies that "a person of ordinary skill in the art would understand that a sealed and/or insulated button assembly from one location on a device can be constructed equally on a rear or sidewall of the device, as taught by at least *Polany* (Ex-1013)." *Id.* ¶ 112 (citing U.S. Patent No. 7,535,799 to Polany). Reviewing various prior art electronic devices, Dr. Berger testifies further that "[p]rior to the '619 patent's earliest alleged priority date of June 19, 2017, a person of ordinary skill in the art would also have known that button assemblies in mobile electronic devices should be sealed in order to prevent ingress of potentially damaging moisture and dust." *Id.* ¶ 48. Dr. Berger points to U.S. Patent No. 10,133,910 to Chang, explaining that "*Chang* discloses that 'as users' needs for portable terminals have been gradually diversified, a [home] key [button] used in the portable terminals

includes a waterproof structure in order to prevent a fluid from infiltrating into the interior of the portable terminals.'" *Id.* (quoting Ex. 1015, 1:32–35). Dr. Berger maintains that sealing and attaching buttons to an electronic device was a common technique, testifying that

> *Polany* discloses that "[o]ne skilled the art would recognize many different methods of fastening a control feature into the housing, such as, but not limited to, screw, bolts, snap fit components, adhesives, press fits, co-molded components, overmolded components, ultrasonically welded components, rotational fits, wedge fits, and other manufacturing means of effecting the assembly of components"

Id. ¶ 52 (quoting Ex. 1013, 21:5–11, 21:31–37). The fact that there would be certain design and structural differences between a combined button on the face of the electronic device, and a combined button on the side wall of the electronic device does not undermine Dr. Berger's testimony that a person of ordinary skill in the art would have understood how to implement a button in an opening on a sidewall of an electronic device. *See id.* ¶ 47 (Dr. Berger testifying "[f]or example, *Polany* discloses that the buttons (1315-1318) along the sidewall of the device included structures and surfaces that could be manually pressed by a user" and citing Ex. 1013, 4:40, 19:42–20:4, Figs. 13B, 17, 19A, 19B).

Although there is not an express combination of the "combined button" embodiment in Figure 10(b) with Figure 18's disclosure of the "combined button" located in opening 711 on the sidewall of a device, the evidence persuasively demonstrates that one of ordinary skill in the art would (1) understand Kim to disclose that the "combined button" structure and function could be implemented in an opening on the face or sidewall of a device and (2) would have had a reasonable expectation of success in doing so. *See, e.g.*, Ex. 1004, 17:23–25; *see also Bristol-Myers Squibb Co.*

v. Ben Venue Labs., Inc., 246 F.3d 1368, 1379 (Fed. Cir. 2001) (explaining that "anticipation does not require actual performance of suggestions in a disclosure," instead "anticipation only requires that those suggestions be enabling to one of skill in the art").

(4) Conclusion as to Anticipation for Claim 11

We are particularly persuaded by Kim's express disclosure that "FIGS. 7 and 18 show examples of the combined button located on the front surface or the side surface of the electronic device 701." Ex. 1004, 17:23–25. For this reason and those discussed above, we find that a person of ordinary skill in the art would understand Kim's written description as sufficiently linking the various "combined button" disclosures, embodiments and described throughout its specification to the embodiment in Figure 18 sufficiently to show that Kim anticipates the "combined button," located in an opening on a side surface of the electronic device in the same way as the challenged claims. Based on all the evidence of record, we determine that Petitioner has proven, by a preponderance of the evidence, that claim 11 is anticipated by Kim under 35 U.S.C. § 102.

c) Obviousness over Kim – Analysis of the Parties' Arguments and Evidence

Even if the combined button embodiments of Figure 10(b) and Figure 18 were not sufficiently linked or "arranged as in the claim" so as to anticipate, we determine that a person of ordinary skill in the art would have been motivated to combine these embodiments and would have had a reasonable expectation of success in doing so, which renders claims 11 and 16 obvious.

Petitioner alleges that claims 11 and 16 would have been obvious over Kim in view of the combination of the same embodiments in Kim's Figures

10(b) and 18. Pet. 8 ("*Kim* discloses and/or renders obvious claims 11, 14, 16, and 19 of the '619 Patent."). Petitioner argues that Kim's Figure 18 "discloses an enclosure with 'opening 711' formed along an exterior surface wherein "a part of the home button 760-1 which is the combined button may be positioned." *Id.* at 14–15 (citing Ex. 1004, 18:19-24; Ex. 1022 ¶ 132; Ex. 1003 ¶ 111). Consistent with Kim's express disclosure, Dr. Berger testifies that "a person of ordinary skill in the art would understand that a sealed and/or insulated button assembly from one location on a device can be constructed equally on a rear or sidewall of the device . . . [c]onsequently, 'an enclosure defining an enclosed volume and an opening along an exterior surface' would have been obvious and well within the skill of a person of ordinary skill in the art." Ex. 1003 ¶ 111.

Patent Owner presents several arguments to the contrary. *See, e.g.*, PO Resp. 25 (Patent Owner arguing that Petitioner "fails to offer sufficient explanation of motivation to combine or reasonable expectation of success that would support using the Figure 10 button in the Figure 18 embodiment.") (citing Ex. 2009 ¶ 53). Patent Owner makes the following specific arguments with respect to obviousness:

> (1) Kim's disclosure does not support the combination, (2) a POSITA would not have been motivated to implement the combination, (3) a POSITA would not have had a reasonable expectation of success in implementing the combination, and (4) the combination fails to satisfy the requirements of ***a fingerprint sensor positioned inward from the input surface*** recited in limitation [11.c] and ***a fingerprint sensor positioned inward from the input surface*** recited in [16.e]. Pet., 15, 33. Further, the Kim Combination is the product of hindsight, e.g., to satisfy the requirements of the ***sandwiched*** arrangement recited in limitations [11.g] and [16.g] for the ***button assembly.***

Id. at 25–26 (citing *id.* at §V.A.2(a)(4); Ex. 2009 ¶ 50). We address each of these arguments in turn.

As to Patent Owner's first and second arguments, as we discussed in detail above with respect to anticipation, we find that there is sufficient evidence in Kim itself of contextual and even express links between the various combined button embodiments and Figure 18. Section II.D.2.b)(1)–(4). We have already determined "that one of ordinary skill in the art would understand Kim to disclose the 'combined button' structure and function that could be implemented on the face or sidewall of a device." *Id.* We likewise determine, based on the same evidence, that a person of ordinary skill in the art *would have* understood Kim to suggest that the combined button structure and function, for example in the embodiment of Figure 10(b), could be implemented in an opening on the face or sidewall of a device. Obviousness does not require an instruction manual on how to physically incorporate or combine the disclosures of two embodiments in a reference. As *KSR* informs us, "in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420. Moreover, in this case we have only one prior art patent, Kim, so at least the pieces of the puzzle are all in the same box. The persuasive testimony of Dr. Berger that "a person of ordinary skill in the art would have been familiar with electronic devices with sealed and/or insulated button assemblies, and would understand that those assemblies were not limited to the front face of a device," is unrebutted in this case. Ex. 1003 ¶ 110. "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR*, 550 U.S. at 421.

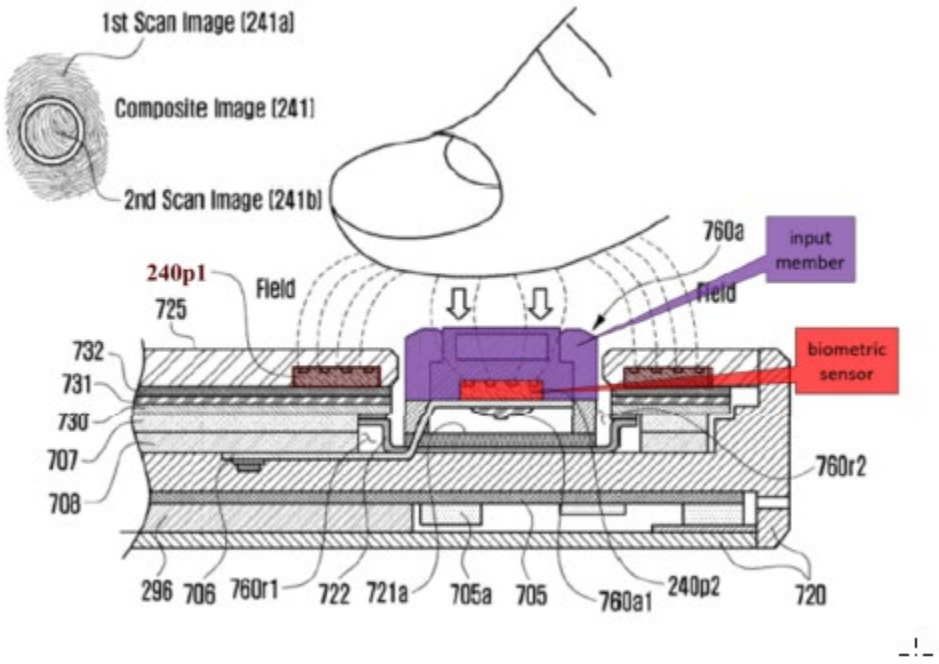
Given the background knowledge of a person of ordinary skill in the art in conjunction with the motivation and teachings in Kim itself for placing

the combined button on the sidewall of the electronic device is certainly sufficient motivation to support the combination of Kim's Figure 10(b) embodiment with the sidewall placement of the combined button taught in Figure 18 for obviousness purposes. It is well-settled that a single prior art obviousness reference itself can provide motivation for the combination. *See General Elec. Co. v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1352 (Fed. Cir. 2020) (Reversing the Board's finding of nonobviousness over a single prior art reference, the Court explained that "the 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.").

Patent Owner's third argument is unavailing because although Dr. Anthony testifies that "implementing the fingerprint sensor assembly of Kim's Figure 10 embodiment in the 'lateral surface' of Kim's Figure 18 embodiment would have complicated the manufacturing process for the resulting mobile device," Dr. Anthony does not provide testimony or evidence that implementing the combined button on the sidewall would have been difficult or beyond the level of ordinary skill in the art. Ex. 2009 ¶ 73. We credit Dr. Berger who explains persuasively that "[p]rior to the '619 patent's earliest alleged priority date of June 19, 2017, a person of ordinary skill in the art would have known that a mobile electronic device could include one or more button assemblies in a sidewall." Ex. 1003 ¶ 47 (citing Ex. 1013, 4:40, 19:42–20:4, Figs. 13B, 17, 19A, 19B). It is well-settled that a person of ordinary skill can use his or her ordinary skill, creativity, and common sense to make the necessary adjustments and further modifications to result in a properly functioning device. *See KSR*, 550 U.S. at 418 ("the

[obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.").

Patent Owner's fourth argument is that Kim "fails to satisfy the requirements of ***a fingerprint sensor positioned inward from the input surface*** recited in limitation [11.c] and ***a fingerprint sensor positioned inward from the input surface*** recited in [16.e]." PO Resp. 25 (citing Pet. 15, 33). Patent Owner provides annotated Figure 10(b) reproduced below.



Patent Owner's annotated Figure 10(b) is a cross-section of combined button 760a (colored purple) and biometric sensors 240*p*2 (colored red) and 240*p*1 colored brown).[13] *Id.* at 35.

[13] We acknowledge that Kim's original Figure 10(b) incorrectly labels biometric sensor 240*p*1 as 240*p*2, and that Patent Owner's annotated Figure 10(b) accounts for this discrepancy.

Patent Owner argues that "fingerprint sensor 240*p*1 is not positioned below a body representing physical button 760*a* (which the Petition maps to the ***input surface***/***input member***)." *Id.* (citing Ex. 2009 ¶ 82). Patent Owner does not expressly contest that Kim's fingerprint sensor 240*p*2 is positioned "below" the input member. However, Patent Owner argues that Petitioner neglects fingerprint sensor 240*p*1, and that the "omission of fingerprint sensor 240*p*1 also runs contrary to how a POSITA would have understood functionality of the fingerprint sensor assembly of Kim's Figure 10 embodiment." *Id.* at 36 (citing Ex. 2009 ¶ 79).

Claim 11 recites in part:

> [11pre] A fingerprint sensing system for a wearable device comprising:
>
> . . .
>
> [11.c] a button assembly positioned in the opening and defining an input surface, the button assembly comprising:
>
> [11.c.i] a fingerprint sensor *positioned inward from the input surface*;

Ex. 1001, 27:54–62 (emphasis added). As shown above, this limitation requires a fingerprint sensor, "positioned inward from the input surface." *Id.* Petitioner points to fingerprint sensor 240*p*2 in Figure 10(b), and asserts that it is shown "below the input member" 760*a* and therefore inward from the input surface of input member. Pet. Reply 9. Even though Kim discloses a second fingerprint sensor 240*p*1 circumscribing input member 760*a*, fingerprint sensor 240*p*2 satisfies limitations [11.c]–[11.c.i]. That there are two fingerprint sensors 240*p*1 and 240*p*2 disclosed in Kim's "combined button" embodiment of 10(b) does not matter because claim 11, which uses the open-ended term "comprising," is not limited to a single fingerprint

sensor. The language of the claim itself thus resolves Patent Owner's fourth argument as a matter of claim construction.

From a functional perspective, to the extent that Kim discloses that "[t]he electronic device 701 may compose fingerprint images 241*a* and 241*b* respectively obtained by the first and second fingerprint sensors into a single fingerprint image 241," a plain reading of Kim shows the arrangement of two fingerprint sensors is optional, i.e., an alternative. *See*, *e.g.*, Ex. 1004, 21:27–30 (Kim describing that "[e]ach of the physical button 760*a* and the virtual button 760*b* *may* include a fingerprint sensor. For example, the capacitive fingerprint sensor *may* be formed equally in each of the physical button 760*a* and the virtual button 760*b*.") (emphases added). Kim's use of the term "may" is permissive in context and not mandatory.

Finally, we address Patent Owner's conclusion that the combination of the Figure 10(b) and Figure 18 embodiments "is the product of hindsight, e.g., to satisfy the requirements of the ***sandwiched*** arrangement recited in limitations [11.g] and [16.g] for the ***button assembly***." PO Resp. 25–26 (citing *id.* at §V.A.2(a)(4); Ex. 2009 ¶ 50). Patent Owner does not elaborate on this hindsight argument—it appears to be mainly a conclusion asserted by Patent Owner based on the previously alleged lack of combination, motivation, and teaching arguments discussed above—however, we address it for purposes of completeness.

Limitation [11.g] recites:

> a portion of the flexible conduit is sandwiched between the seal and the sealing surface of the retainer or between the seal and the surface of the opening.

Ex. 1001, 27:13–15. The concept of hindsight is an appropriate consideration when the asserted combination is gleaned mainly, or only,

from the challenged patent itself. *See W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) ("To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher."), *see also Metalcraft of Mayville, Inc. v. The Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017) ("[W]e also recognize that we cannot allow hindsight bias to be the thread that stitches together prior art patches into something that is the claimed invention.").

In the present case, Petitioner has shown that Kim discloses limitation [11.g], which requires that the flexible electrical conduit "is sandwiched between the seal and the sealing surface of the retainer or between the seal and the surface of the opening." *See* Pet. 26 (Petitioner explaining that "Figure 10(b) discloses a portion of the flexible conduit (*i.e.*, *Kim*'s 'flexible PCB 706,' teal) is sandwiched between the seal (*i.e.*, *Kim*'s 'sealing rubber 722,' green) and the surface of the opening (*i.e.*, *Kim*'s 'housing 720' yellow.)).[14] Patent Owner disagrees with the combination of Kim's

[14] Petitioner also argues limitation [11.g] in ground 2, asserting that this structure is essentially a matter of design choice where "the flexible PCB could be routed throughout several different pathways in the electronic device, depending on the structure and goals of the device in question, to effectively utilize internal space of the mobile terminal." Pet. 38 (citing Ex. 1003 ¶¶ 239–242). As for limitation [11.g], Dr. Berger's testimony is essentially unrebutted that "[m]inor variations in device structure, purpose, and component configuration could lead a designer to choose one pathway over another," and one option was "that the flexible printed circuit board would be routed between the seal (*i.e.*, the gasket) and the retainer (*i.e.*, the support fixture), as depicted in the altered and annotated Figure 10(b),

embodiments in Figures 10(b) and 18, but does not substantively dispute that Kim's Figure 10(b) illustrates the structure recited in limitation [11.g]. PO Resp. 27–28.

Patent Owner's argument for limitation [11.g] relies mainly on its incorrect previous assertion that because Kim's embodiments in Figures 10(b) and 18 would not have been considered together by a person of ordinary skill in the art. This hindsight argument is unavailing for the same reasons as discussed above and because we determine on the full record that one of ordinary skill in the art would have understood Kim to disclose or suggest that the combined button structure and function of embodiments in Figures 10(b) and 18 can be implemented on the sidewall of an electronic device. In terms of obviousness, and given the various button structures disclosed by Kim, we find Petitioner's arguments and evidence persuasive that a person of ordinary skill in the art "would have been motivated to provide the seal by sandwiching existing, known components (*i.e.*, the enclosure and flexible conduit), to protect ingress points (*i.e.*, the pathway between the flexible conduit and internal electronics)," and, would have had a reasonable expectation of success in configuring the button structure in such a manner. Pet. 29 (citing Ex. 1003 ¶ 160).

d) Conclusion as to Obviousness for Claim 11

Petitioner has shown sufficiently that Kim alone teaches all of the limitations of claim 11, and a person of ordinary skill in the art would have been motivated to combine the combined button embodiments of Figures 10(b) and 18 to arrive at the fingerprint sensing system of claim 11 with a

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below, in order to avoid interference with moving pieces of the button assembly." Ex. 1003 ¶¶ 241–242.

reasonable expectation of success. *See* Pet. 10–28; Ex. 1003 ¶¶ 68–146. Based on all the evidence of record, we determine that Petitioner has proven, by a preponderance of the evidence, that claim 11 would have been obvious based on Kim under 35 U.S.C. § 103.

3. Dependent Claim 14

Because we determine that dependent claim 14 would have been obvious in view of Kim we do not reach Petitioner's anticipation challenge for this dependent claim.

Dependent claim 14 depends from claim 11 and recites "wherein the fingerprint sensor is further configured to detect a touch." Ex. 1001 28:16–17. Petitioner argues that "*Kim* discloses a capacitive fingerprint sensor, which a POSITA would have understood functions by detecting a touch." Pet. 30 (citing Ex. 1004, 21:27–41; Ex. 1022 ¶¶ 167–170; Ex. 1003 ¶¶ 162–165). Dr. Berger testifies that "a person of ordinary skill in the art would have understood that a capacitive fingerprint sensor functions by detecting a touch." Ex. 1003 ¶ 164.

Patent Owner relies on its arguments with respect to independent claim 11 and does not substantively contest Petitioner's additional arguments and evidence for dependent claim 14. *See* PO Resp. 15–19. Based on Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, we are persuaded that Petitioner has proven, by a preponderance of the evidence, that Kim renders claim 14 unpatentable as obvious. *See* Pet. 29; Ex. 1003 ¶¶ 162–165.

4. Independent Claim 16

Independent claim 16 is similar to independent claim 11 but rather than a "wearable device," is drawn specifically to "a watch," including "a

display," and "a watchband" and like claim 1, requires "an opening formed in a sidewall." Ex. 1001, 28:22–28. Patent Owner mostly does not dispute Petitioner's mapping of Kim's disclosure to the elements of claim 16, but argues, the same as for claim 11, that, (1) a person of ordinary skill in the art would not combine the embodiments of Kim's Figures 10(b) and 18, and (2) the combination of the embodiments in Figures 10(b) and 18 fails to satisfy the fingerprint sensor positioning limitations in limitation [16.e.iii]. PO Resp. 15–19, 25–37.

As to argument (1), for the same reasons as discussed above with respect to claim 11, we find Petitioner's arguments and evidence persuasive for claim 16 that a person of ordinary skill in the art would understand that Kim teaches the combined button embodiments disclosed in Kim's various embodiments, e.g., Figure 10(b), could be implemented in the front and side surfaces of an electronic device as expressly illustrated in Figure 18. *See* Section II.D.2.b)(1)–(2).

For argument (2), we reproduce below the relevant portion of claim 16 and the button assembly limitations:

> [16.e] a button assembly disposed within the opening, the button assembly comprising:
>
> [16.e.i] a button housing;
>
> [16.e.ii] an input member with an input surface;
>
> [16.e.iii] *a fingerprint 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 fingerprint;
>
> [16.e.iv] a touch sensor configured to detect the touch;
>
> [16.e.v] a flexible conduit electrically coupled to the fingerprint sensor and configured to transmit the output signal to the processor; and

Ex. 1001, 28:30–41 (emphasis added). The same as for claim 11, Patent Owner argues that Petitioner fails to account for Kim's fingerprint sensor 240*p*1 in mapping Kim's disclosure to claim limitation [16.e. iii]. PO Resp. 35 (Patent Owner arguing that "by omitting fingerprint sensor 240*p*1 from its mapping, AliveCor deviated from Kim's disclosure in order to provide a superficial mapping based on the arrangement required by limitations [11.c.i] and [16.e.iii]."") (citing Ex. 2009 ¶ 78). As we discussed above for limitation [11.c.i], the fact that Kim discloses two fingerprint sensors 240*p*1 and 240*p*2 does not matter because claim 16 is not limited to a single fingerprint sensor, and Figure 10(b) explicitly discloses fingerprint sensor 240*p*2 "positioned below the input member" as claim limitation [16.e.iii] requires.

Apart from these arguments, which parallel Patent Owner's arguments for claim 11, Patent Owner does not substantively contest Petitioner's mapping of Kim to the limitations of claim 16. *See* PO Resp. 26–38. Thus, we find unavailing Patent Owner's arguments with respect to anticipation and obviousness regarding claim 16 for the reasons explained above.

In summary, we have reviewed Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, as to all the limitations in claim 16 and, finding them persuasive, adopt Petitioner's positions as our own. *See* Pet. 30–36; Ex. 1003 ¶¶ 166–226. Considering the full record in this proceeding, we are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 16 is anticipated by, and also would have been obvious based on Kim, under 35 U.S.C. §§ 102–103, for the reasons stated by Petitioner. *See id.*

5. Dependent Claim 19

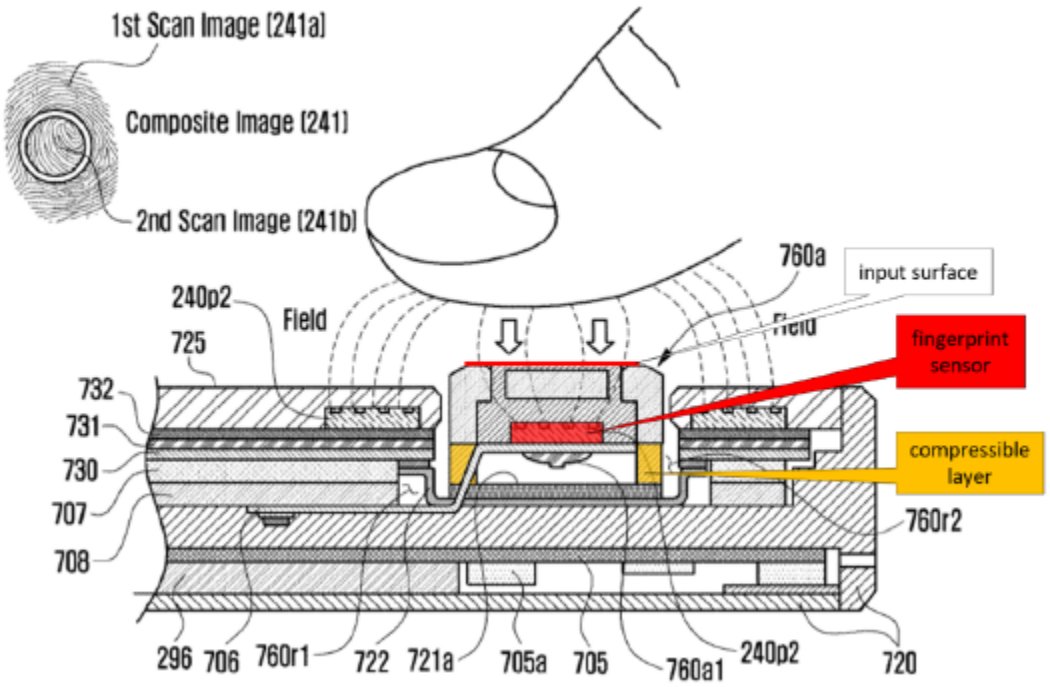
Because we determine that dependent claim 19 would have been obvious in view of Kim we do not reach Petitioner's anticipation challenge for this dependent claim.

Dependent claim 19 depends from claim 16 and further recites:

> The watch of claim 16, further comprising a compressible layer disposed below the fingerprint sensor the compressible layer compressing to receive a displacement or a deflection of the input member upon receipt of a user force to the input surface.

Ex. 1001, 28:55–59.

Petitioner provides annotated Figure 10(b), reproduced below, and argues that "Figure 10(b) shows the compressible layer (orange) is disposed below the fingerprint sensor (red), and compresses following a force on the input surface (red line)." Pet. 36–37 (citing Ex. 1003 ¶¶ 219–222).



Petitioner's annotated Figure 10(b) illustrates a user's finger adjacent to fingerprint sensor 240p2 (red) and compressible layer (orange). Dr. Berger testifies that

> [i]n order for the dome switch to contact support fixture 721a, and therefore operate as designed, a person of ordinary skill in the art would understand that the layer highlighted in orange, above, must necessarily compress to receive a displacement or a deflection of the input member upon receipt of a user force to the input surface.

Ex. 1003 ¶ 225.

Patent Owner relies on its arguments with respect to independent claim 16 and does not substantively contest Petitioner's arguments and evidence for dependent claim 19. *See* PO Resp. 15–19. We have reviewed Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, and are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 19 would have been obvious based on Kim under 35 U.S.C. § 103, for the reasons stated by Petitioner. *See* Pet. 36–38; Ex. 1003 ¶¶ 219–226.

E. Ground 2: Claims 11–14 and 16–20 – Obviousness over Kim

Because we have determined that claims 11 and 16 are anticipated by or would have been obvious over Kim, and claims 14 and 19 would have been obvious based on Kim, we address below the parties' arguments and evidence with respect to the challenged dependent claims 12–13, 17–18, and 20.

1. Claims 12 and 13

Claims 12 and 13 each depend from independent claim 11. Ex. 1001, 28:10–14. Claim 12 requires that the "the flexible conduit extends through

the passage," and claim 13 recites that "the flexible conduit is coupled to a second flexible conduit that extends through the passage." *Id.*

Petitioner argues that "*Kim* includes electrical components located in the opening of the enclosure which are separated from a power supply by the enclosure wall, a POSITA would have understood that the claimed passage is necessary to connect the components to the power supply." Pet. 23–24 (citing Ex. 1003 ¶ 146). Dr. Berger testifies that "[i]n order for these connections to occur, *Kim* discloses the flexible conduit extends through the passage between the opening and the enclosed volume." Ex. 1003 ¶ 246. With respect to the first and second flexible conduits recited in claim 13, Dr. Berger testifies further that

> a person of ordinary skill in the art would understand that the flexible PCB 706 discussed in claims 11 and 12, above, would include multiple portions, each of which constitutes a separate "chip on panel." In light of *Kim's* teachings that an electronic device may be composed of one or more components, a person of ordinary skill in the art would likewise understand that *Kim's* flexible PCB 706 would be formed of one or more separate and distinct flexible PCBs that are connected together, wherein only one of the flexible PCBs extends through the passage.

Id. ¶ 251.

Patent Owner relies on its arguments with respect to independent claim 11 and does not substantively contest Petitioner's evidence for dependent claims 12 and 13. *See* PO Resp. 25–37 (Patent Owner mainly arguing that a person of ordinary skill in the art would not have combined the embodiments of Kim's Figures 10(b) and 18 and that Kim fails to disclose the fingerprint sensor positioning recited in claim limitations [11.c.i] and [16.e.iii]). We disagree with Patent Owner's arguments regarding parent claim 11 for the reasons explained above. We have

reviewed Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, and are persuaded that Petitioner has proven, by a preponderance of the evidence, that claims 12 and 13 would have been obvious based on Kim under 35 U.S.C. § 103 for the reasons stated by Petitioner. *See* Pet. 40–41; Ex. 1003 ¶¶ 245–252.

2. Claims 17 and 18

Claims 17 and 18 each depend from independent claim 16. Ex. 1001, 28:47–54. Claim 17 requires "a passage extending from the opening to the enclosed volume; wherein the flexible conduit extends from the opening to the enclosed volume through the passage." *Id.* at 28:48–51. Claim 18 requires "a fastener attaching the button housing to the enclosure and placing the seal in compression." *Id.* at 28:53–54.

Petitioner argues that the "passage" in claim 17 is obvious over Kim for the same reasons as discussed with respect to limitations [11.e] and claim 12 above. Pet. 41 (citing Ex. 1003 ¶¶ 268–273). As for claim 18, Petitioner argues that a person of ordinary skill in the art "would have understood the button housing of *Kim* is attached to the portion of the enclosure underneath the seal (which would necessarily place the seal in compression), because Figure 10(b) does not depict any points of attachment to the side of the button housing." *Id.* at 42 (citing Ex. 1003 ¶¶ 274–278).

Patent Owner relies on its arguments with respect to independent claims 11 and 16 and does not substantively contest Petitioner's evidence for dependent claims 17 and 18. *See* PO Resp. 25–37 (Patent Owner mainly arguing that a person of ordinary skill in the art would not have combined the embodiments of Kim's Figures 10(b) and 18 and that Kim fails to disclose the fingerprint sensor positioning recited in claim limitations

[11.c.i] and [16.e.iii]). We disagree with Patent Owner's arguments regarding parent claims 11 and 16 for the reasons explained above. We have reviewed Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, and are persuaded that Petitioner has proven, by a preponderance of the evidence, that claims 17 and 18 would have been obvious based on Kim under 35 U.S.C. § 103 for the reasons stated by Petitioner. *See* Pet. 41–42; Ex. 1003 ¶¶ 268–278.

3. Claim 20

Claim 20 depends from independent claim 16 and requires "an electrical isolation sheet disposed between the button housing and the enclosure." Ex. 1001, 28:60–62. Although Kim does not discuss an "isolation sheet," Petitioner argues that "it was well known in the art that electrical isolation sheets were needed so that capacitance would be measured 'between the user's finger and the fingerprint recognition sensor, not between any other object and the fingerprint sensor.'" *Id.* at 43 (quoting Ex. 1007 ¶¶ 79–80). Dr. Berger testifies that "person of ordinary skill in the art would have understood that use of electrical isolation techniques are beneficial to prevent interference with the sensitive electronic components disposed in the button assembly of *Kim*, such as capacitive fingerprint sensors." Ex. 1003 ¶ 282.

Patent Owner relies on its arguments with respect to independent claims 16 and does not substantively contest Petitioner's evidence for dependent claims 20. *See* PO Resp. 25–37 (Patent Owner mainly arguing that a person of ordinary skill in the art would not have combined the embodiments of Kim's Figures 10(b) and 18 and that Kim fails to disclose the fingerprint sensor positioning recited in claim limitations [11.c.i] and

[16.e.iii]). We disagree with Patent Owner's arguments regarding parent claims 11 and 16 for the reasons explained above. We have reviewed Petitioner's contentions and supporting evidence, including the testimony of Dr. Berger, and are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 20 would have been obvious based on Kim under 35 U.S.C. § 103 for the reasons stated by Petitioner. *See* Pet. 42–43; Ex. 1003 ¶¶ 280–283.

4. Conclusion as to Obviousness for Claims 12–13, 17–18, and 20

We have considered, and on the complete record before us, adopt as our own, Petitioner's arguments and evidence set forth at pages 40–43 of the Petition as to dependent claims 12–13, 17–18, and 20. Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that claims 12–13, 17–18, and 20 would have been obvious over Kim.

F. Ground 4: Claims 11–17 and 19 – Anticipation and Obviousness over Chang

Because we have determined, above, that claims 11–14 and 19 are either anticipated by, or would have been obvious over Kim, we address below only Petitioner's remaining challenge to claim 15.

1. Dependent Claim 15

Dependent claim 15 recites:

> The fingerprint sensing system of claim 11, wherein: the button assembly further comprises a tactile dome switch disposed inward from the retainer; and
>
> the tactile dome switch compresses in response to a press on the input surface.

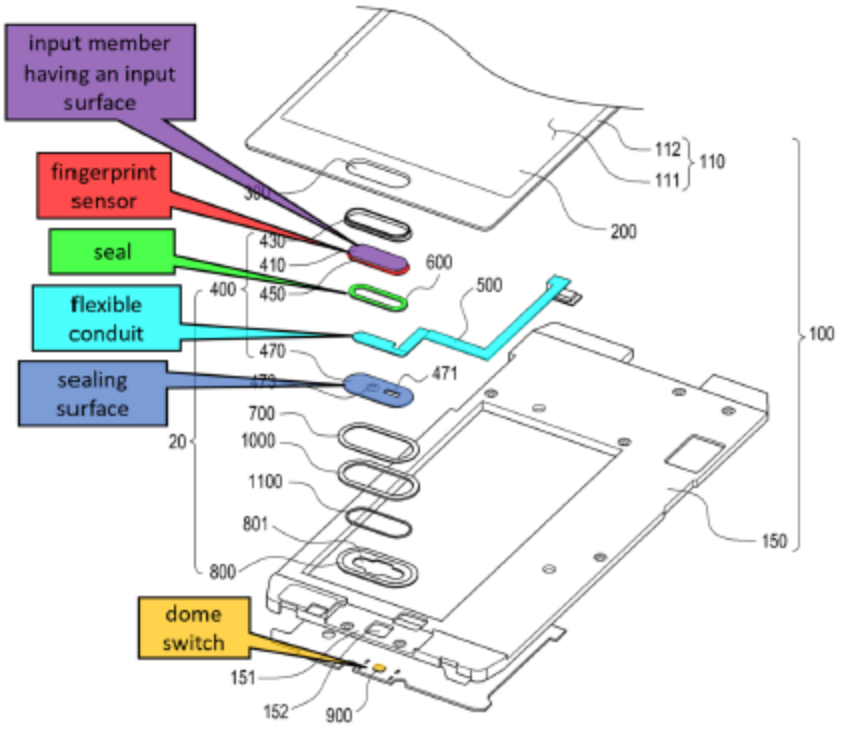
Ex. 1001, 28:17–21. However, the limitations of claim 15 are not material to our analysis, because, as we discuss below, Petitioner has not met its burden to show that independent claim 11 is unpatentable over Chang. In particular our analysis focuses on limitation [11.g] which requires:

> a portion of the flexible conduit is sandwiched between the seal and the sealing surface of the retainer or between the seal and the surface of the opening.

Id. at 28:44–46.

2. Chang (Ex. 1015)

Chang is titled "Electronic Device with Key Module and Method of Manufacturing the Same." Ex. 1015, code (54). Chang describes "an electronic device including an input device in which an instable waterproof point is removed and a key click feeling is improved with a simple structure." *Id.* at 1:54–57. Chang's Figure 3, reproduced below as annotated by Petitioner, illustrates the structural arrangement of a button assembly including a fingerprint sensor and dome switch for an electronic device.



Chang's Figure 3 is "an exploded perspective view illustrating the components of an example key module provided in an electronic device." *Id.* at 3:20–23. More specifically, Chang discloses button structure 400 including fingerprint recognizing member 450, and beneath that, sealing member 600, flexible conductive member 500, and lower plate 470. *Id.* at 7:35–40, 9:29–31, 10:1–12. Lower plate 470 includes concave recess 473 which depends downward to contact dome switch 900 as well as opening 471 through which flexible conductive member 500 passes so as to extend inside button assembly 400.[15]

[15] We point out that Figure 3 is deceiving because the exploded view shows essentially the entirety of flexible conductive member 500 positioned between sealing member 600 and lower plate 470. Chang explains, however, that "the flexible conductive member 500 may [] extend to the inside of the electronic device 10 via a second opening 471 of a lower plate 470 and a third opening 801 of an elastic member 800." Ex. 1001, 9:20–28. In other

We reproduce below Chang's Figures 9 and 10 as annotated by the Board.

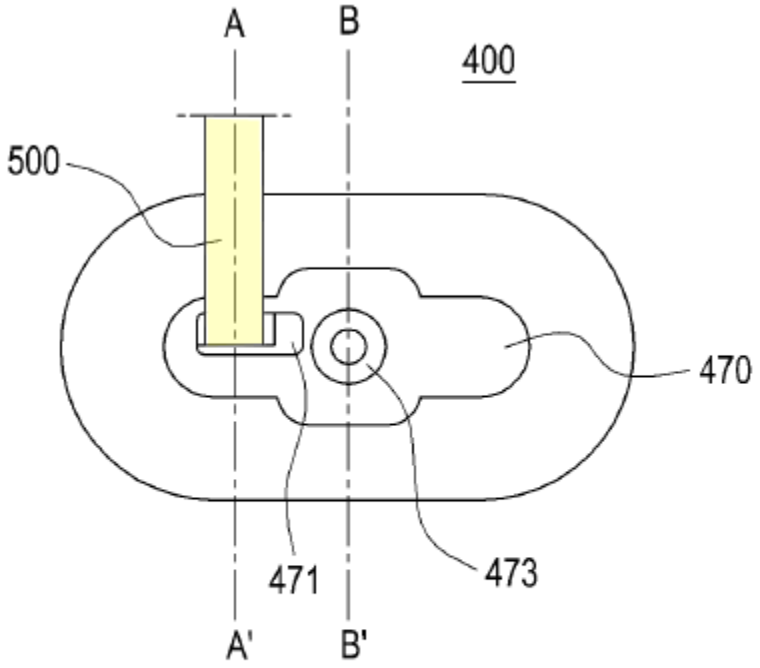


FIG.9

Chang's Figure 9 "is a diagram illustrating a state of a button structure of a key module according to an example embodiment of the present disclosure when viewed from the bottom side." *Id.* at 3:42–44. In Figure 9, a portion of flexible conductive member 500 (highlighted yellow) is shown extending

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words, we understand that flexible conductive member 500 is, for lack of a better term, "threaded" through *all* the openings (including opening 801 and opening 471) in the components of key module 20 so that mainly the free end, that is—the partially rounded end portion of flexible conductive member 500—is positioned radially *within* sealing member 600, *beneath* fingerprint recognizing member 450, and *above* lower plate 470. *Id.* at Fig. 4B.

through both opening 801 in elastic member 800, (no reference numerals in Figure 9) and then through opening 471 in lower plate 470. *Id.* at 9:20–37.

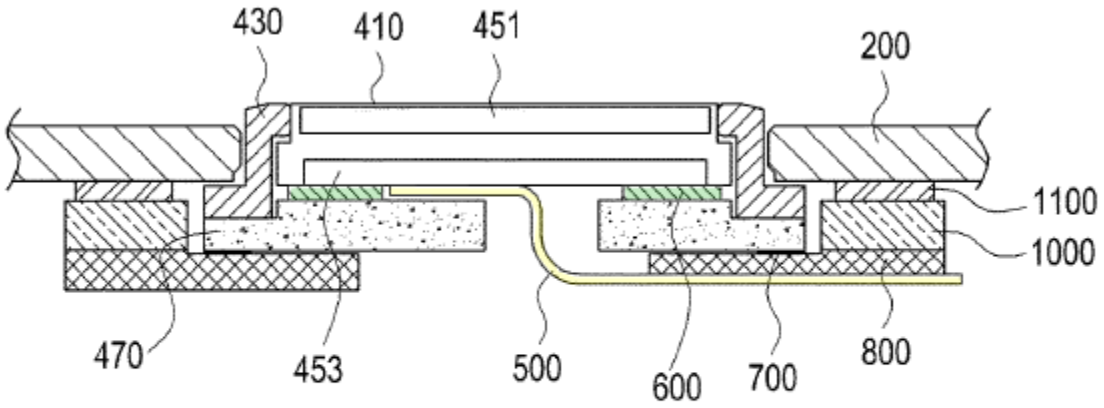


FIG.10

Chang explains that "Figure 10 is a cross-sectional side view of the key module along line A-A' in FIG. 9." *Id.* at 3:45–46. Figure 10 illustrates that fingerprint recognizing member 450 (no reference numeral in Figure 10) includes fingerprint recognizing pad 451 and circuit region 453 shown connected to free end portion of conductive member 500 (highlighted yellow) positioned in a radially inward position adjacent sealing member 600 (highlighted green). Conductive member 500 is further shown passing through opening 471 in lower plate 470, as well as through opening 801 in elastic member 800 before extending into the larger interior volume of electronic device 10 itself.

Consistent with the structure of the button assembly and sealing member 600 shown Figure 3 and Figure 10 in particular, Chang describes that

> sealing member 600 may be interposed between the lower plate 470 and the fingerprint recognizing member 450 in order to block

> external foreign matter (e.g., a fluid, such as moisture), and the opposite end faces of the first sealing member 600 may be respectively attached to the top face of the lower plate 470 and the bottom face of the fingerprint recognizing member 450 via taping.

Id. at 12:12–18.

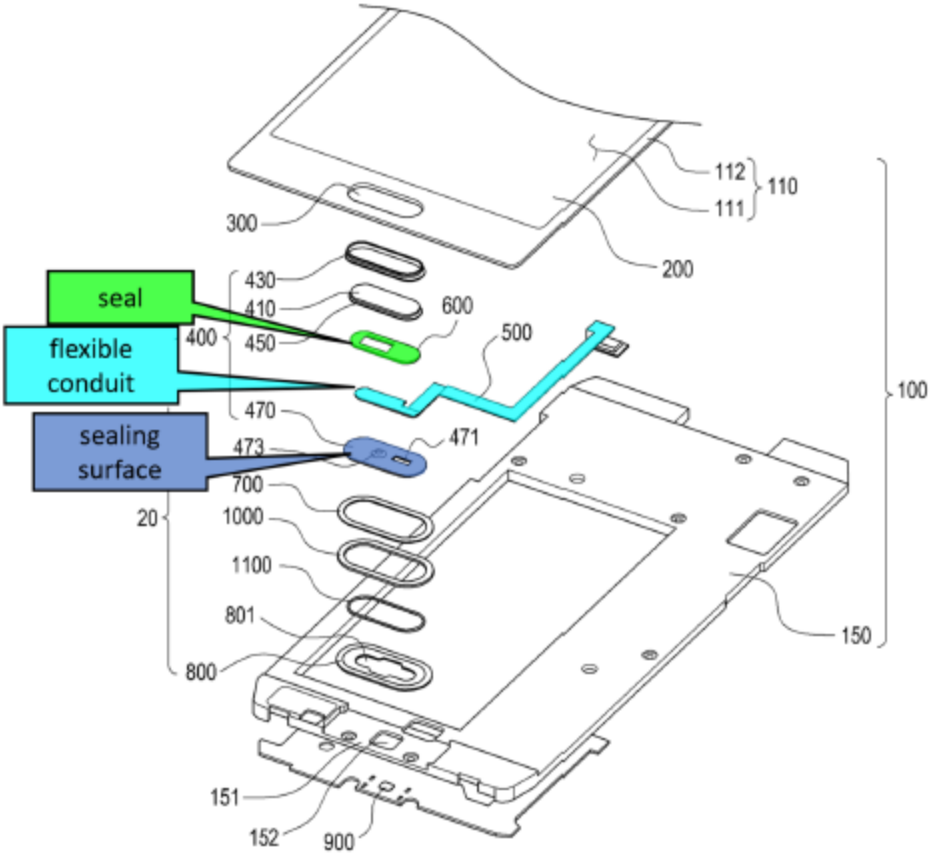
3. The Parties' Arguments and Analysis

Patent Owner's main argument is that Petitioner's

> anticipation challenge in Ground 4 also fails as a matter of law because it either relies on an embodiment in Chang that fails to satisfy all requirements of the ***button assembly*** or combines two allegedly "alternative" embodiments of Chang ("the Chang Combination"), but fails to sufficiently address how a POSITA would have arranged elements of Chang to achieve the ***button assembly***.

PO Resp. 20 (citing *Net Moneyin*, 545 F.3d. at 1369). More specifically, for anticipation, Patent Owner argues that Chang's button assembly fails to disclose "flexible conductive member 500 . . . ***sandwiched*** between the sealing member 600 (mapped to the ***seal***) and the lower plate 470 (mapped to the ***sealing surface***) as required by limitations [11.g] and [16.g]." *Id.* at 21. As for obviousness, Patent Owner argues, *inter alia*, that a person of ordinary skill in the art would not modify sealing member 6 as Petitioner and Dr. Berger allege. *Id.* at 46–50. Patent Owner further argues inoperability of Petitioner's proposed modifications to Chang's sealing member 600 and button assembly arrangement and that a person of ordinary skill in the art "would not have implemented the assembly of the Chang combinations . . . because this would have prevented electrical connection to the ***conductive*** member 500. *Id.* at 59–60 (citing Ex. 2009 ¶ 123).

Petitioner provides the following annotated *and altered* Figure 3 from Chang, as reproduced below.



Chang's Figure 3 as annotated and altered by Petitioner, illustrates the arrangement of sealing member 600 (green), flexible conduit 500 (teal), and opening 471 in lower plate 470 (blue). Importantly, Petitioner has altered sealing member 600 from what is actually shown in original Figure 3, to what is shown as modified sealing member 600, above, highlighted green.

The reason that Petitioner has altered sealing member 600 for its anticipation and obviousness arguments as to limitation [11.g] is because, as Patent Owner persuasively contends, and we agree, for original Figure 3 "the arrangement does not provide any portion of conductive member 500 that is ***sandwiched*** between the sealing member 600 and the lower plate 470 (mapped to the ***sealing surface***). PO Resp. 21–22 (citing Ex. 2009 ¶ 42). For example, as shown by Figure 10 as annotated by the Board and reproduced below, flexible conduit 500 (yellow) is *not* sandwiched in a

stacked arrangement between sealing member 600 (green) and either the "button housing," or a "surface of the opening," as required by limitation [11.g].

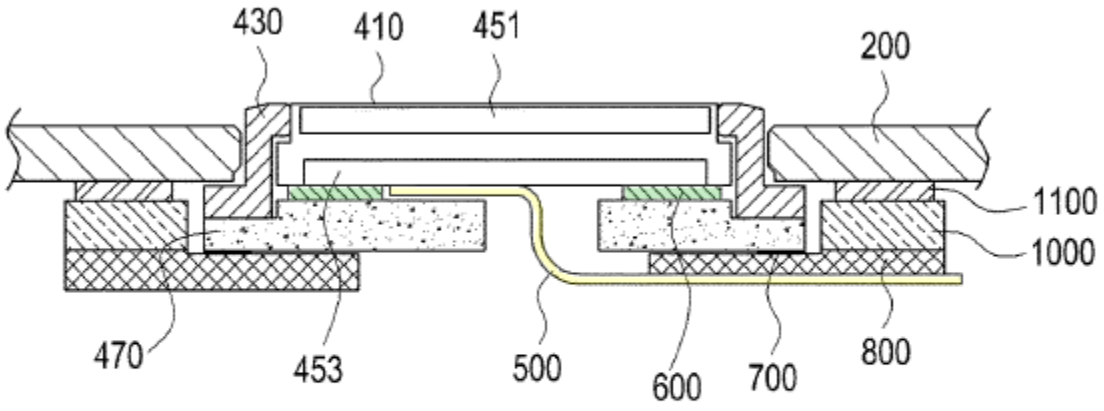
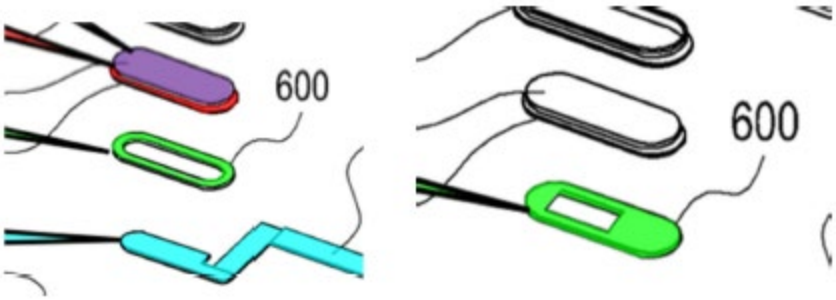


FIG.10

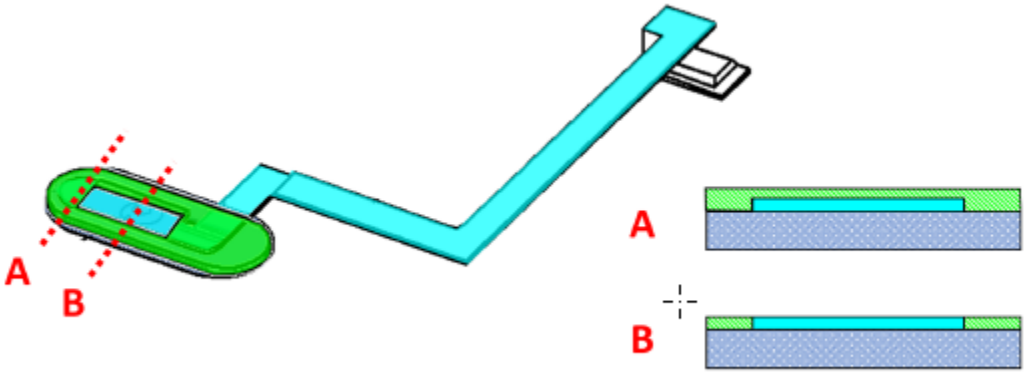
Chang's Figure 10, as annotated by the Board, illustrates conductive member 500 (highlighted yellow) positioned radially adjacent and within sealing member 600, then passing through opening 471 in lower plate 470 as well as through opening 801 in elastic member 800 before extending into the larger interior volume of the electronic device itself.

Petitioner has thus altered, i.e., modified, sealing member 600 so that it is no longer annular or ring shaped, but an oblong shape with an off-center rectangular opening as shown in the annotated comparison from Patent Owner's response reproduced below.



Patent Owner's comparison of an annotated portion of original Figure 3 on the left, compared to Petitioner's altered Figure 3 on the right illustrating modified sealing member 600. PO Resp. 23.

Petitioner also provides the following additional altered and annotated figures reproduced below.



With modified sealing member 600 according to Petitioner, certain cross-sections (lines A and B) would exist, as shown in Figures A and B, where for example, Figure A shows flexible conductor (teal) apparently sandwiched between sealing member 600 (green) and the sealing surface of lower plate 470 (blue). *Id.* at Pet. 95.

Based on Petitioner's modified sealing member 600, Dr. Berger testifies that "[a]s shown in section cut A, at least a portion of the flexible conduit (teal) is sandwiched between the seal (green) and the sealing surface (blue)." Ex. 1003 ¶ 496. We find Petitioner's arguments, alterations and

modified figures, along with Dr. Berger's testimony in this instance, as the epitome of hindsight. Hindsight is an appropriate consideration here, as modified sealing member 600 is asserted with little, if any, persuasive evidentiary support and appears designed by Petitioner purely to reflect the language of claim limitation [11.g] itself. *See W.L. Gore & Associates, Inc.* 721 F.2d at 1553 ("To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher."). On the complete record before us, and for the reasons that follow, we find that Petitioner's modification of sealing member 600 has been done simply to shoehorn Chang's disclosure into claim limitation [11.g].

For one thing, Petitioner has pointed to no express figure or written description in Chang which would have taught a person of ordinary skill in the art that modified sealing member 600 would have been functionally or structurally fabricated in the manner asserted by Petitioner and Dr. Berger. Pet. 90–97. Due to the lack of any figure or clear written description of modified sealing member 600 in Chang, Petitioner points to the following written description in Chang:

> *Alternatively*, the first sealing member 600 may be designed in an annular shape (e.g., a loop or ring shape), which corresponds to the entire shape of the key module 20 and includes an opening so as to allow the flexible conductive member 500 to extend therethrough.

Ex. 1015, 14:24–29). Based on the word "[a]lternatively," Petitioner argues that "a POSITA would have understood that *Chang* ***also*** teaches a sealing member 600 that ***is not*** designed in an annular or ring shape. . . . Therefore,

a POSITA would have understood that sealing member 600 would be constructed as depicted as depicted below" in modified sealing member 600. Pet. 92 (citing Ex. 1015, 14:24–29; Ex. 1003 ¶¶ 491–493). This argument and evidence in Chang's written description is not persuasive. Even, if Petitioner's interpretation of "[a]lternatively" is correct, we can find no disclosure in Chang, nor does Petitioner point to any, that shows or describes any "alternative" sealing member 600, much less a modified sealing member 600 as depicted by Petitioner in its altered figures from Chang.

Really, the only evidence that Petitioner offers for modified sealing member 600 is some rather underwhelming reasoning from Dr. Berger. Dr. Berger testifies:

> To the extent that a person of ordinary skill in the art would not find claim element [11.g] to be explicitly disclosed by *Chang*, it is nevertheless rendered obvious by *Chang*. In summary, a person of ordinary skill in the art would understand that Chang discloses a button assembly that, while depicted in an oval or ring shape, would be modified to fit the structural shape or design of the electronic device in question. Modification of the button assembly would include modification of the size and shape of both the fingerprint sensor, and the flexible conductive member attached thereto, among other things. In order to meet the stated purpose of ensuring that the electronic components are separated to the outside and safely affixed, and as I explained in Section VI.B (which is incorporated herein) a person of ordinary skill in the art would understand that the seal would need to be modified in accordance with the button assembly. In making these modifications, a person of ordinary skill in the art would choose the sandwiching configuration depicted in the annotated figures, above, in order to ensure that the electrical connection between the flexible conductive member and the fingerprint sensor is sufficiently sealed.

Ex. 1003 ¶ 499. This explanation falls flat, first, because it does not really make sense. It is entirely unclear how "[m]odification of the button

assembly," in some unexplained fashion, would lead to modification of seal member 600 in the manner imagined by Petitioner. Second, Dr. Berger does not explain why the "modification of the size and shape" of the fingerprint sensor and the flexible conductive member would require anything other than respectively sizing annular sealing member 600 to match the size and profile shape of a larger fingerprint sensor and the flexible conductive member. Moreover, this testimony by Dr. Berger is entirely unsupported by any reference to the record and supporting evidence. Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight. 37 C.F.R. § 42.65(a). Dr. Berger does not provide sufficient explanation, facts, data, or analysis to support the opinion stated. Consequently, for this aspect of our Decision we give Dr. Berger's testimony no probative weight.

On the complete record before us, we find that Petitioner has failed to show by a preponderance of the evidence that Chang discloses the structure of limitation [11.g] requiring "the flexible conduit sandwiched between the seal" and either the button housing or the surface of the opening. As for obviousness specifically, we determine that Petitioner has failed to present a preponderance of evidence that a person of ordinary skill in the art would have modified Chang's sealing member 600 in the manner asserted by Petitioner and Dr. Berger to meet claim limitation [11.g].

Accordingly, Chang does not anticipate or render obvious independent claim 11 and its respective dependent claim 15.

G. Ground 3: Claims 11–14, 16–17, 19–20 – Obviousness over Jung and Meyers

Because we determine that claims 11–14, 16–17, and 19–20 are anticipated by or would have been obvious over Kim we need not address whether these same claims would have been obvious over Jung and Meyers.

III. CONCLUSION[16]

For the reasons discussed above, we determine Petitioner meets its burden of establishing, by a preponderance of the evidence, that the challenged claims are unpatentable as summarized in the following table:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claims Not Shown Unpatentable
11, 14, 16, 19	102	Kim	11, 16[17]	
11, 14, 16, 19	103	Kim	11, 14, 16, 19	
11–14, 16–20	103	Kim	11–14, 16–20	

[16] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

[17] Because we determine that dependent claims 14 and 19 would have been obvious based on Kim, we do not reach Petitioner's anticipation challenge for these dependent claims.

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claims Not Shown Unpatentable
11–14, 16–17, 19–20	103	Jung, Meyers[18]		
11–17, 19	102	Chang	11–14, 16–17, 19	15
11–17, 19	103	Chang	11–14, 16–17, 19	15
Overall Outcome			11–14, 16–20	15

III. ORDER

For the reasons given, it is

ORDERED that, based on a preponderance of the evidence, claims 11–14 and 16–20 of the '619 patent have been shown to be unpatentable and that claim 15 has *not* been shown to be unpatentable;

FURTHER ORDERED that, because this is a Final Written Decision, any party to the proceeding seeking judicial review of this Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

[18] Because Petitioner's contentions regarding anticipation and obviousness of claims 11–14 and 16–20 based on Kim are dispositive of these challenged claims, we do not reach asserted Ground 3. *See In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009).

For PETITIONER:

Christopher TL Douglas
Scott M. Stevens
J. Ravindra Fernando
Erin Beaton
ALSTON & BIRD LLP
christopher.douglas@alston.com
scott.stevens@alston.com
ravi.fernando@alston.com
erin.beaton@alston.com

PATENT OWNER:

W. Karl Renner
Grace Kim
Ryan Chowdhury
Parvin Ghane
Jeremy Monaldo
FISH & RICHARDSON P.C.
axf-ptab@fr.com
gkim@fr.com
rchowdhury@fr.com
ghane@fr.com
jjm@fr.com