UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ALIVECOR, INC.,

Petitioner

v.

APPLE INC.,

Patent Owner

_____

Case No. IPR2023-00948

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

_____

PETITION FOR *INTER PARTES* REVIEW

UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104

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LIST OF EXHIBITS

Exhibit	Short Name	Description
Ex. 1001	’619 Patent	U.S. Patent No. 10,866,619 B2 (“the ’619 Patent”)
Ex. 1002	’619 File History	Prosecution History of U.S. Patent No. 10,866,619 B2
Ex. 1003	Berger Declaration	Declaration of Dr. Ronald D. Berger
Ex. 1004	Kim	U.S. Patent No. 10,620,828
Ex. 1005	Jung	U.S. Patent Pub. No. 2016/0100499
Ex. 1006	Dunlap	U.S. Patent No. 9,651,513
Ex. 1007	Meyers	U.S. Patent Pub. No. 2015/0071509
Ex. 1008	Evans	U.S. Patent No. 8,694,793
Ex. 1009	Pare	U.S. Patent No. 6,131,464
Ex. 1010	Chaudhri	U.S. Patent No. 9,740,381
Ex. 1011	Choung	U.S. Patent Pub. No. 2015/0245514
Ex. 1012	Hwang	U.S. Patent No. 8,750,919
Ex. 1013	Polany	U.S. Patent No. 7,535,799
Ex. 1014	Choi	U.S. Patent Pub. No. 2017/0099742
Ex. 1015	Chang	U.S. Patent No. 10,133,910
Ex. 1016	Mittleman	U.S. Patent No. 8,367,958
Ex. 1017	Aapro	U.S. Patent No. 7,486,517
Ex. 1018	Vittu	U.S. Patent No. 9,973,669

Exhibit	Short Name	Description
Ex. 1019	Wagman	U.S. Patent No. 9,973,840
Ex. 1020	Dave	U.S. Patent Pub. No. 2013/0108082
Ex. 1021	Berger CV	Curriculum vitae of Dr. Ronald Berger
Ex. 1022	Kim-KR	KR 10-2016-0162565 and certified translation thereof
Ex. 1023	Kim-KR-Pub.	KR 10-2018-0062654 and certified translation thereof
Ex. 1024	National Judicial Caseload Profile	U.S. District Courts – National Judicial Caseload Profile (accessed via https://www.uscourts.gov/sites/default/files/fcms_na_distprofile0331.2022.pdf)
Ex. 1025	Complaint	Complaint for Patent Infringement, *Apple Inc., v. AliveCor, Inc.*, Case No. 4:22-cv-07608-HSG (N.D. Cal. 2022)

AliveCor, Inc. ("Petitioner") seeks IPR under 35 U.S.C. §§311–319 and 37 C.F.R. §42 of Claims 1-10 ("the Challenged Claims") of Patent No. 10,866,619 ("'619 Patent"). Petitioner requests cancellation of the Challenged Claims.

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

Petitioner certifies that the '619 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. PAYMENT OF FEES

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

III. OVERVIEW OF CHALLENGES AND RELIEF REQUESTED

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

Ground 1: Claims 1, 5, 9, and 10 are unpatentable under 35 U.S.C. §§102 and/or 103 over *Kim*.

Ground 2: Claims 1-10 are unpatentable under 35 U.S.C. §103 over *Kim*.

Ground 3: Claims 1, and 3-10 are unpatentable under 35 U.S.C. §103 over *Jung* in view of *Meyers*.

Ground 4: Claims 1-2, 6, and 9 are unpatentable under 35 U.S.C. §§ 102 and/or 103 over *Chang*.

IV. SUMMARY OF THE '619 PATENT

A. The ’619 Patent’s Specification

The ’619 Patent relates generally to an electronic device with a biometric button assembly (*see* Ex. 1001, Abstract). According to the specification’s “Background” section, many traditional buttons were (1) unable to sense biometric characteristics, and (2) were difficult to seal against liquid and other contaminants (*id.*, 1:14-22). The ’619 Patent purported to solve these problems by describing “a button with a biometric sensor” having a “flexible conduit” that “cooperates with a seal to restrict ingress of contaminants into the electronic device” (*id.*, 4:18-28). Figure 2A (below) is a cross-sectional view of “biometric button assembly 210” (*id.*, 8:14-23):

Ex. 1001, Fig. 2A

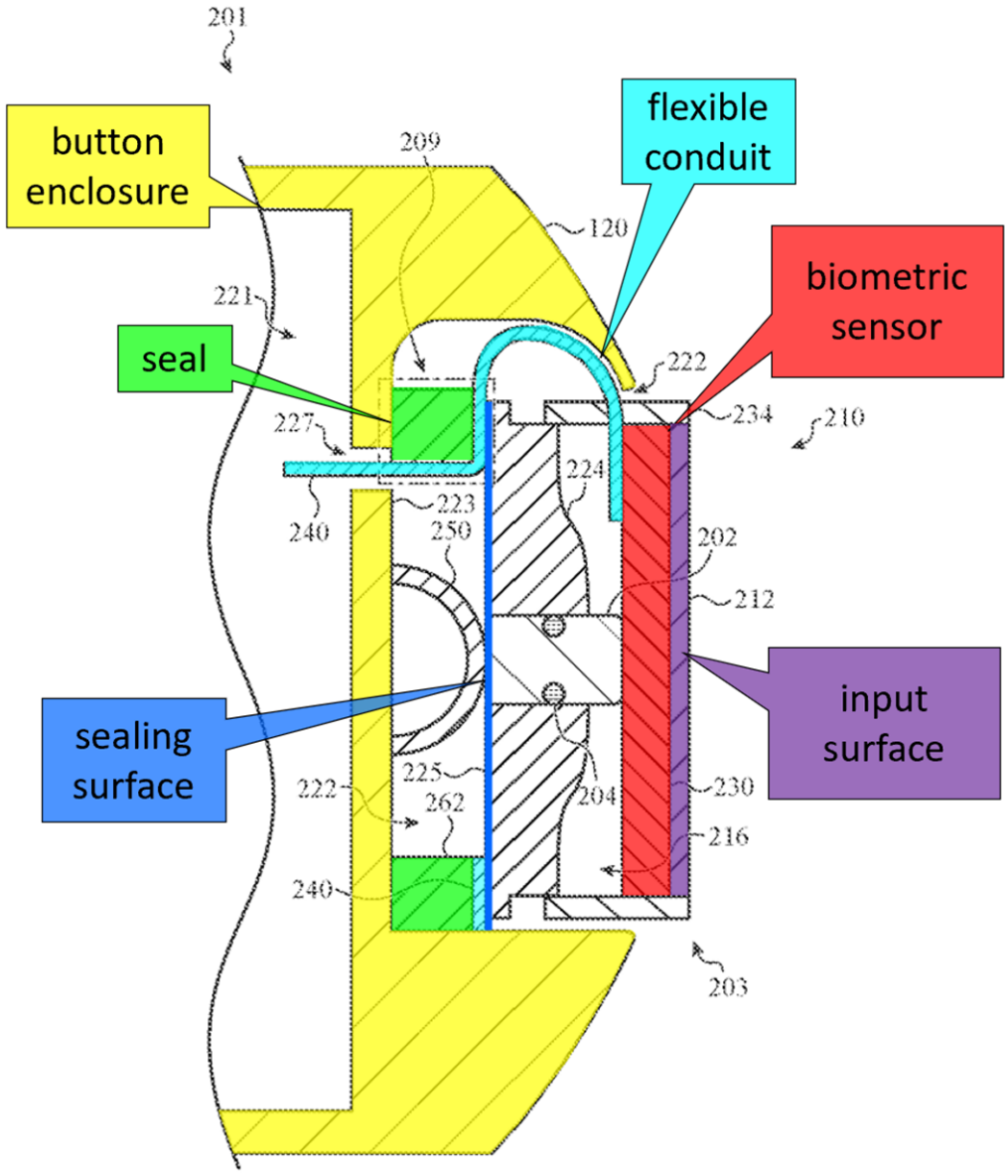


FIG. 2A

Figure 2A further discloses that the "biometric button assembly 210 is disposed in an opening of an enclosure 120" (yellow). In addition, "[t]he biometric button assembly 210 is configured to move or displace in response to an input to the input surface 212, *e.g.*, a user touch to the input surface" (purple) (*id.*, 8:24-34).

Behind the "input surface 212" is a "biometric sensor 230" (red), for example a fingerprint sensor that "produces an output signal in response to a user input ... such as a user touch" (*id.*, 3:63-4:17). Figure 2A also discloses the "flexible conduit 240" (teal) (*id.*, 9:11-16). This component "receives the output signal of the biometric sensor 230 and provides the output signal to the processor of the electronic device 100" (*id.*, 9:11-16).

The purported invention of the '619 Patent involves using the "flexible conduit" to "form part of a seal that blocks or inhibits the ingress of foreign debris or contaminants into the enclosure" (*id.*, 5:53-60). Specifically, Figure 2A discloses that "[t]he flexible conduit 240 portion stacked on top of the seal 262" (green) is "disposed below a sealing surface 225" (blue) "of the button assembly 210" (*id.*, 11:16-31). But "[o]ther configurations of the seal region 209 are possible. For example, a portion of the flexible conduit 240 may be positioned below the seal 262, such that a stack is formed of seal 262 then flexible conduit 240" (*id.*, 9:45-57). In this configuration, the "flexible conduit 240" "may form part of a seal that blocks or inhibits the ingress of foreign debris or contaminants into the enclosure" (*id.*, 5:53-60; Ex. 1003, ¶¶56-59).

B. Prosecution History

The Examiner initially rejected all pending claims under §§ 102 and 103 in view of U.S. Patent No. 9,972,459 ("Hill") and U.S. Patent Pub. No. 2016/0098016

("Ely") (Ex. 1002, 144-153). Subsequently, the Applicant and Examiner conducted an interview (Ex. 1002, 162-164). In the summary of that interview, the Examiner stated that "[p]ossible amendments further defining the relationship between the sealing surface, the flexible conduit and the portion of flexible conduit were discussed" (Ex. 1002, 163). In response, Applicant amended pending claims 1, 11, and 16 to state that a portion of the flexible conduit was "sandwiched" between either (1) the seal and the sealing surface or (2) the seal and the enclosure (Ex. 1002, 165-178). Applicant also amended pending claim 16 to incorporate the following limitations from then-pending claims 17 and 18:

- a flexible conduit electrically coupled to the fingerprint sensor and configured to transmit the output signal to the processor; and
- a seal positioned between the button housing and a surface of the opening.

(Ex. 1002, 172-173; Ex. 1003, ¶¶60-63).

C. Claim Construction

In the context of the intrinsic record of the '619 Patent, the phrase "biometric characteristic" should be construed to mean "a human characteristic that is so distinctive and measureable that a particular human individual may be identified" (Ex. 1003, ¶64).

The phrase "as used herein" is "definitional syntax" that "has been recognized as definitional in a wide host of Federal Circuit and district court cases." *Intercept*

Pharms., Inc. v. Apotex Inc., No. CV 20-1105, 2022 WL 856859, at *3 (D. Del. Mar. 23, 2022); *see also Braintree Lab'ys, Inc. v. Novel Lab'ys, Inc.*, 749 F.3d 1349, 1355-56 (Fed. Cir. 2014). Here, the '619 Patent's specification states:

> A "biometric characteristic" or a "biometric identifier," ***as used herein***, may refer to a human characteristic that is so distinctive and measureable that a particular human individual may be identified. Fingerprints and DNA are example biometric characteristics.

(Ex. 1001, 5:9-14).[1] A POSITA would have understood the phrase "as used herein" to be definitional syntax for the phrase "biometric characteristic" (Ex. 1003, ¶¶65-66). Moreover, the explicit definition ("a human characteristic that is so distinctive and measureable that a particular human individual may be identified") is consistent with the provided examples ("Fingerprints and DNA"), stated purpose (to identify users for security purposes) (Ex. 1001, 5:1-8, 10:15-20; Ex. 1003, ¶¶65-66).

Regardless, "biometric characteristic" is disclosed by the prior art (Ex. 1003, ¶67). The '619 Patent explains "fingerprints" are an example of a "biometric characteristic" (Ex. 1001, 5:9-14, 1:63-64, 5:25-26, 4:22-25). And, the prior art

[1] All emphasis is added unless otherwise noted.

discloses "fingerprints" as "biometric characteristics" (Ex. 1003, ¶67). *See* Section VII.

V. SUMMARY OF THE PRIOR ART

A. Kim (Ex. 1004); Kim-KR (Ex. 1022)

Patent No. 10,620,828 ("*Kim*") is titled "Electronic Device Having Combined Button." *Kim* is prior art under at least 35 U.S.C. §102(a)(2) (AIA).

First, *Kim* meets the "ministerial requirements" of 35 U.S.C. §119. *Apple Inc., v. Telefonaktiebolaget LM Ericsson*, IPR2022-00341, Paper 10 at 14-21 (PTAB Sept. 14, 2022). For example, *Kim* claims priority to Korean patent application number 10-2016-0162565 (Ex. 1022) ("*Kim-KR*"), filed on December 1, 2016 (Ex. 1022, Cover). A certified translation of *Kim-KR* is also included in Exhibit 1022.[2] *Kim* properly claimed benefit to *Kim-KR* (Ex. 1001, (30)), was filed co-pending with *Kim-KR* (Ex. 1001, (22); Ex. 1022; Ex. 1023), and shared common inventors with *Kim-KR* (Ex. 1001, (72); Ex. 1022, 2-4). Thus, *Kim*, was effectively filed on December 1, 2016, and qualifies as prior art under AIA §102.

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[2] *Kim-KR* was published without substantive edits on June 11, 2018. A copy of the publication (KR 10-2018-0062654), as well as a certified translation thereof is included as Ex. 1023 ("*Kim-KR-Pub.*"). Citations to *Kim-KR* likewise encompass the identical material present in *Kim-KR-Pub.*

Second, *Kim-KR* describes the subject matter relied upon in *Kim*. *See* MPEP §2154.01(b) ("If the subject matter relied upon is described in the application to which there is a priority or benefit claim, the U.S. patent document is effective as prior art as of the filing date of the earliest such application, regardless of where filed."); *see also Apple Inc., v. Telefonaktiebolaget LM Ericsson*, IPR2022-00341, Paper 10 at 14-21 (PTAB Sept. 14, 2022). In the limitation-by-limitation analysis presented in Section VII below, this Petition provides citations to Ex. 1004 and Ex. 1022, showing that every disclosure relied on in *Kim* was described in *Kim-KR*. *See* MPEP §§2151, 2154.01. Additionally, for efficient comparison of the subject matter described in *Kim* and *Kim-KR*, Petitioner provides a chart that compares the applicable excerpts/figures in *Kim* with the corresponding excerpts/figures in *Kim-KR* (Ex. 1003, ¶¶68-77, Appendix A). Indeed, *Kim's* disclosure and claims are materially similar to the disclosure and claims in *Kim-KR*.

Thus, *Kim-KR* fully supports the *Kim* disclosure and claims, so *Kim* is entitled to an effective filing date of December 1, 2016.

B. Jung (Ex. 1005)

Patent Pub. No. 2016/0100499 ("*Jung*") is titled "Electronic Device Adopting Key-Waterproof Structure and Method for Waterproofing Key Thereof" and published on April 7, 2016. *Jung* is prior art under at least 35 U.S.C. §102(a)(1) (AIA) (Ex. 1003, ¶¶78-84).

C. Meyers (Ex. 1007)

Patent Pub. No. 2015/0071509 ("*Meyers*") is titled "Biometric sensor stack structure" and published on March 12, 2015. *Meyers* is prior art under at least 35 U.S.C. §102(a)(1) (AIA) (Ex. 1003, ¶¶85-91).

D. *Chang* (Ex. 1015)

Patent No. 10,133,910 ("*Chang*") is titled "Electronic device with key module and method of manufacturing the same" and was filed in the U.S. on January 20, 2017. *Chang* is prior art under at least 35 U.S.C. §102(a)(2) (AIA) (Ex. 1003, ¶¶92-97).

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") at the time of the alleged invention of the '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 (Ex. 1003, ¶¶37-38). More education can supplement practical experience and vice versa (*id.*).

VII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1, 5, 9, and 10 are Unpatentable Under 35 U.S.C. §§102 and/or 103 over Kim

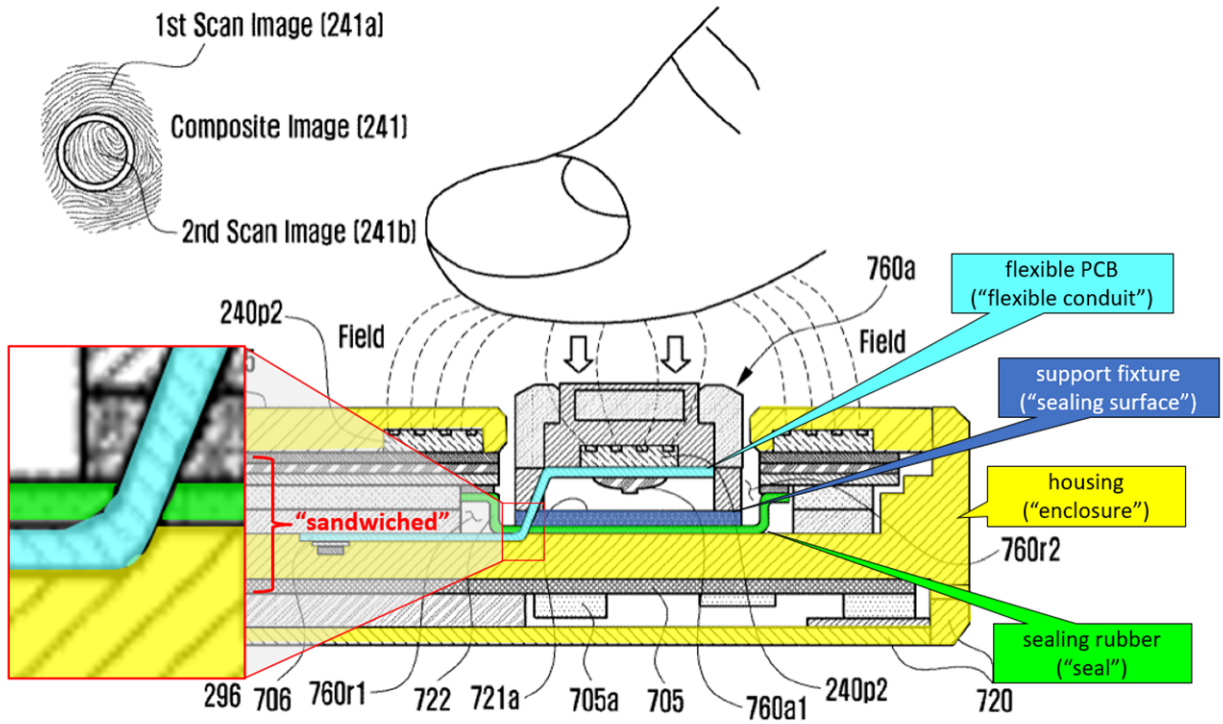
Kim discloses and/or renders obvious claims 1, 5, 9, and 10 of the '619 Patent.

1. Overview of Ground 1 (Kim)

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. 1004, Abstract; Ex. 1022, Abstract).

Annotated Figure 10(b), below, shows the flexible printed circuit board ("PCB") sandwiched between the sealing rubber and the housing (Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b); Ex. 1003, ¶¶68-77).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



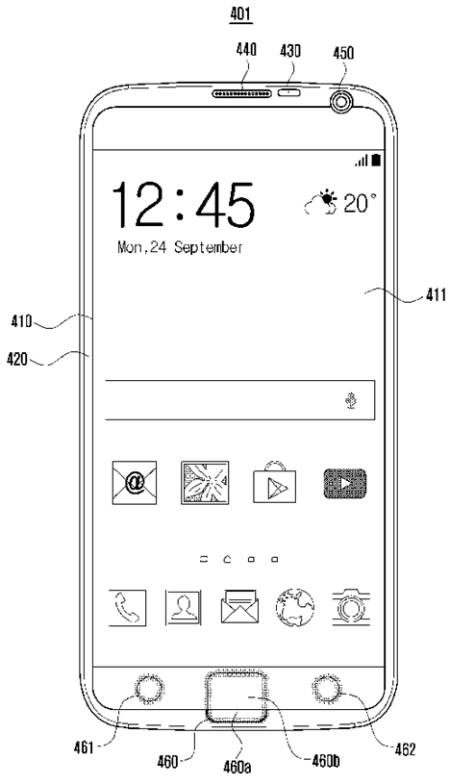
2. Claim 1

i. Claim 1: [1.pre] An electronic device comprising:

Kim discloses element [1.pre]. *Kim* teaches that "[a]n electronic device may include a housing, … a mechanical button, … a processor located in side the housing, … and a memory located inside the housing" (Ex. 1004, Abstract; Ex. 1022, Abstract). Figure 4 (below) "shows a front view of an electronic device according to an embodiment" (Ex. 1004, 2:49-50; *see also* 4:20-31, Figs. 4-5, 6A, 6B; Ex. 1022, ¶¶8, 12-13, Figs. 4-5, 6A, 6B; Ex. 1003, ¶¶99-102).

Ex. 1004, Fig. 4; Ex. 1022, Fig. 4

FIG. 4

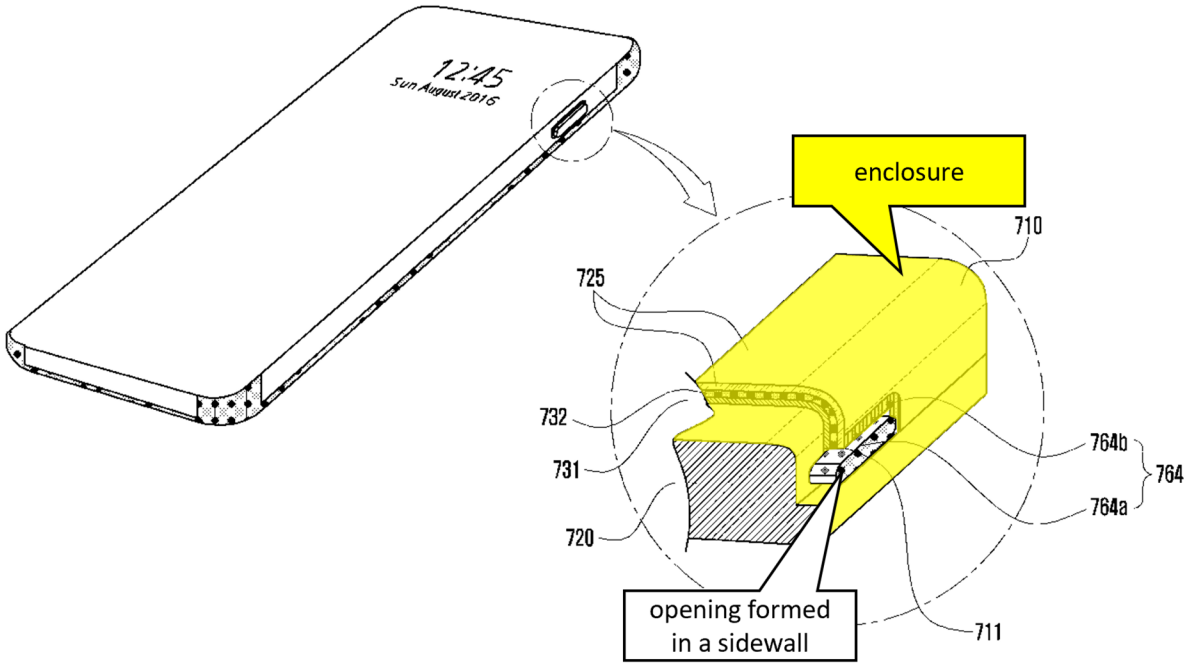


ii. Claim 1: [1.a] an enclosure having an enclosed volume and an opening formed in a sidewall;

Kim discloses element [1.a] (*see* Fig. 18 (annotated below)).

Ex. 1004, Fig. 18; Ex. 1022, Fig. 18

FIG. 18



First, *Kim* discloses an enclosure having an enclosed volume, teaching a "housing 720" and "cover glass 725" (Ex. 1004, 22:4-27; Ex. 1022, ¶¶175-178; Ex. 1003, ¶¶103-104). *Kim* discloses "a processor located ***inside the housing*** and … a memory located ***inside the housing***" (Ex. 1004, 2:7-11; *see also* Ex. 1004, Abstract; Ex. 1022, ¶6, Abstract). *Kim* also discloses that there are components inside of the "cover glass," such as the "display panel" (Ex. 1004, 15:1-13; Ex. 1022, ¶102). A

POSITA would have known that a "processor," "memory," and "display panel" are physical components located "inside" the housing that occupy space, and therefore have understood that *Kim's* housing and cover glass would have an enclosed volume (Ex. 1003, ¶104).

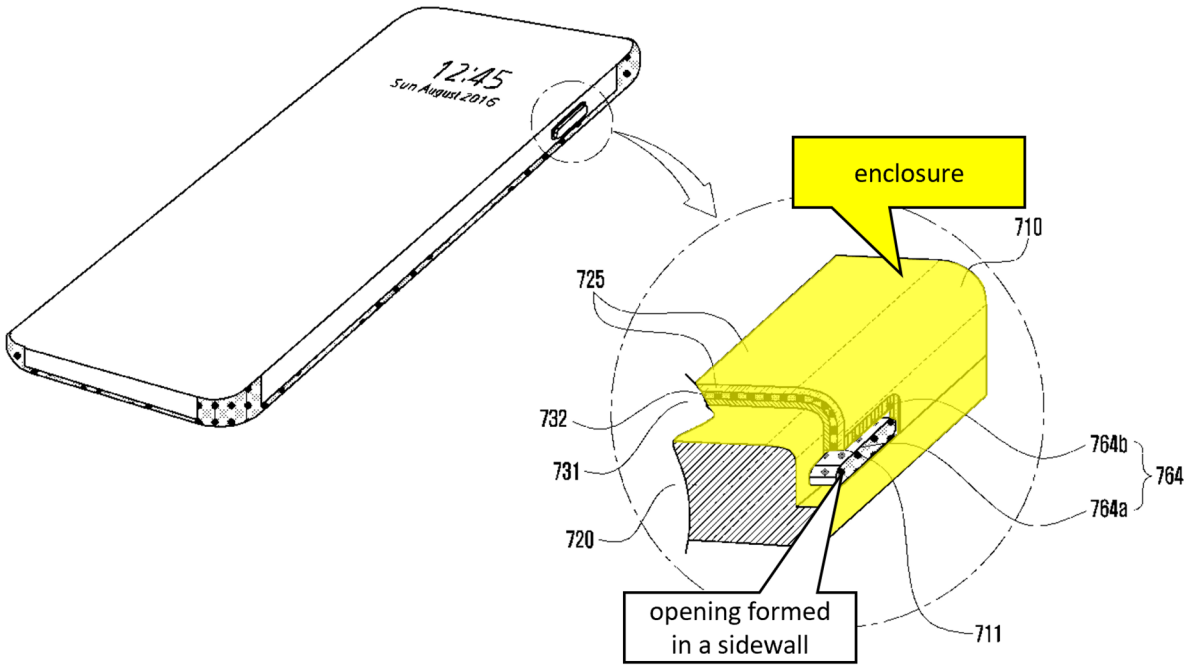
Kim's Figure 18 (above) shows an enclosure having an enclosed volume (Ex. 1004, 3:22-24; Ex. 1022, ¶8; Ex. 1003, ¶105):

Indeed, *Kim* discloses element [1.a] the same way as the '619 Patent, which discloses that the "enclosure" is a "structure" that may be "constructed from multiple materials" including metals, polymers, and glass "operably connected together" in order to "define[] an internal volume of the electronic device" (Ex. 1001, 6:3-17; Ex. 1003, ¶106). Likewise *Kim* discloses a "housing 720" and "cover glass 725" operably connected together to form a structure that defines an internal volume of the electronic device (Ex. 1003, ¶107).

Second, *Kim* discloses the enclosure has an "opening 711" formed in a sidewall wherein "a part of the home button 760-1 which is the combined button may be positioned" (Ex. 1004, 18:19-24; Ex. 1022, ¶132; Ex. 1003, ¶108). Element [1.a] is disclosed in Figure 18 (annotated below):

Ex. 1004, Fig. 18; Ex. 1022, Fig. 18

FIG. 18



Kim further contemplates the "combined button" is a button assembly within an opening formed in a sidewall. For example, *Kim* discloses "a power button ... located on the ***lateral*** [*i.e.*, side] ***surface*** of the electronic device 600 ***may also be the combined button,***" and "***the combined button is not limited to the home button***" (Ex. 1004, 13:46-53, 17:10-12; Ex. 1022, ¶¶89, 166; Ex. 1003, ¶109).

Furthermore, element [1.a] would have been well known to a POSITA, who would have been familiar with electronic devices with sealed and/or insulated button assemblies, and would have understood that those assemblies were not limited to the front face of a device (Ex. 1003, ¶110). Instead, a POSITA would have understood

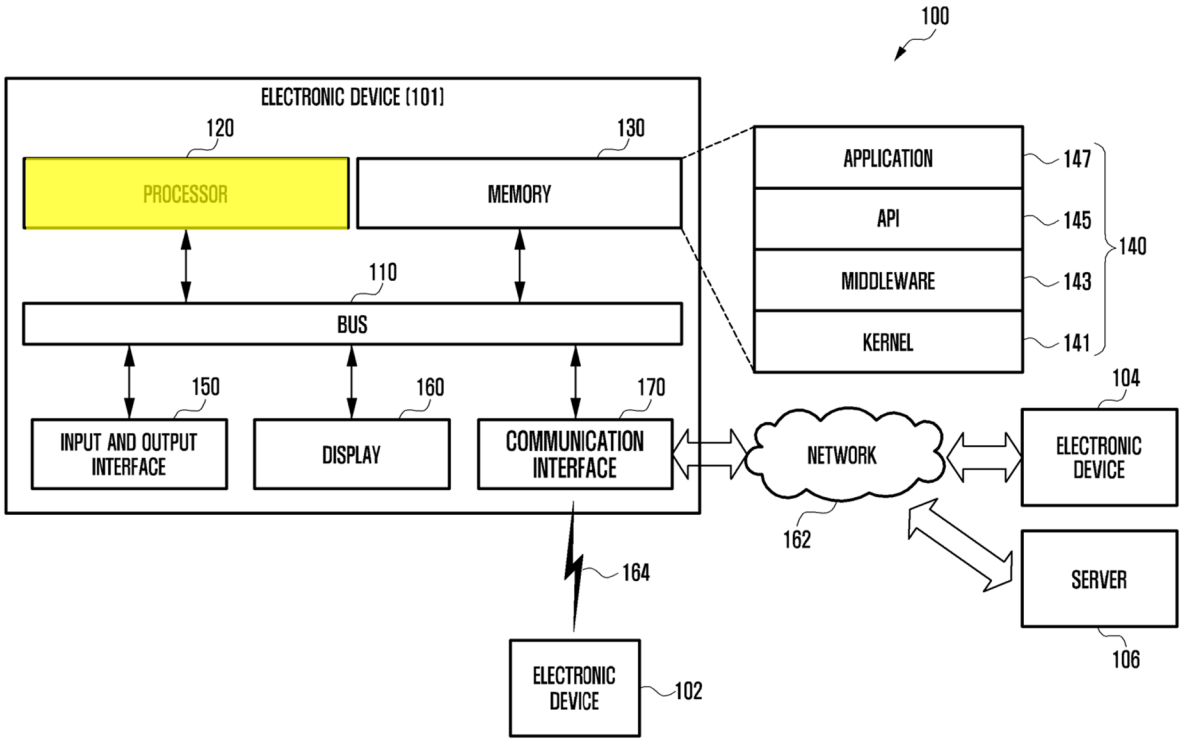
that a sealed and/or insulated button assembly from one location on a device would be constructed equally on a rear or sidewall of the device (Ex. 1003, ¶¶110-111).

iii. Claim 1: [1.b] a processor positioned in the enclosed volume;

Kim discloses element [1.b].

Ex. 1004, Fig. 1; Ex. 1022, Fig. 1

FIG. 1



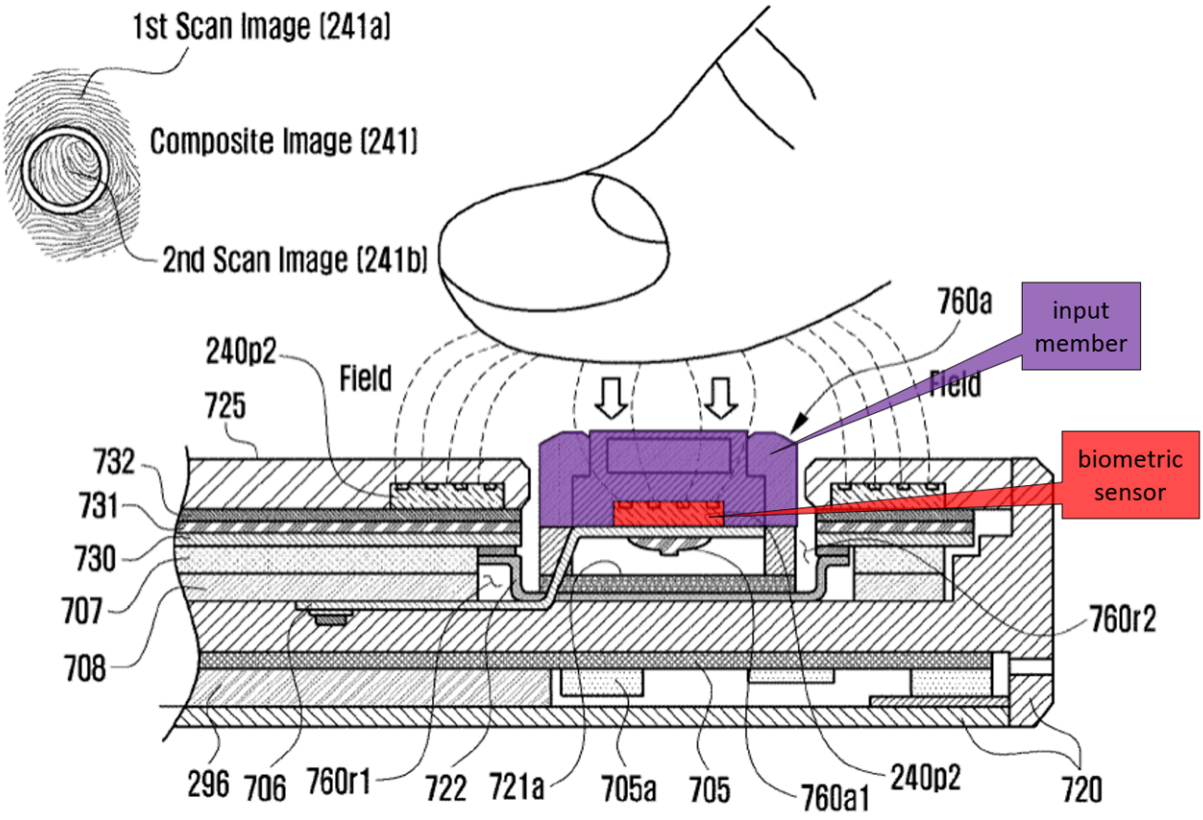
Kim discloses "a processor located ***inside*** the housing" (Ex. 1004, 2:7-11; *see also* Ex. 1004, Abstract, Figs. 1-3, 1:38-2:38, 5:1-28; Ex. 1022, ¶¶5-7, 17-19; element [1.a]) (Ex. 1003, ¶¶112-113). Furthermore, a POSITA would have understood that *Kim's* processor would be in the enclosed volume because the

enclosed volume exists to protect it from potentially damaging external stimuli (Ex. 1003, ¶¶114-115).

iv. Claim 1: [1.c] a button assembly within the opening, the button assembly comprising: an input member having an input surface; and a biometric sensor positioned below the input member and configured to produce an output signal in response to a touch on the input surface, the output signal corresponding to a biometric characteristic;

Kim discloses element [1.c] (*see* Figure 10(b) (annotated below); Ex. 1003, ¶¶116-117).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



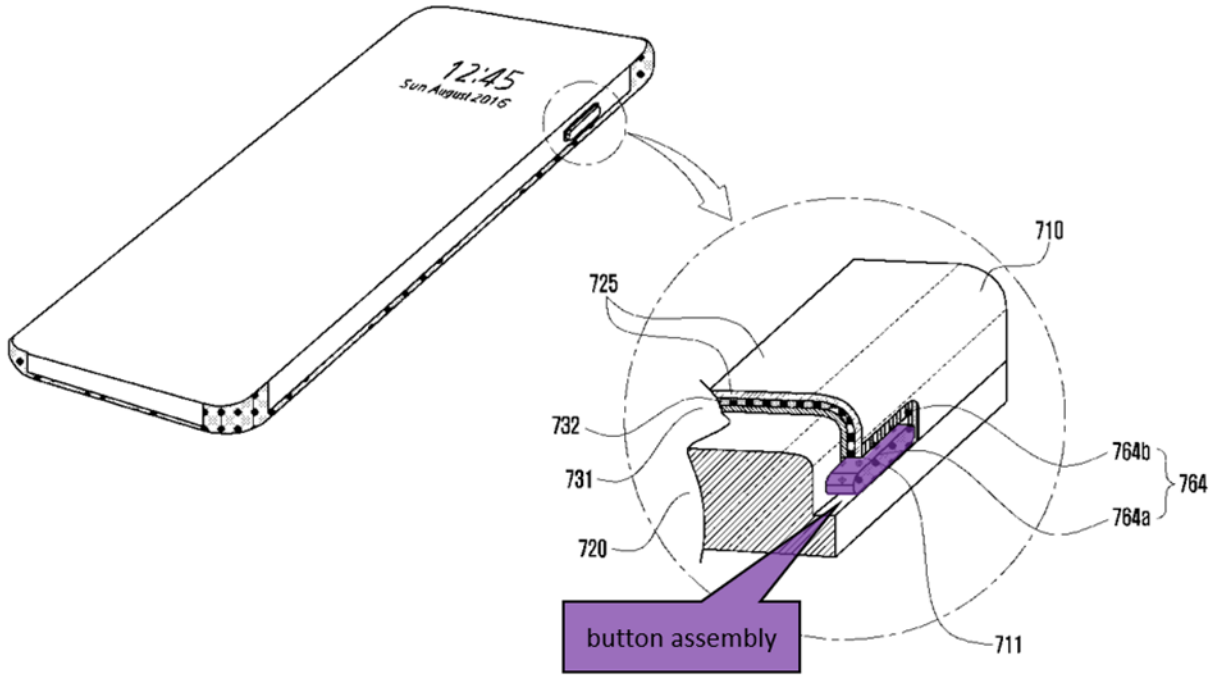
Element [1.c] includes two sub-elements:

(a) Claim 1: [1.c.i] a button assembly within the opening, the button assembly comprising: an input member having an input surface;

Kim discloses element [1.c.i] (*i.e.*, *Kim's* "combined button"). Figure 18 shows "a ***combined button***" (Ex. 1004, 3:22-24; Ex. 1022, ¶8; Ex. 1003, ¶118).

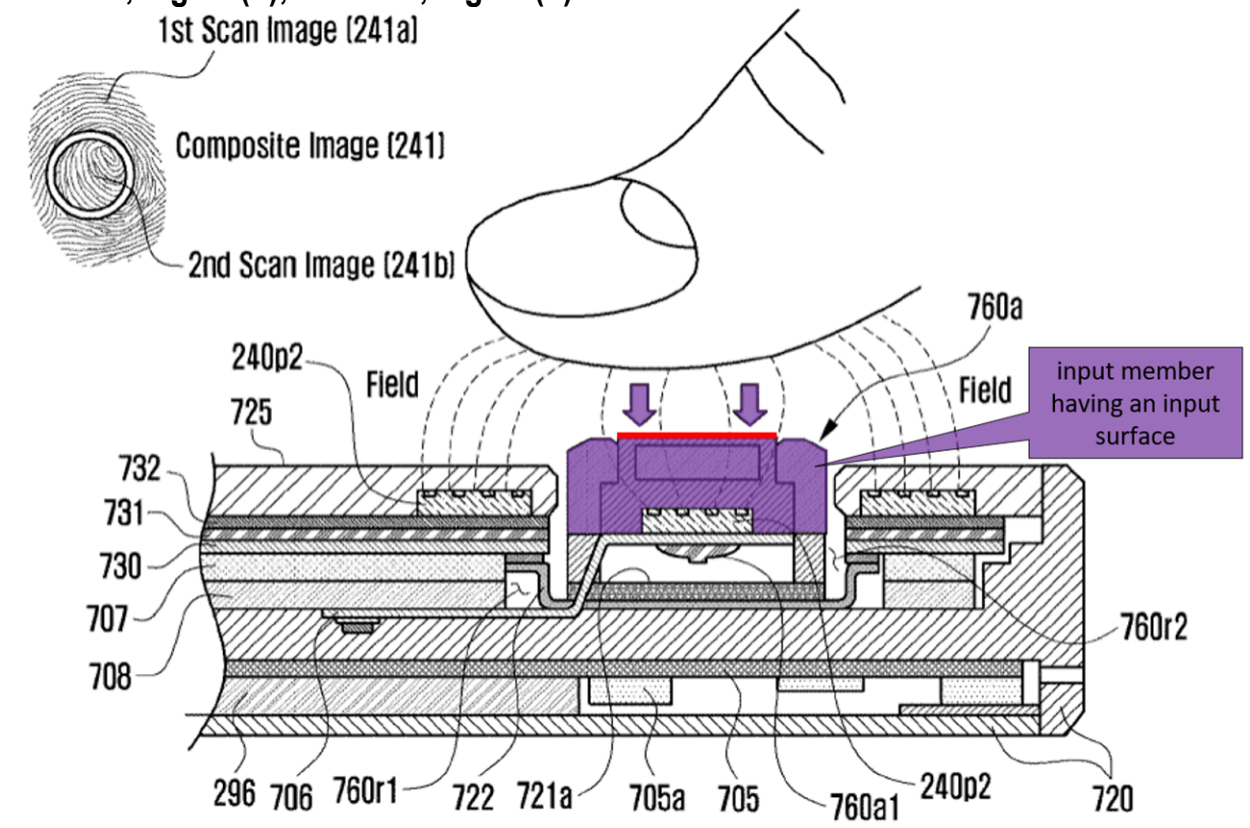
Ex. 1004, Fig. 18; Ex. 1022, Fig. 18

FIG. 18



Furthermore, Figure 10(b) shows a "cross-sectional view of [the] ***combined button***" (Ex. 1004, 21:20-22; Ex. 1022, ¶166), which includes a surface that may be pressed downward (Ex. 1003, ¶119).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



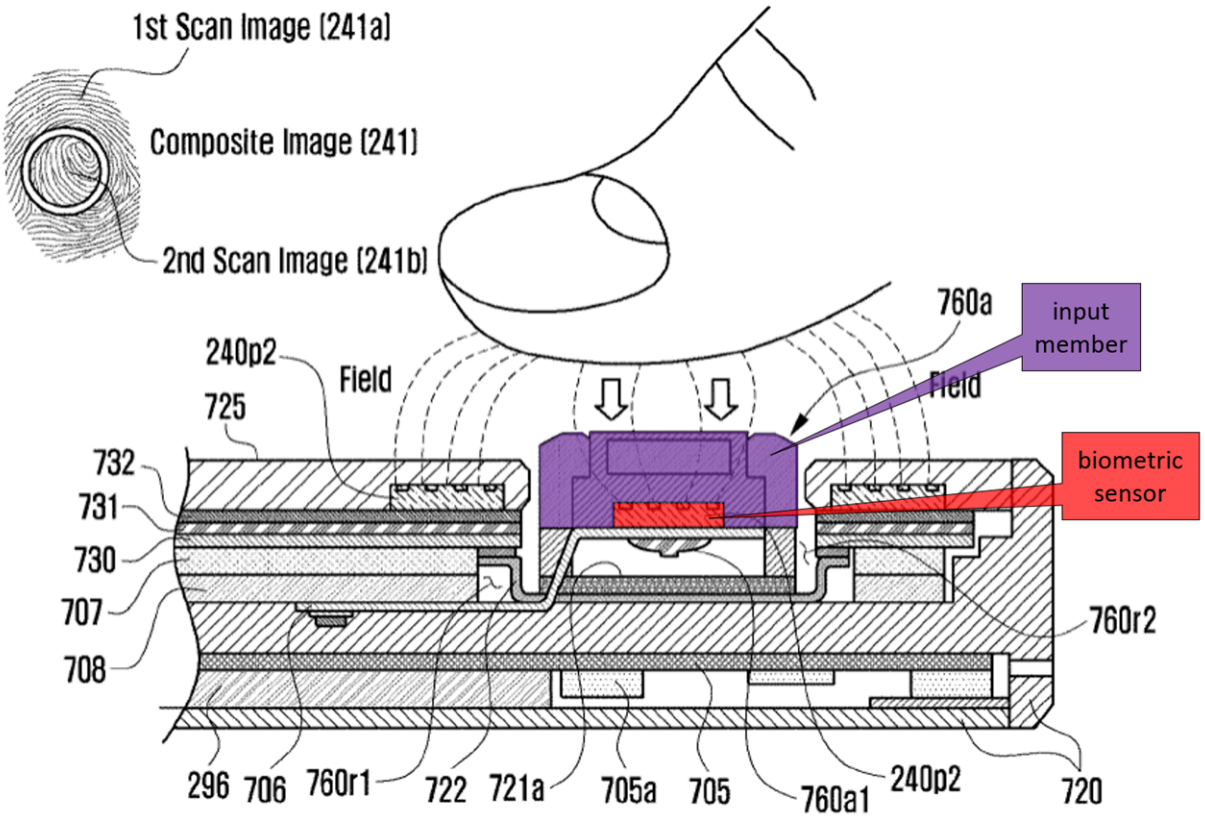
Kim discloses this limitation in the same way as the '619 Patent, which states "[t]he button assembly 110 includes an input member 112 that may be touched, pressed, or otherwise interacted with by a user" (Ex. 1001, 6:49-59; Ex. 1003, ¶¶120-121). Likewise, *Kim* discloses a "combined button" with a surface that similarly may pressed by a user (*see also* Ex. 1004, 13:42-67, 16:48-17:12; Ex. 1022, ¶¶89-92, ¶¶118-120; Ex. 1003, ¶¶121-122).

(b) Claim 1: [1.c.ii] a button assembly within the opening, the button assembly comprising: ... a biometric sensor positioned below the input member and configured to produce an output signal in response to a touch on the input

surface, the output signal corresponding to a biometric characteristic;

Kim discloses element [1.c.ii]. *Kim* discloses a "combined button" with an input member. *See* element [1.c.i]. Furthermore, *Kim* discloses that the "combined button" includes a fingerprint sensor below the input member (pictured below) (Ex. 1003, ¶123).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



First, *Kim* discloses "a biometric sensor … configured to produce an output signal in response to a touch on the input surface, the output signal corresponding to a biometric characteristic." *Kim* discloses a "***capacitive fingerprint sensor*** 240p2

embedded in the physical button 760a" (Ex. 1004, 20:57-59, 22:11-12; *see also* Ex. 1004, 21:27-41; Ex. 1022, ¶161, 167-170, 176). *Kim* also teaches "[t]he electronic device 701 may compose fingerprint images" (Ex. 1004, 21:58-22:3; Ex. 1022, ¶¶173-174; Ex. 1003, ¶124).

Indeed, *Kim* discloses a "biometric sensor" the same way as the '619 Patent, which teaches the "biometric sensor" includes a "fingerprint" sensor such as "capacitive fingerprint sensor 240p2," and "[f]ingerprints and DNA are example biometric characteristics" (Ex. 1001, 4:51-5:14; Ex. 1003, ¶¶125-126).

Second, *Kim* discloses "capacitive fingerprint sensor 240p2" is "located ***under*** the physical button 760a" (Ex. 1004, 23:7-8; *see also* Ex. 1004, 17:3-5, 18:8-13, 18:28-32, 18:47-53, 19:1-2, 19:26-30, 19:47-51, 23:6-10; Ex. 1022, ¶¶120, 130, 134, 139, 143, 146, 150, 187; Ex. 1003, ¶127).

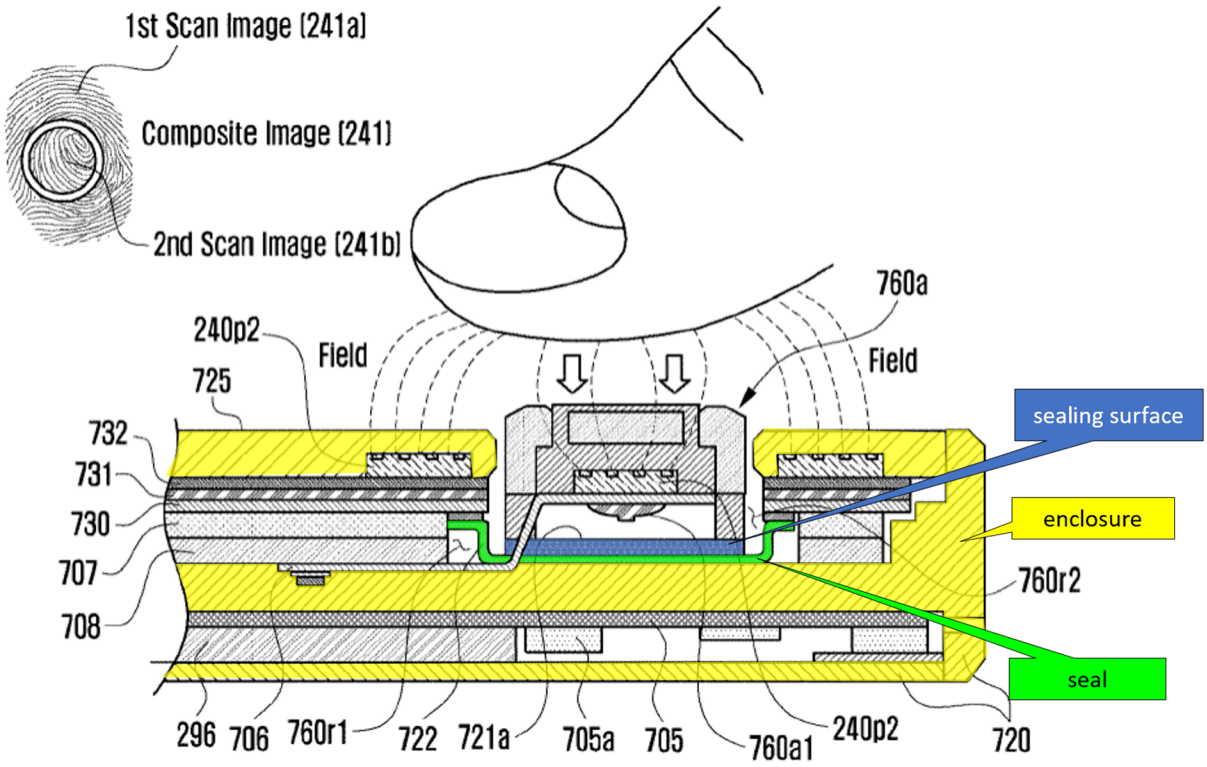
Furthermore, a POSITA would have been familiar with biometric sensors (*e.g.*, fingerprint sensors), and would have understood that the "output signal" from a fingerprint sensor would correspond to a biometric characteristic (*e.g.*, a fingerprint) (Ex. 1003, ¶¶128-129). Likewise, a POSITA would have understood a capacitive fingerprint sensor functions in response to a user's touch. If argued that this limitation was not disclosed by *Kim*, it would have been obvious in light of the general knowledge of the POSITA and well within the skill of a POSITA, which likewise would have provided a reasonable expectation of success (*Koninklijke*

Philips N.V. v. Google LLC, 948 F.3d 1330, 1337–38 (Fed. Cir. 2020); Ex. 1003, ¶¶128-129).

v. Claim 1: [1.d] a seal positioned between a sealing surface of the button assembly and the enclosure;

Kim discloses element [1.d] (*see* Figure 10(b) (annotated below)).

Ex. 1004, Fig. 10(b); Ex. 1004, Fig. 10(b)



First, *Kim* discloses a seal. For example, *Kim* discloses use of "sealing rubber 722" (Ex. 1004, 22:35-40; *see also* Ex. 1004, 20:27-50, 22:28-42; Ex. 1022, ¶¶156-159, 179-181), which creates the claimed "seal." As *Kim* explains, the "sealing rubber 722 may have a sealing and waterproof function" (Ex. 1004, 20:47-48; Ex. 1022, ¶159; Ex. 1003, ¶¶130-131).

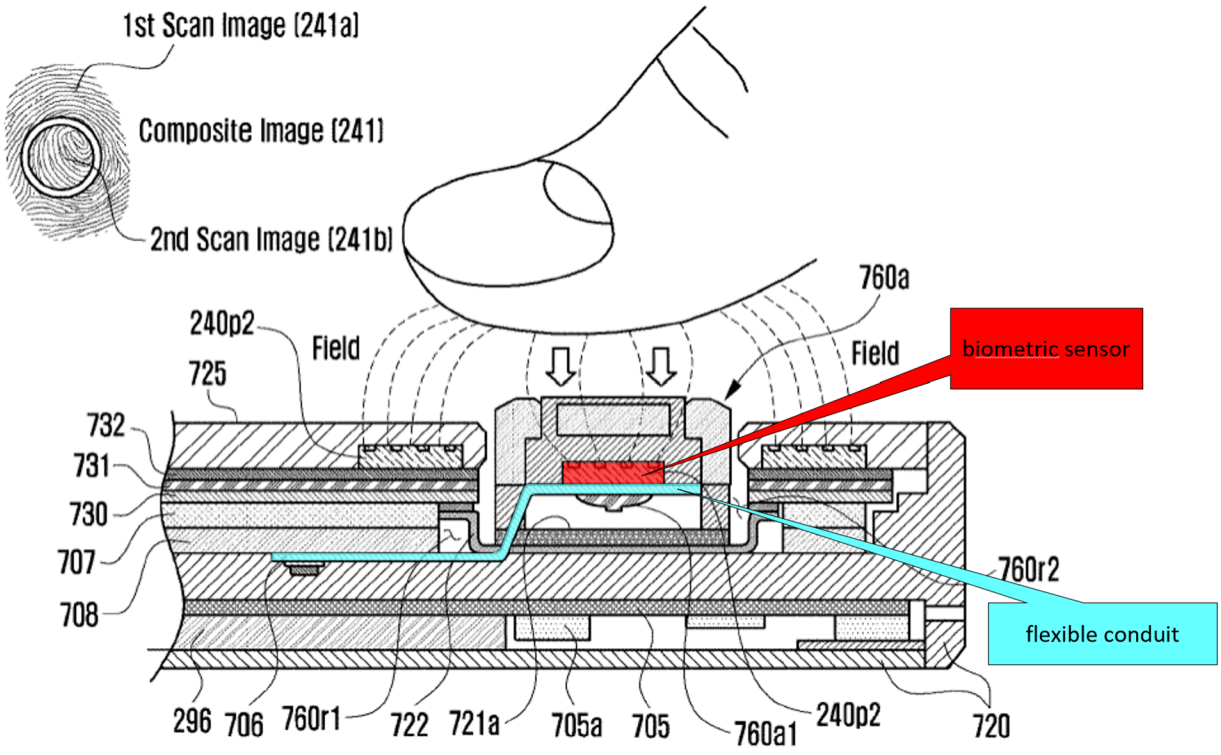
Second, *Kim* discloses the seal is positioned between a sealing surface of the button assembly and the enclosure. For example, *Kim* discloses "support fixture 721a" (Ex. 1004, 22:28-34; Ex. 1022, ¶179), which includes the claimed "sealing surface of the button assembly" of element [1.d] (Ex. 1003, ¶132). Figure 10(b) (above) discloses that "sealing rubber 722" (green) is positioned between a sealing surface of the button assembly (blue) and the enclosure (yellow) (Ex. 1003, ¶132).

Furthermore, a POSITA would have known button assemblies in mobile electronic devices should be sealed in order to prevent ingress of potentially damaging moisture and dust, and that common techniques to add a seal were to use a rubber gasket or a pressure sensitive adhesive ("PSA") layer, rendering this limitation obvious in view of the general knowledge of a POSITA and well within their skill (Ex. 1003, ¶¶133-134).

vi. Claim 1: [1.e] a flexible conduit coupled to the biometric sensor and configured to transmit the output signal to the processor; wherein:

Kim discloses element [1.e] (*see* Figure 10(b) (annotated below); Ex. 1003, ¶135).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



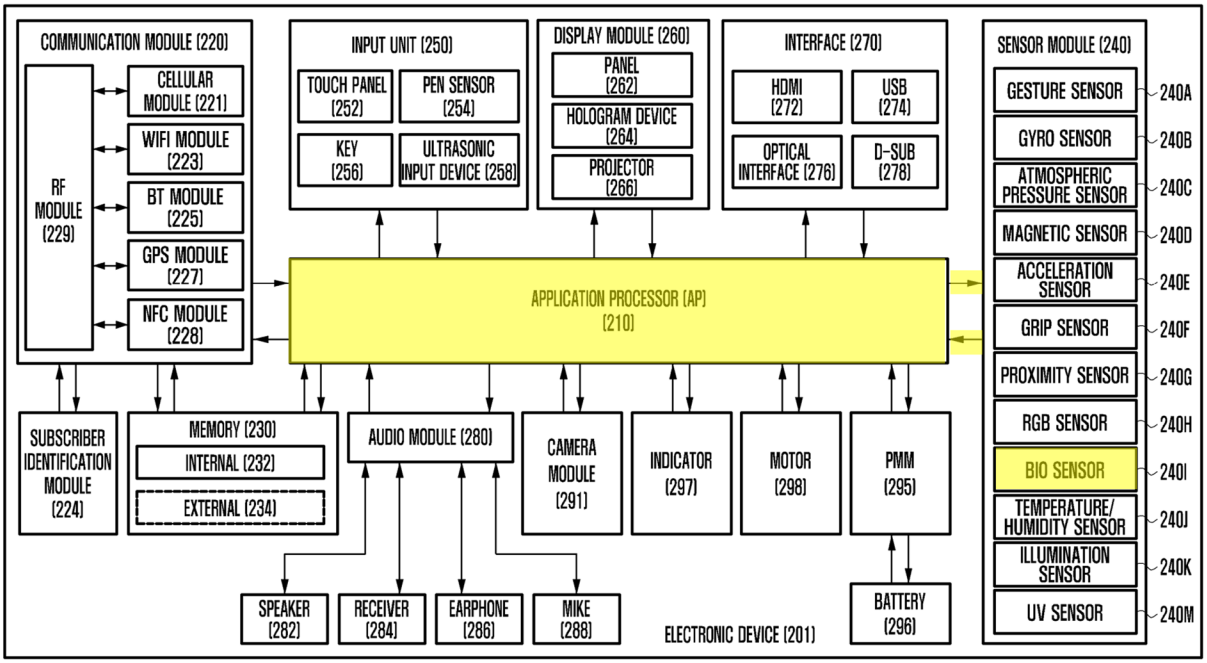
First, *Kim* discloses "flexible PCB 706," which corresponds to the claimed "flexible conduit" of element [1.e] (Ex. 1004, 22:9-27; *see also* Ex. 1004, 19:63-20:26, 23:6-21; Ex. 1022, ¶¶153-155, 176-178, 187-189; Ex. 1003, ¶136).

Second, *Kim* further discloses that "***flexible PCB 706 may be electrically connected to the capacitive fingerprint sensor 240p2*** embedded in the physical button 760a." (Ex. 1004, 22:9-17; Ex. 1022, ¶¶176-177; *see also* Ex. 1004, 20:59-60; Ex. 1022, ¶¶161, 176). Figure 10(b) shows "flexible PCB 706" (teal) coupled to the biometric sensor (red) (Ex. 1003, ¶137).

This electrical connection is further illustrated in Figure 2, which shows arrows between the "application processor" and the "sensor module 240," which includes "biometric sensor 240I" (Ex. 1004, Fig. 2, 7:33-38, 9:13; Ex. 1022, Fig. 2, ¶¶33, 43; Ex. 1003, ¶137). A POSITA would have understood that Figure 2 depicts an electrical connection, such that the biometric sensor will transmit an output signal to the application processor, and that this connection is enabled by flexible PCB 706 (Ex. 1003, ¶137).

Ex. 1004, Fig. 2; Ex. 1022, Fig. 2

FIG. 2



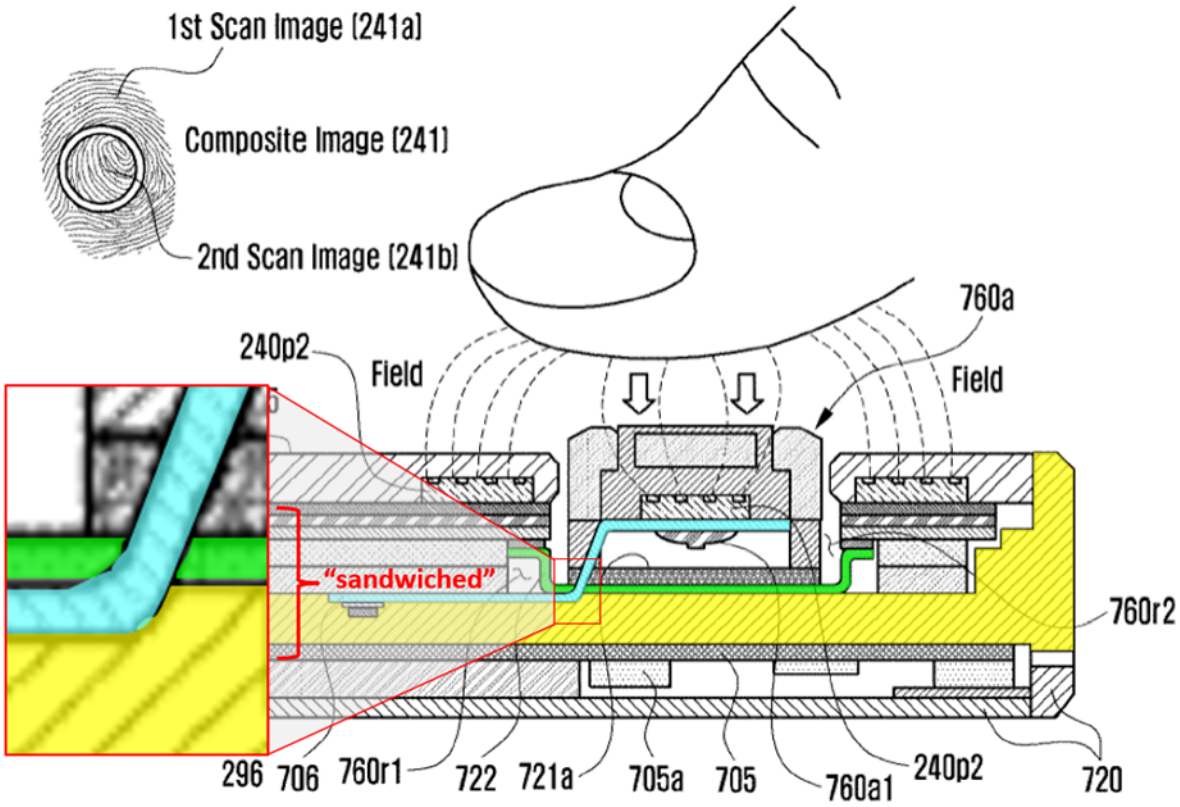
A POSITA would have understood the purpose of the electrical connection between "flexible conduit 706" and "fingerprint sensor 240p2" was to transmit an output signal from "fingerprint sensor 240p2" to the "application processor" (Ex.

1003, ¶138). Furthermore, a POSITA would have known to electrically connect a fingerprint sensor and a processor with a flexible PCB, such that the flexible conduit would transmit the sensor's output signal to the processor, so that the electronic device may do something with the output signal (*e.g.*, use the output or "fingerprint" for biometric authentication) (Ex. 1003, ¶139). A POSITA would have also known flexible PCBs should be used in mobile devices, which have relatively smaller volume and profile. Consequently, this limitation would have been obvious in view of this general knowledge and well within the skill of a POSITA (Ex. 1003, ¶¶139-140).

vii. Claim 1: [1.f] a portion of the flexible conduit is sandwiched between the seal and the sealing surface or between the seal and the enclosure.

Kim discloses element [1.f] (*see* Figure 10(b) (annotated below); Ex. 1003, ¶141).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)

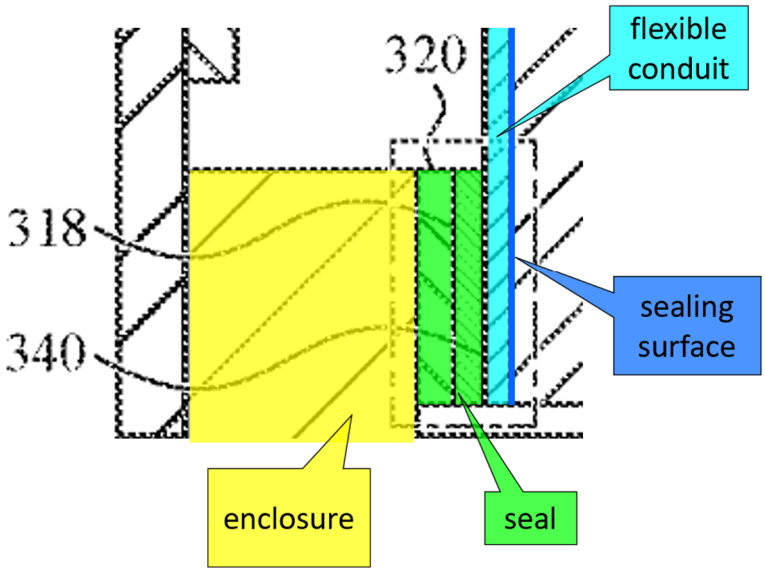


Kim discloses the claimed "flexible conduit," "seal," and "enclosure." *See* elements [1.a], [1.d]-[1.e]. Furthermore, Figure 10(b) discloses a portion of the flexible conduit (*i.e.*, *Kim*'s "flexible PCB 706," teal) sandwiched between the seal (*i.e.*, *Kim*'s "sealing rubber 722," green) and the enclosure (*i.e.*, *Kim*'s "housing 720" and "cover glass 725," yellow) (Ex. 1003, ¶142).

Indeed, *Kim* discloses element [1.f] the same way as the '619 Patent, which teaches that "a gasket seal (such as face seal 318) may further be applied below the lower PSA portion, such that ***a sandwich … is formed of PSA, flexible conduit 340, PSA, and then the gasket seal***" (Ex. 1001, 17:35-46; Ex. 1003, ¶143). This

"sandwiching" is illustrated in the '619 Patent's Figure 3A (excerpted and annotated below). The '619 Patent also discloses that "sandwiching" includes a "stack" of elements (Ex. 1001, 23:39-43 ("[i]n one embodiment, the compressible layer 404 is a heat activated (HAF) silicon sandwich [which] is a stack of … five elements"); Ex. 1003, ¶143).

Ex. 1001, Fig. 3A (excerpted and annotated)



Likewise *Kim* discloses a "stack" of elements including "a portion of the flexible conduit," a "seal," and an "enclosure" (Ex. 1003, ¶144).

Furthermore, a POSITA would have known a common way to electrically connect a fingerprint sensor and a processor was with a flexible PCB (*see* element [1.e]), and that button assemblies and fingerprint sensors in mobile electronic devices would be sealed in order to prevent ingress of potentially damaging

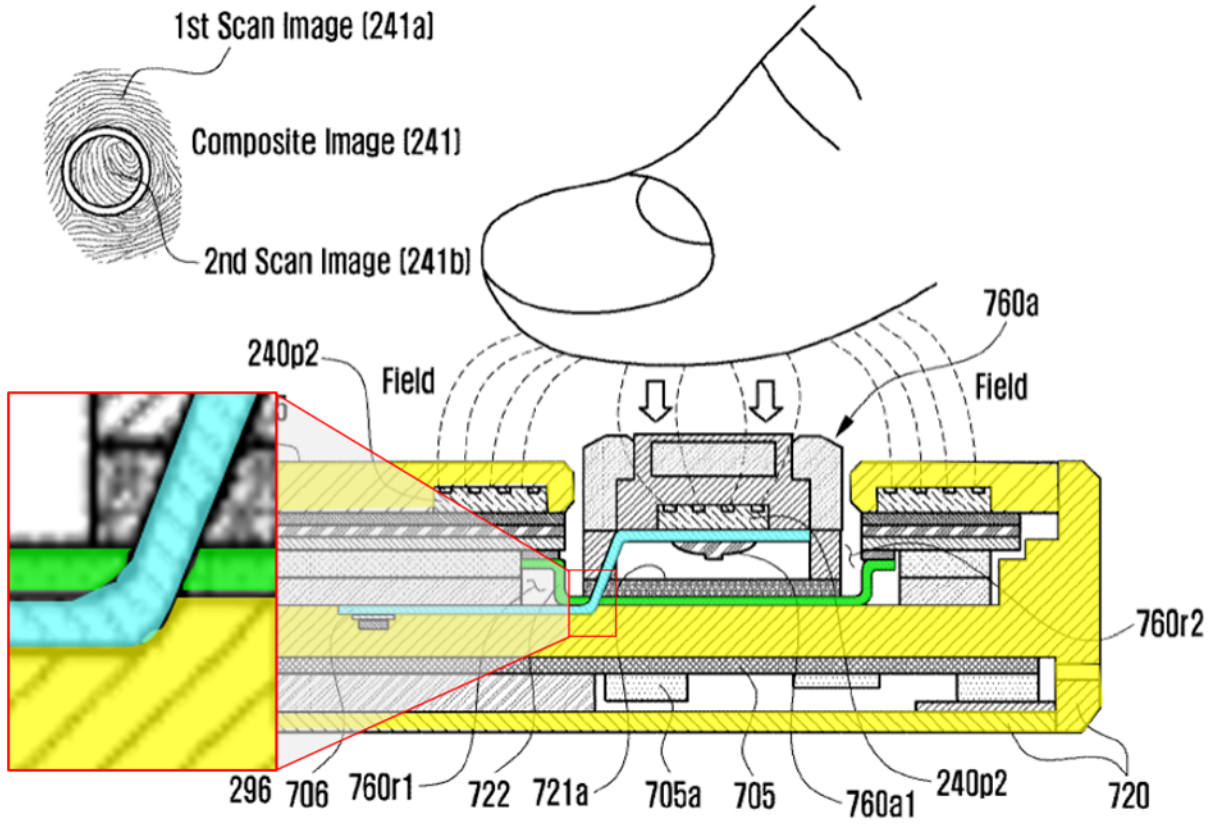
substances (Ex. 1003, ¶145). From this, a POSITA would have been motivated to provide the seal by sandwiching existing, known components (*i.e.*, the enclosure and flexible conduit), to protect ingress points (*i.e.*, the pathway between the flexible conduit and internal electronics) (Ex. 1003, ¶145). Using these existing, known components would have saved costs and promoted an efficient use of limited space within the mobile device. Consequently, this limitation would have been obvious and well within the skill of a POSITA, which likewise would have provided a reasonable expectation of success. (Ex. 1003, ¶¶145-146).

3. Claim 5: The electronic device of claim 1, wherein the flexible conduit passes through an aperture in the seal.

Kim discloses claim 5. *See* claim 1.

Figure 10(b) depicts the flexible conduit (teal) passing through an aperture in the seal (green) (Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b); Ex. 1003, ¶¶147-149).

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



Furthermore, a POSITA would have known that button assemblies would be sealed to prevent contaminants (*see also* element [1.d]), and that electronic components located outside the enclosure would need to communicate with components inside the enclosure, such as the processor (Ex. 1003, ¶¶150-151). To avoid compromising the benefits of the seal, the conduit would need to travel through an aperture of the seal. Consequently, this limitation would have been obvious in view of the general knowledge of a POSITA and well within their skill (Ex. 1003, ¶¶150-151).

4. Claim 9: The electronic device of claim 1, wherein the biometric sensor is a fingerprint sensor and the biometric characteristic is a fingerprint.

Kim discloses claim 9. *See* claim 1. *Kim* discloses a fingerprint sensor (Ex. 1003, ¶¶152-153), stating that "[e]ach of the physical button 760a and the virtual button 760b may include a fingerprint sensor" (Ex. 1004, 21:27-41; Ex. 1022, ¶¶167-170). Moreover, *Kim's* device "may compose fingerprint images" (Ex. 1004, 21:58-22:3; Ex. 1022, ¶¶173-174; Ex. 1003, ¶¶154-155).

Claim 9 would have been well known to a POSITA, who would have understood that a fingerprint sensor is a biometric sensor which produces a fingerprint image, and would be applied to an electronic device such as a mobile phone or smart watch (Ex. 1003, ¶¶156-157).

5. Claim 10: The electronic device of claim 1, wherein: the biometric sensor comprises an array of capacitive sensing elements that are configured to detect either or both of ridges and grooves of a user's finger.

Kim discloses claim 10. *See* claim 1.

Kim discloses a capacitive fingerprint sensor (*see* claim 9; Ex. 1004, 21:27-41; Ex. 1022, ¶¶167-170; Ex. 1003, ¶¶158-159).

Claim 10 would have been well known to a POSITA, who would have understood a capacitive fingerprint sensor includes "an array of capacitive sensing elements that are configured to detect either or both of ridges and grooves of a user's finger" (Ex. 1003, ¶¶160-162).

B. Ground 2: Claims 1-10 are Unpatentable Under 35 U.S.C. §103 over Kim

Kim further renders obvious claims 1-10 of the '619 Patent. Ground 1 (§VII.A) analyzes, *inter alia*, how *Kim* renders obvious claims [1.pre]-[1.f], 5, and 9-10. These limitations are incorporated herein. Ground 2 address only the limitations that are further rendered obvious by *Kim*.

1. Overview of Ground 2 (Kim)

Kim is described above. §VII.A.1.

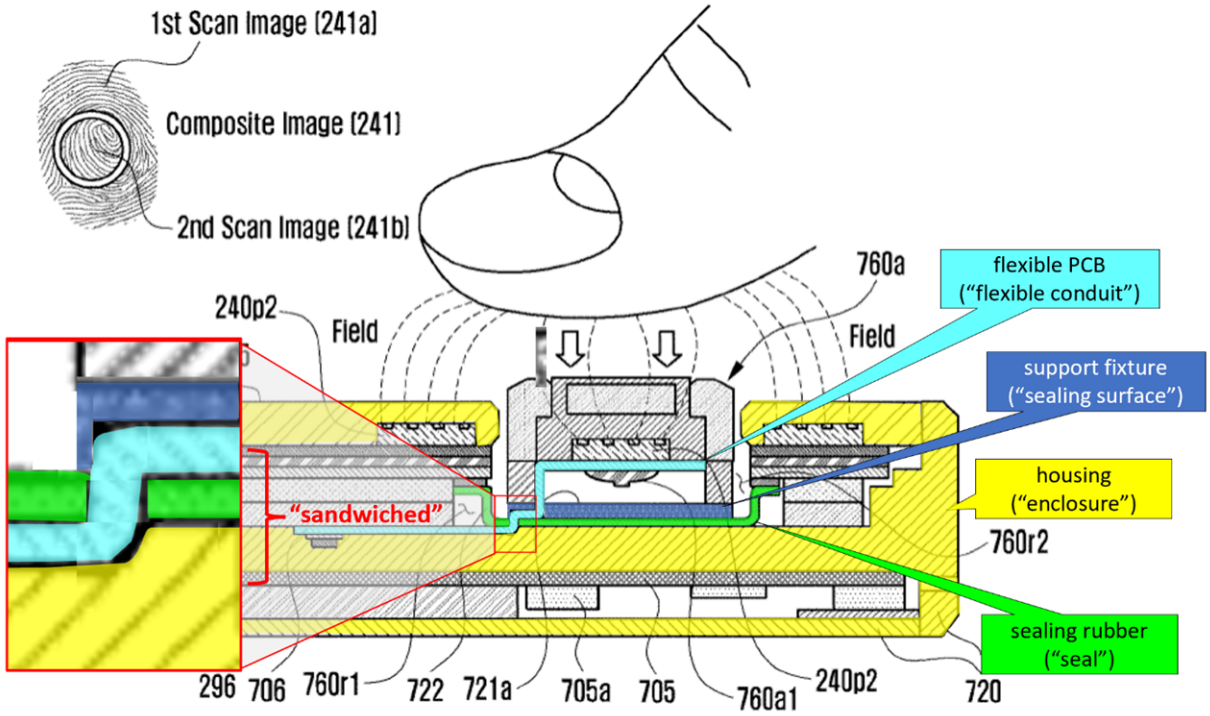
2. Claim 1

viii. Claim 1: [1.f]

Kim discloses element [1.f]. *See* Ground 1, element [1.f].

Alternatively, a POSITA would have understood the flexible PCB would 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. For example, a POSITA would have understood the flexible PCB would be routed between the seal (*i.e.*, the gasket) and the sealing surface, as depicted in the altered and annotated Figure 10(b), to avoid interference with moving pieces of the button assembly (Ex. 1003, ¶¶172-174).

Ex. 1004, Fig. 10(b) (altered and annotated); Ex. 1022, Fig. 10(b)



Furthermore, a POSITA would have known a common way to electrically connect a fingerprint sensor to a processor was with a flexible conduit, such as a flexible PCB, and that button assemblies and fingerprint sensors in mobile electronic devices should be sealed in order to prevent ingress of potentially damaging substances (Ex. 1003, ¶175). From this, a POSITA would have been motivated to provide the seal by sandwiching existing, known components (*i.e.*, the enclosure and flexible conduit) to save costs and promote an efficient use of limited space. Consequently, this limitation would have been obvious in view of the general knowledge of a POSITA and well within their skill (Ex. 1003, ¶¶175-176).

3. Claim 2

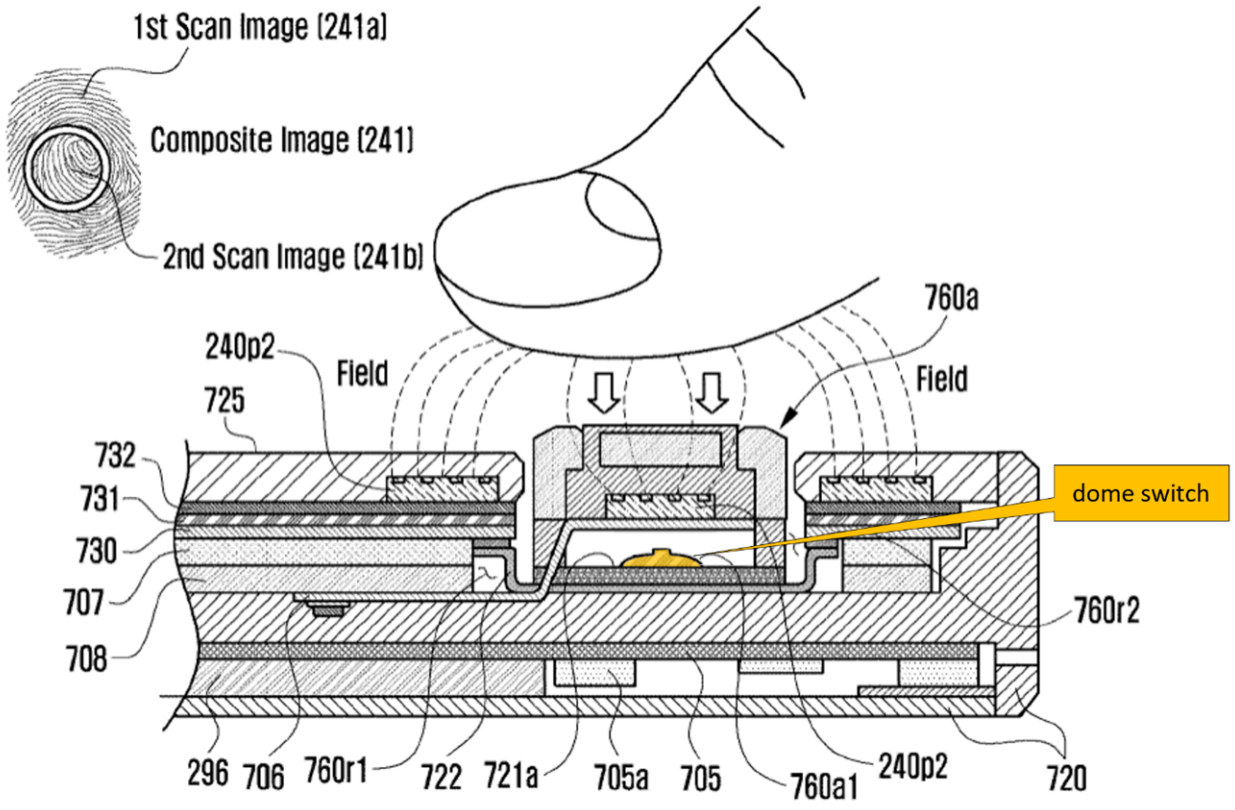
i. Claim 2: [2.pre]: The electronic device of claim 1, wherein the button assembly further comprises:

Kim discloses element [2.pre]. *See* claim 1.

ii. Claim 2: [2.a]: a tactile dome switch configured to compress in response to a press on the input surface;

Kim discloses element [2.a], as illustrated in Figure 10(b):

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



First, *Kim* discloses "dome switch 760a1" which corresponds to the claimed "tactile dome switch" of element [2.a] (Ex. 1004, 22:28-34; *see also* Ex. 1004,

20:27-37, 21:12-19; Ex. 1022, ¶¶ 156, 165, 179). Figure 10(b) depicts "dome switch 760a1" (orange) (Ex. 1003, ¶¶179-180).

Second, *Kim* discloses that the "dome switch 760a1 of the physical button 760a may move downward by a user's click" (Ex. 1004, 22:28-34; Ex. 1022, ¶179; Ex. 1003, ¶181). A POSITA would have known tactile dome switches function by transferring pressure from a physical input (*i.e.*, a press on an input surface above the dome switch) to an electronic sensor, through the compression or elastic deformation of the dome switch itself. Consequently, this limitation would have been obvious in view of the general knowledge of a POSITA and well within their skill (Ex. 1003, ¶¶182-183).

iii. Claim 2: [2.b]: a plunger positioned below the biometric sensor and above the tactile dome switch, the plunger displacing and compressing the tactile dome switch in response to the press on the input surface;

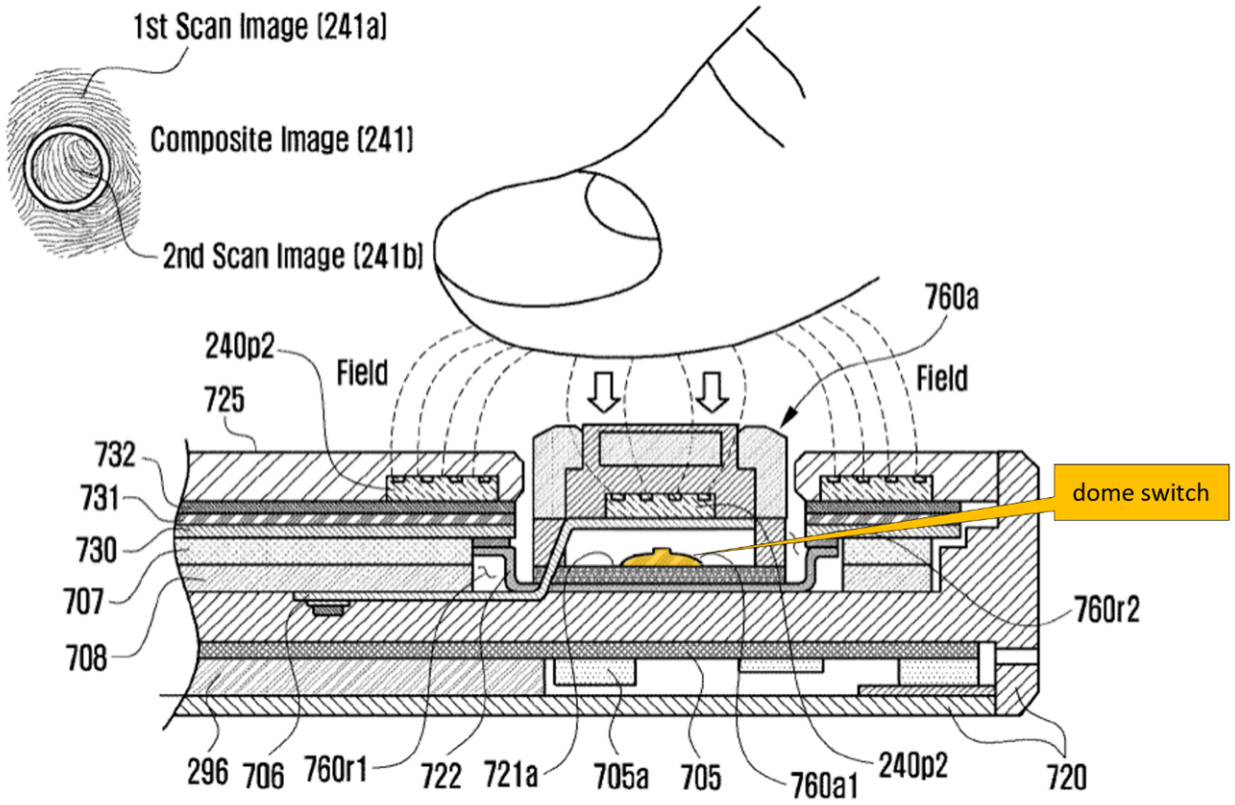
See element [2.c], below.

iv. Claim 2: [2.c]: a retainer defining an aperture housing the plunger;

Kim renders elements [2.b]-[2.c] obvious.

Figure 10(b) shows the "tactile dome switch" (*i.e.*, "dome switch 760a1," orange) is configured to compress in response to a press on the input surface (Ex. 1003, ¶¶184-185). *See* element [2.a].

Ex. 1004, Fig. 10(b) (altered and annotated); Ex. 1022, Fig. 10(b)

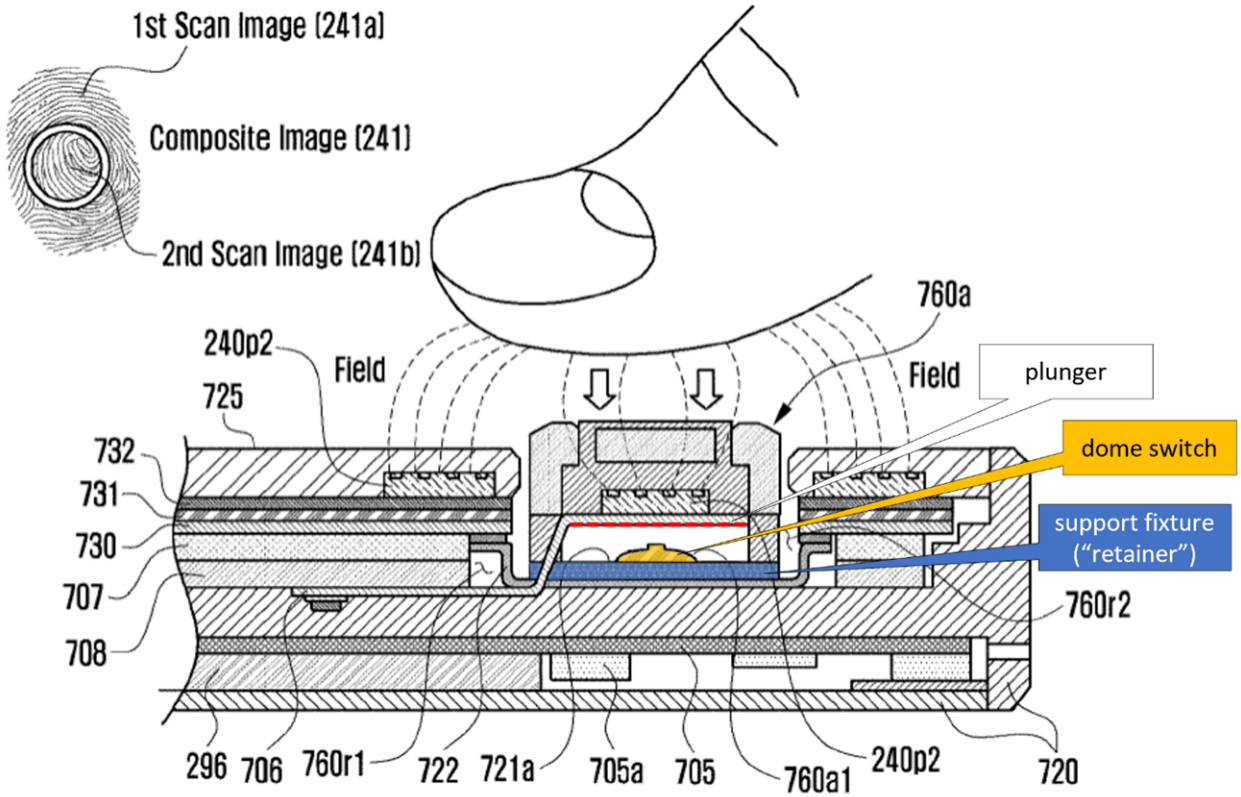


Furthermore, a POSITA would have known tactile dome switches were a common type of switch for use in mobile devices, to transform physical and/or mechanical button presses into electronic signals, and would also have known dome switches would be implemented with a plunger and a retainer defining an aperture housing for the plunger, such that the plunger is configured to move downward and compress a dome switch, thus creating an electronic signal that would be read by a processor, in response to a press on the input surface (Ex. 1003, ¶186). Given that *Kim* explicitly discloses the use of dome switches, a POSITA would have understood

the aforementioned dome switch configuration was one among a finite number of options (Ex. 1003, ¶186).

When implemented in *Kim*'s button assembly, this known dome switch configuration would have resulted in a plunger positioned below the biometric sensor and above the tactile dome switch, such that the plunger would displace and compress the tactile dome switch in response to the press on the input surface. This configuration is depicted in annotated and altered Figure 10(b), below (Ex. 1003, ¶187).

Ex. 1004, Fig. 10(b) (altered and annotated); Ex. 1022, Fig. 10(b)



Kim also discloses a "support fixture 721a" which functions as a retainer defining the lower surface of an aperture housing the plunger (Ex. 1004, 22:28-34; Ex. 1022, ¶179). The '619 Patent teaches that (1) multiple "configurations of the retainer 224 are possible," (2) it provides "a stop to displacement of the button housing" and (3) "[t]he retainer 224 lower surface forms a sealing surface 225 for the button assembly 310" (Ex. 1001, 16:54-60; Ex. 1003, ¶188). A POSITA would have understood support fixture 721a of *Kim* likewise serves as "a stop to the displacement of the button housing" and includes a "lower surface [that] forms a sealing surface … for the button assembly." As such, a POSITA would have understood that support fixture 721a constitutes a retainer that functions as a surface of the aperture housing the disclosed plunger (Ex. 1003, ¶¶188-189).

v. Claim 2: [2.d]: the retainer defines the sealing surface of the button assembly.

Kim renders element [2.d] obvious. *See* elements [2.b]-[2.c]. Further, a POSITA would have understood that because the retainer defined an aperture housing the plunger, it would be formed of a rigid, durable material that would withstand repeated user presses on the input surface. Therefore, the retainer would be one of a limited number of surfaces that could be used as a sealing surface of the button assembly and, given its location relative the plunger, would be used as a sealing surface by the POSITA (Ex. 1003, ¶¶190-191).

4. Claim 3

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

Kim discloses element [3.pre]. *See* claim 1.

ii. Claim 3: [3.a]: the seal includes a gasket and a pressure sensitive adhesive (PSA) layer; and

Kim discloses element [3.a].

Kim teaches the claimed seal the same way as the '619 Patent, which explains it may be "a composite of more than one material … that may form a water-tight seal" (element [1.d], Ex. 1001, 11:32-41; Ex. 1003, ¶¶194-195). *Kim* explains the purpose of the sealing rubber 22 is to "have a sealing and waterproof function" (Ex. 1004, 20:47-50; Ex. 1022, ¶159). Specifically, *Kim* states: "[t]he sealing rubber 722 may be adhered to the force touch panel 730 ***with an adhesive (or an adhesive tape)***" (Ex. 1004, 20:47-50; Ex. 1022, ¶159; Ex. 1003, ¶196).

Furthermore, a POSITA would have known button assemblies and fingerprint sensors in mobile electronic devices should be sealed to prevent ingress of potentially damaging substances, and common sealing techniques included using a rubber gasket and/or PSA layer (Ex. 1003, ¶197). For example, common sealing techniques included tape, adhesive (including two-sided pressure sensitive adhesive film), waterproof dispensing, silicon, waterproof rubber, and urethane, as well as gaskets generally (Ex. 1003, ¶197). Using these existing, known components would

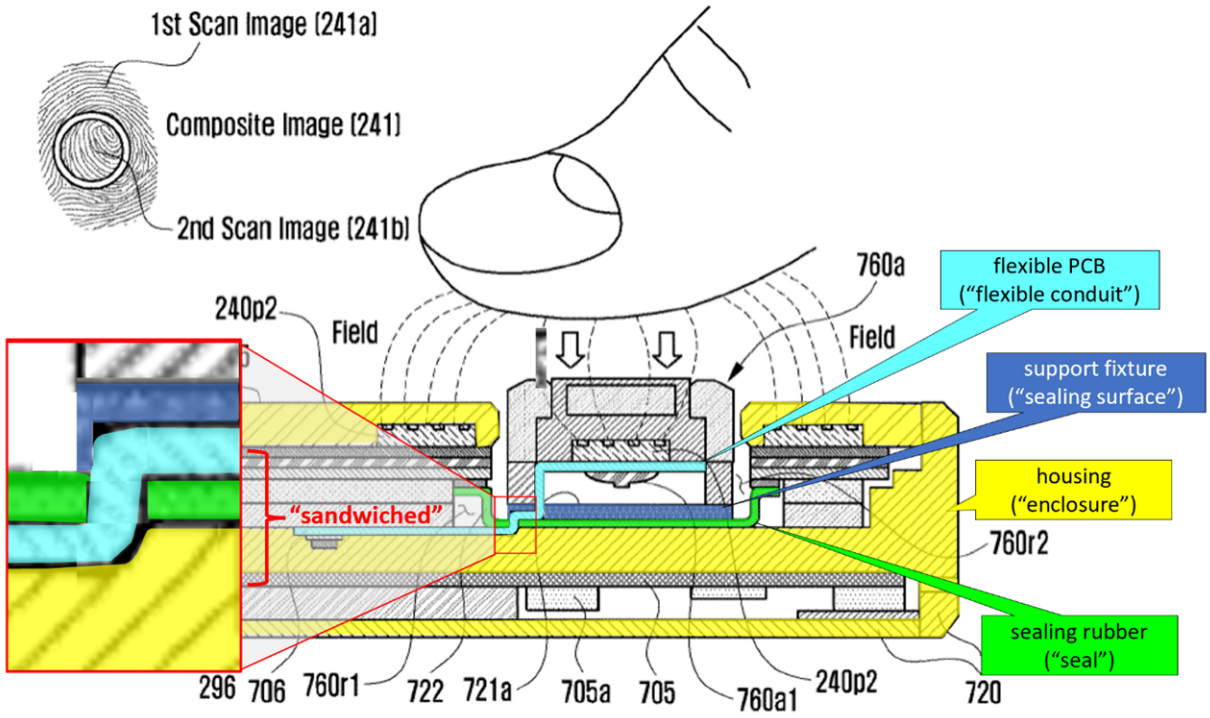
have saved costs and promoted an efficient use of limited space within the mobile device. Consequently, this limitation would have been obvious and well within the skill of a POSITA, particularly in light of *Kim*'s disclosures that the sealing rubber 722 be affixed with an adhesive and/or adhesive tape (Ex. 1003, ¶¶197-198).

iii. Claim 3: [3.b]: the portion of the flexible conduit is positioned between the gasket and the sealing surface of the button assembly.

Kim renders element [3.b] obvious.

Figure 10(b) of *Kim* renders obvious a portion of the flexible conduit sandwiched between the seal and the sealing surface of the button assembly (Ex. 1003, ¶¶199-200). *See* element [1.f].

Ex. 1004, Fig. 10(b) (altered and annotated); Ex. 1022, Fig. 10(b)



And, as discussed above, *Kim* renders obvious a seal, wherein the seal includes a gasket. As such, a POSITA would have understood that the flexible PCB is sandwiched between the ***gasket*** seal and the sealing surface of the button assembly (Ex. 1003, ¶¶201-202).

5. Claim 4: The electronic device of claim 1, wherein the seal is overmolded around the portion of the flexible conduit.

Kim renders claim 4 obvious (Ex. 1003, ¶¶203-205). *See* claim 1.

Kim discloses the claimed seal and flexible conduit. *See* elements [1.d], [1.f]. [3.b].

Furthermore, a POSITA would have known overmolding refers to a technique in which a material (*i.e.*, epoxy resin) is injected, poured or otherwise loaded into a space to surround another component, then cured so it forms a hard casing or overmold around the component (Ex. 1003, ¶206).

A POSITA would have also known components would be sealed by an overmolding process so they are liquid-tight (Ex. 1003, ¶207). Similarly, a POSITA would have understood there were other, mechanical methods of fastening a control feature into the housing, but that overmolding, unlike mechanical fasteners such as screws, bolts, snap fit components, etc., provides for a liquid-tight seal (Ex. 1003, ¶207).

In light of this knowledge, a POSITA would have understood that the seal of *Kim* would be overmolded around the portion of the flexible conduit in order to enhance the quality of the seal (Ex. 1003, ¶208).

6. Claim 6: The electronic device of claim 1, further comprising a passage extending from the opening to the enclosed volume, wherein the flexible conduit passes through the passage.

Kim renders claim 6 obvious. *See* claim 1.

As discussed above, the opening contains a button assembly which includes electrical components, such as a fingerprint sensor. *See* elements [1.b]-[1.d]. However, *Kim's* battery and main PCB are located inside the enclosed volume and, thus, a passage is necessary to connect them (Ex. 1004, 22:4-9; Ex. 1022, ¶175; Ex. 1003, ¶¶210-211).

Furthermore, claim 6 would have been well known to a POSITA. Because *Kim* includes electrical components (*i.e.*, the fingerprint sensor) located in the opening of the enclosure which are separated from a power supply by the enclosure wall, a POSITA would have understood there would have been a passage extending from the opening formed in the sidewall of the enclosure to the enclosed volume (Ex. 1003, ¶212). Likewise, a POSITA would have known a biometric sensor (*e.g.*, a fingerprint sensor) outputs an electrical signal that should be electrically connected via the flexible PCB to an integrated circuit or processor disposed within the enclosed volume, and that requires a power supply to function. In order for these

connections to occur, *Kim* discloses a passage between the opening and the enclosed volume (Ex. 1003, ¶¶212-213).

7. Claim 7

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

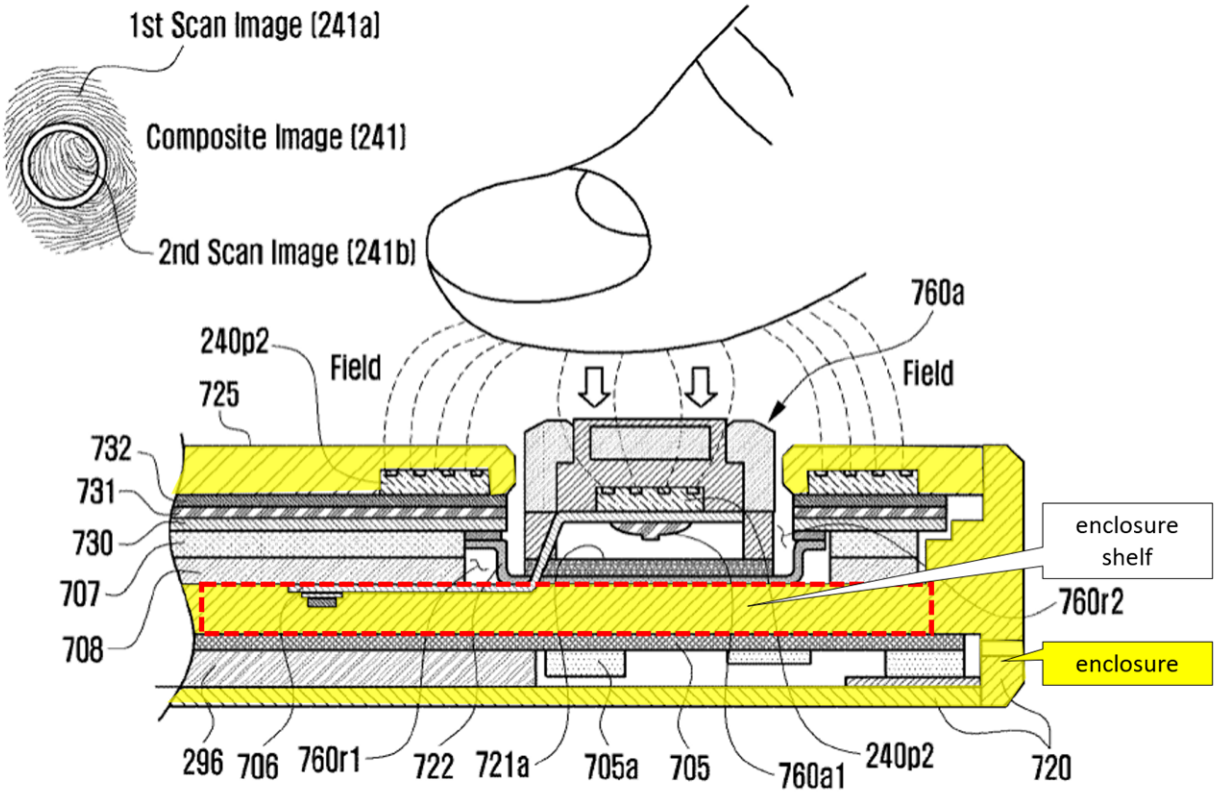
Kim discloses element [7.pre]. *See* claim 6.

ii. Claim 7: [7.a]: an enclosure shelf is defined at the bottom of the opening;

Kim discloses element [7.a].

Figure 10(b) depicts a shelf in the enclosure wall (red dashes) located at the bottom of the opening.

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



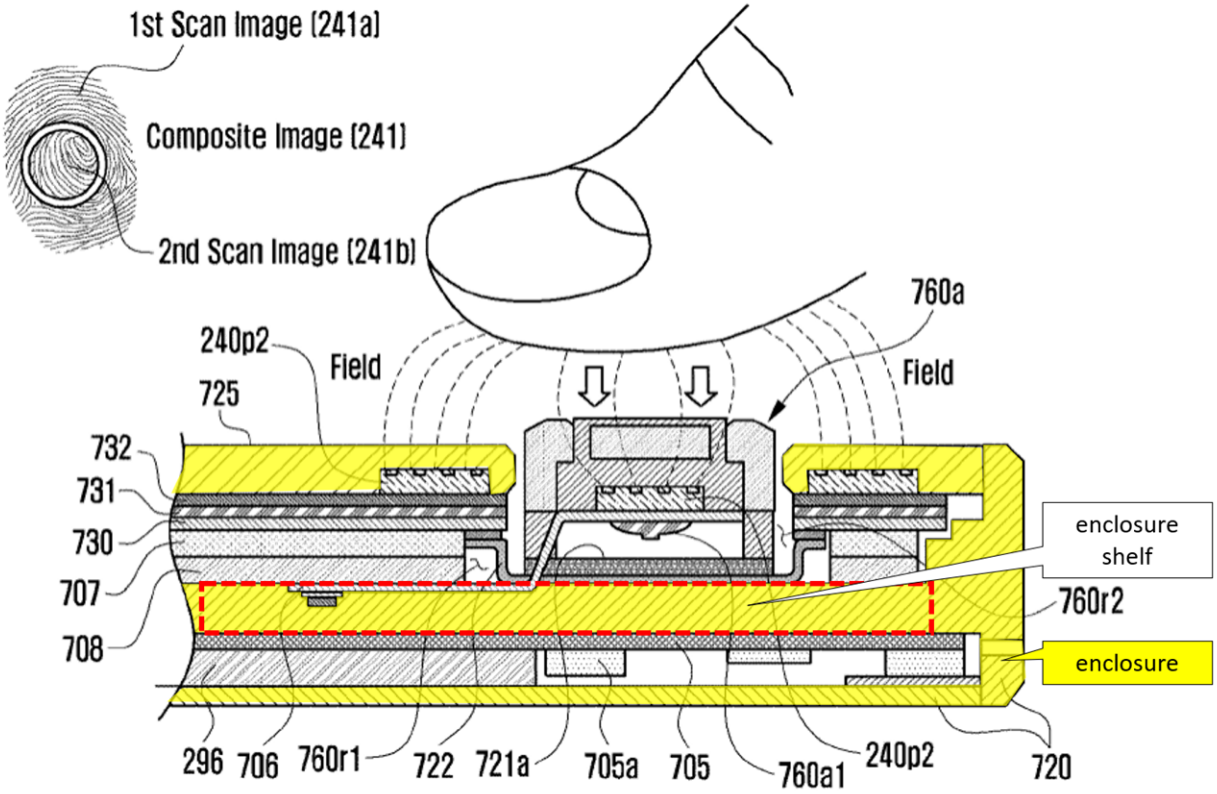
The '619 Patent discloses that the "enclosure shelf 223 [is] formed at a lower or distal portion of the opening" (Ex. 1001, 12:40-47; Ex. 1003, ¶218; element [1.a]). A POSITA would have understood Figure 10(b) discloses this limitation in the same way as the '619 Patent (Ex. 1003, ¶¶216-220).

iii. Claim 7: [7.b]: the passage is formed in the enclosure shelf;

Kim renders element [7.b] obvious (Ex. 1003, ¶¶221-223). *See* claim 6.

Figure 10(b) shows the enclosure shelf separating the electronic components in the button assembly from those within the enclosed volume. *See* element [7.a].

Ex. 1004, Fig. 10(b); Ex. 1022, Fig. 10(b)



Because *Kim* includes a fingerprint sensor located in the opening of the enclosure which is electrically connected to a processor and power supply located on the other side of the enclosure shelf in the enclosed volume, a POSITA would have understood that any passage would necessarily go through the enclosure shelf (Ex. 1003, ¶¶224=226).

iv. Claim 7: [7.c]: the seal encircles the passage.

Kim renders element [7.c] obvious.

Kim discloses an electronic wherein the flexible conduit passes through (1) an aperture in the seal, and (2) a passage extending from the opening to the enclosed

volume (Ex. 1003, ¶¶227-228). *See* claims 1, 5, 6. Therefore, a POSITA would necessarily conclude that the aperture in the seal aligns with (and encircles) the passage (Ex. 1003, ¶¶229-230).

8. Claim 8: The electronic device of claim 6, wherein the portion of the flexible conduit encircles the passage.

Kim renders claim 8 obvious. *See* claim 6.

The '619 Patent describes the relationship between the flexible conduit and the passage, stating that in Fig. 2A (depicted below) "both the seal 262 and ***a portion of the flexible conduit 240 encircle or surround the passage 227***" (Ex. 1001, 9:26-44; Ex. 1003, ¶¶231-233).

Ex. 1001, Fig. 2A

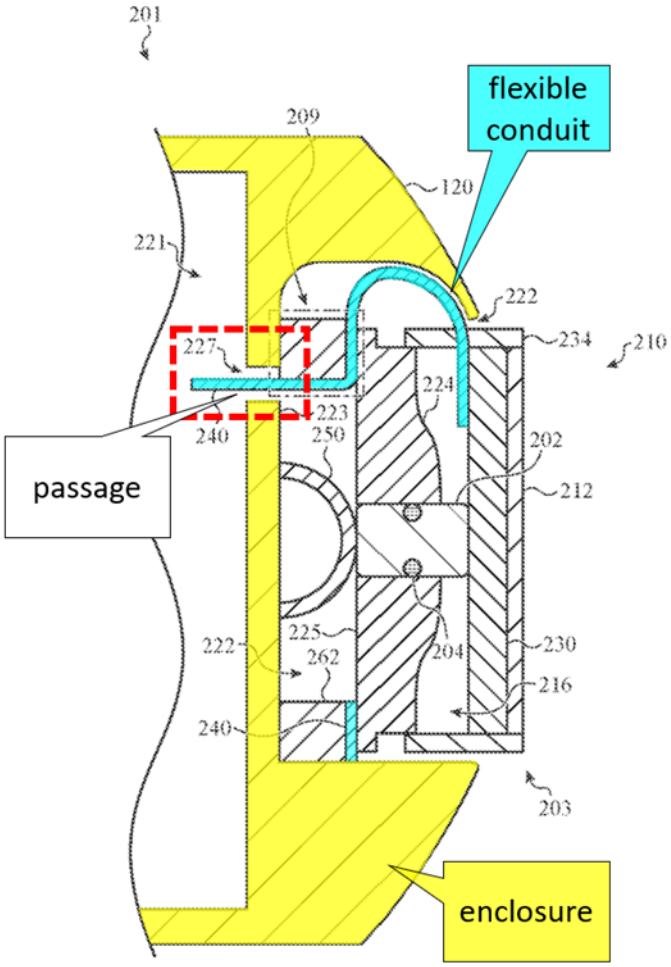


FIG. 2A

Given this, a POSITA would have understood the flexible conduit of *Kim* encircles the passage in the same way as the '619 Patent (Ex. 1003, ¶234; claim 6). A POSITA would have understood there is no reason to make the passage larger than the conduit itself, to prevent contaminants from entering the enclosed volume and avoid weaking the structure of the enclosure (Ex. 1003, ¶235). Thus, a POSITA

would be motivated to create a passage such that the flexible conduit can be said to encircle surround the passage (*i.e.*, encompass it on all sides) (Ex. 1003, ¶¶235-236).

C. Ground 3: Claims 1, and 3-10 are Unpatentable Under 35 U.S.C. §103 over *Jung* in view of *Meyers*

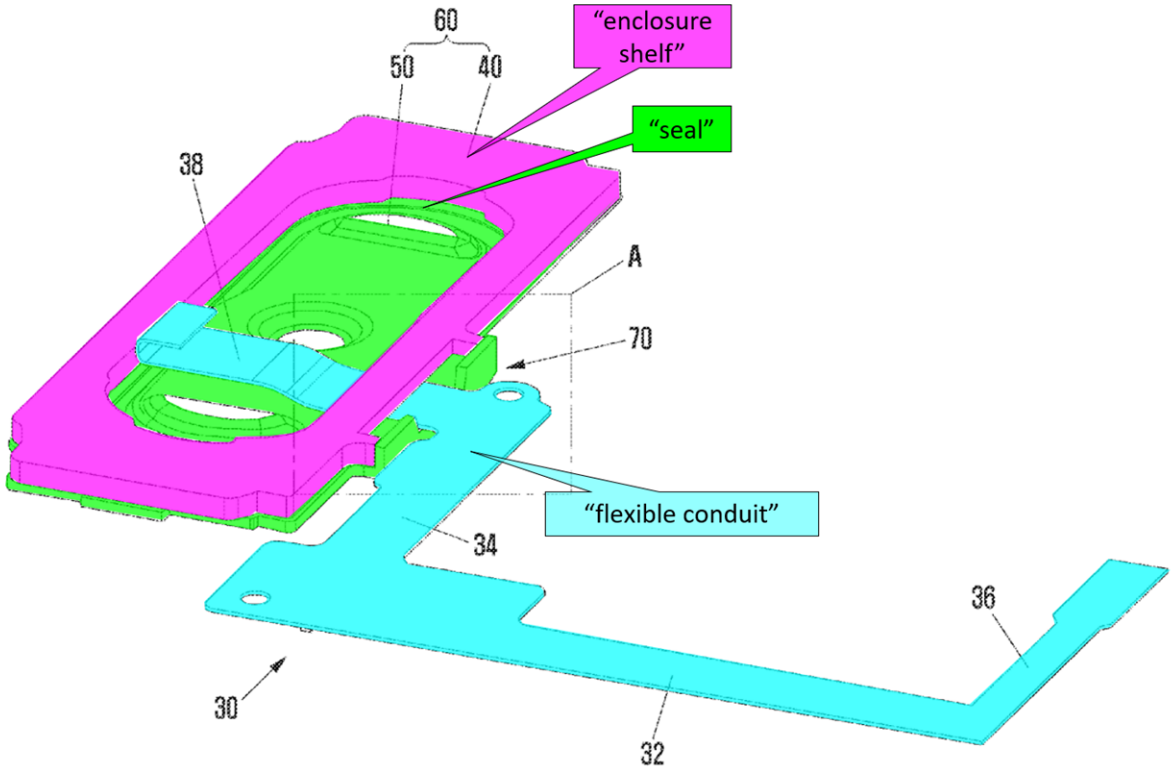
Jung in view of *Meyers* discloses and/or renders obvious claims 1, and 3-10 of the ’619 Patent.

1. Overview of Ground 3

i. Jung

Jung discloses an electronic device with “a key-waterproof structure … that includes an insert-injected sealing area” (Ex. 1005, Abstract, [0012]). Annotated Figure 10, below, shows a flexible conduit (teal) passing through a passageway or opening in the enclosure shelf (pink), and pressed against a seal (green) (Ex. 1005, Fig. 10; Ex. 1003, ¶¶78-84).

Ex. 1005, Fig. 10



ii. Meyers

Meyers discloses "[v]arious structures and methods … for packaging a biometric sensor, such as a capacitive biometric sensor" (Ex. 1007, Abstract). Specifically, *Meyers'* "[e]mbodiments incorporate various placements of the biometric sensor, structure surrounding [the] biometric sensor, [and] connection structures (electrical, physical, or both)" (Ex. 1007, Abstract; Ex. 1003, ¶¶85-91).

Figure 1 of *Meyers* "shows an assembly of parts disposed to form the fingerprint recognition sensor 102 circuit and position the sensor 102 circuit below a push button" (Ex. 1007, ¶[0042]; Ex. 1003, ¶¶85-91).

Ex. 1007, Fig. 1

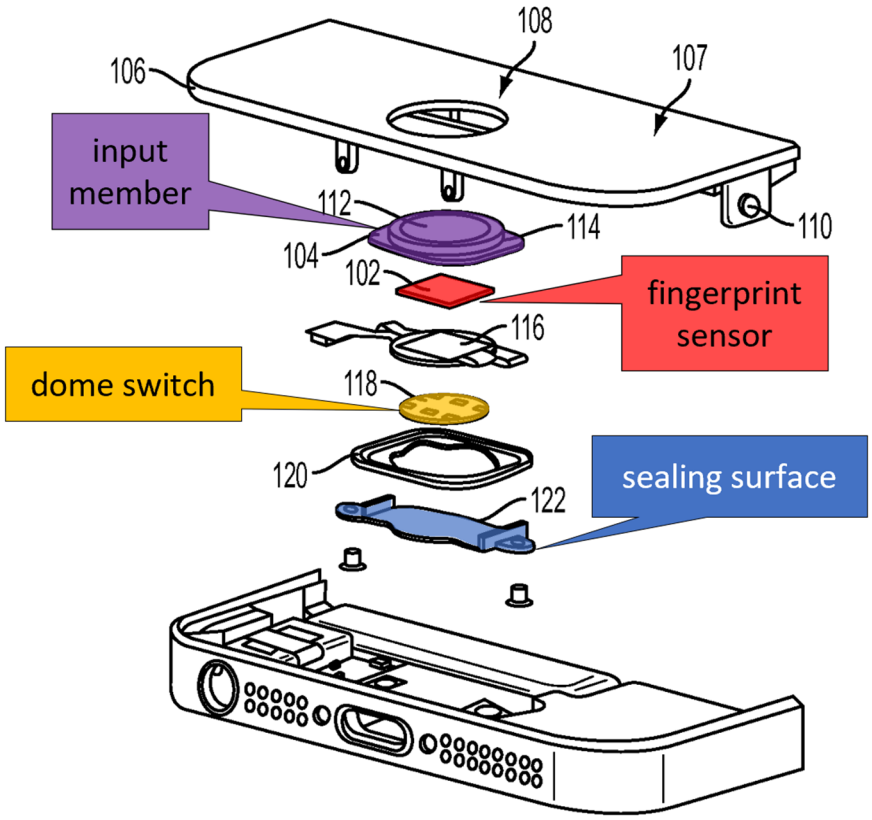


FIG. 1

iii. Motivation to Combine

Jung and *Meyers* are generally directed to the same technical field of button structures within mobile devices. *Jung* is directed to "mobile phones" and other "portable device[s]," having "a home-key that implement various functions in a one-

touch type to enhance the user's convenience" (Ex. 1005, [0003]-[0007]; Ex. 1003, ¶240). And *Meyers* is "directed to fingerprint sensor systems for electronic devices, including, but not limited to, fingerprint image sensors for smartphones (or smart phones), tablet computers, media players, personal computers, and other portable electronics and mobile devices," where "the fingerprint sensor is disposed beneath a control button or display element (Ex. 1007, ¶[0036]; Ex. 1003, ¶240).

In particular, *Jung* discloses "[a]n electronic device and a method of waterproofing a key thereof" (Ex. 1005, Abstract). "The device includes a body, a display device disposed in the body, a key disposed in the body, and a key-waterproof structure..." (Ex. 1005, [0012]). *Jung* also discloses a "biometric sensor" such as a "fingerprint sensor" (Ex. 1005, [0060]). But *Jung* does not expressly disclose the structure of its "fingerprint sensor" (Ex. 1003, ¶241). To supply this teaching, a POSITA would have turned to *Meyers*, which expressly discloses the structure of a "fingerprint sensor" button assembly. Indeed, *Meyers* teaches that its button assembly should be incorporated in devices using biometric recognition (Ex. 1007, Abstract, ¶¶[0003], [0011]; Ex. 1003, ¶241).

A POSITA would have been motivated to implement *Meyers*' "fingerprint sensor" button assembly in *Jung*'s "key-waterproof structure" because this would have involved use of known technique to improve similar devices in the same way (Ex. 1003, ¶242). A POSITA would also have known that it was important to seal a

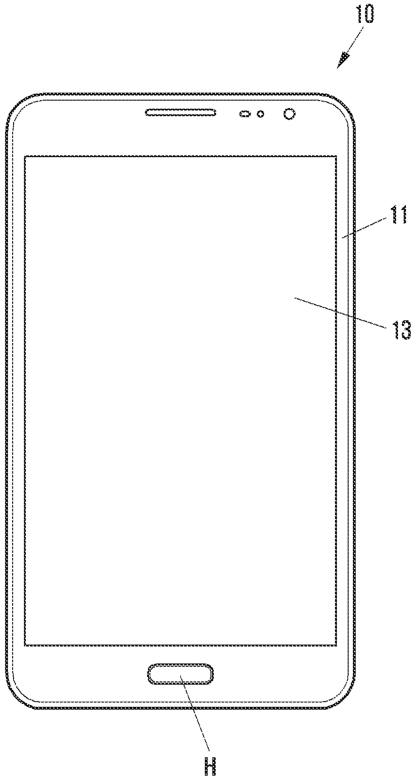
fingerprint sensor because fingers can introduce potentially damaging substances (Ex. 1003, ¶242). For example, *Evans* discloses that "[f]ingerprints may be deposited in natural secretions from the eccrine glands present in friction ridge skin (secretions consisting primarily of water)" (Ex. 1008, 6:67-7:2). Sealing a fingerprint sensor prevents ingress of contaminants that would potentially damage a fingerprint sensor's electronic circuitry (Ex. 1003, ¶242). Thus, a POSITA would have been motivated to waterproof *Meyers*'s "fingerprint sensor" button assembly using *Jung*'s "key-waterproof structure" and in view of the well known understanding that electronic components should be protected from contaminants, would have had a reasonable expectation of success (*see* Ex. 1005, [0007] ("The home-key, which implements various functions using one touch, ***should be provided with a waterproof structure***."); Ex. 1003, ¶242).

2. Claim 1

i. Claim 1: [1.pre]

Jung in view of *Meyers* renders element [1.pre] obvious. *Jung* discloses an electronic device:

Ex. 1005, Fig. 4A

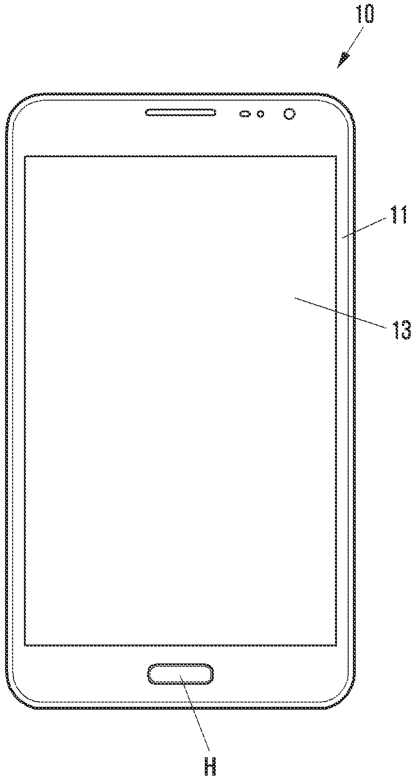


Jung teaches "[a]n electronic device and a method of waterproofing a key thereof are provided" (Ex. 1005, Abstract; Ex. 1003, ¶¶243-246).

ii. Claim 1: [1.a]

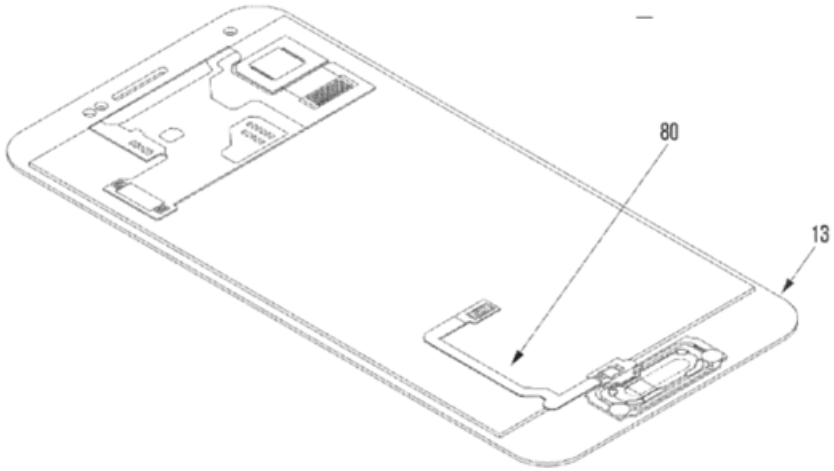
Jung in view of *Meyers* renders element [1.a] obvious. *Jung* discloses an enclosure having an enclosed volume and an opening formed in a sidewall:

Ex. 1005, Fig. 4A



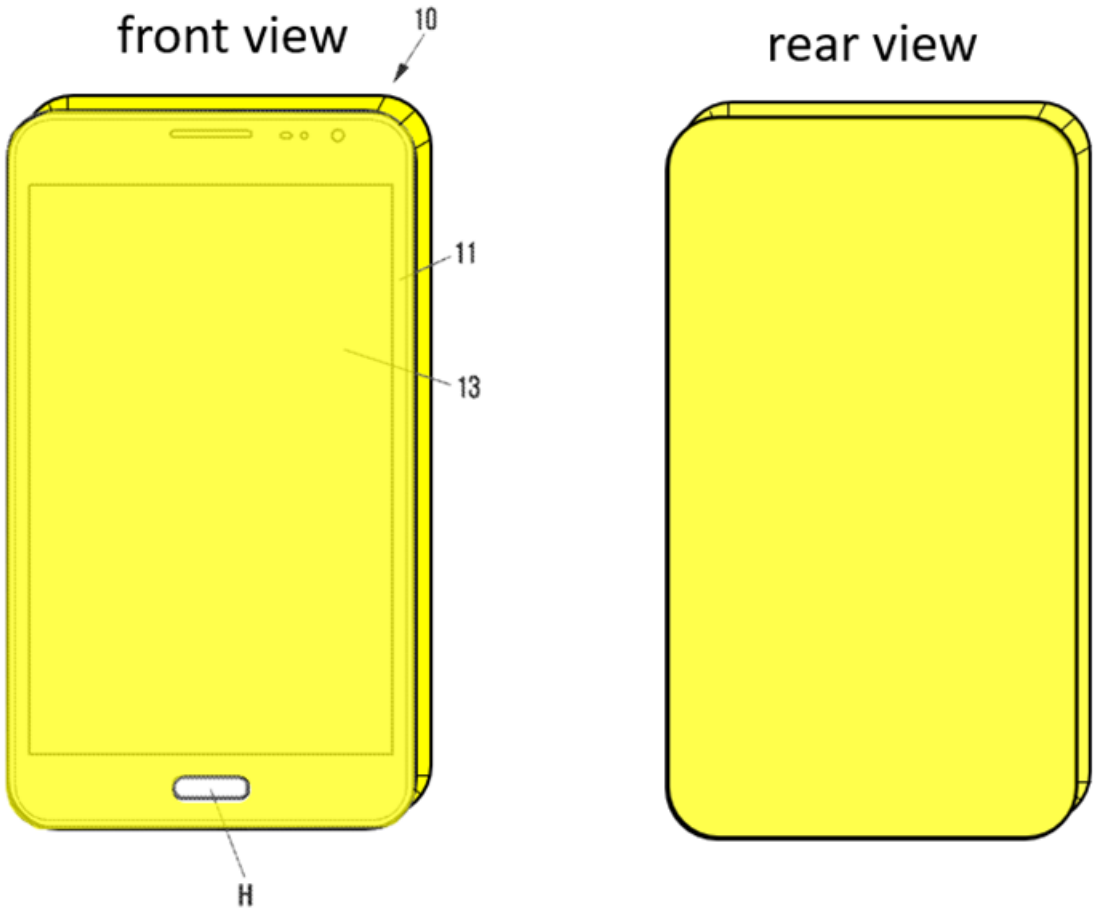
First, *Jung* discloses an enclosure having an enclosed volume (Ex. 1005, [0019]). *Jung's* Figure 12 "illustrat[es] … the ***back surface*** of a display device … of FIG. 4A" (Ex. 1005, [0028]; Ex. 1003, ¶¶247-248).

Ex. 1005, Fig. 12



From this, a POSITA would have understood *Jung*'s electronic device has front, side, and rear surfaces, as depicted in altered and annotated Figure 4A, below (Ex. 1003, ¶249):

Ex. 1005, Fig. 4A (altered and annotated)



Indeed, *Jung* discloses element [1.a] the same way as the '619 Patent, which discloses that the "enclosure" is a "structure" that may be "constructed from multiple materials" including metals, polymers, and glass "operably connected together" in order to "define[] an internal volume of the electronic device" (Ex. 1001, 6:3-17; Ex. 1003, ¶¶250-251). Second, *Jung* renders obvious that the enclosure has an opening formed in a sidewall, stating "other keys for performing various functions rather than

the home-key may be applied to the key-waterproof structure of the present disclosure" (Ex. 1005, [0123]; Ex. 1003, ¶252).

A POSITA would have understood the key-waterproof structure of *Jung* would be applied to any of the electronic devices disclosed therein (Ex. 1005, [0019], [0037]; claim [1.a]; Ex. 1003, ¶252). Therefore, a POSITA would have understood that the key-waterproof structure can be applied to one or more keys and/or buttons, including keys located in the sidewall of the electronic device (Ex. 1003, ¶¶252-253). Indeed, waterproofing keys located in the sidewall of the electronic device was well within the general knowledge of a POSITA (*see, e.g.,* Ex. 1004, 13:46-53, 17:10-12; Ex. 1022, ¶¶89, 166; Ex. 1003, ¶¶252-254).

iii. Claim 1: [1.b]

Jung in view of *Meyers* renders element [1.b] obvious, as illustrated in at least *Jung's* Figure 2:

Ex. 1005, Fig. 2

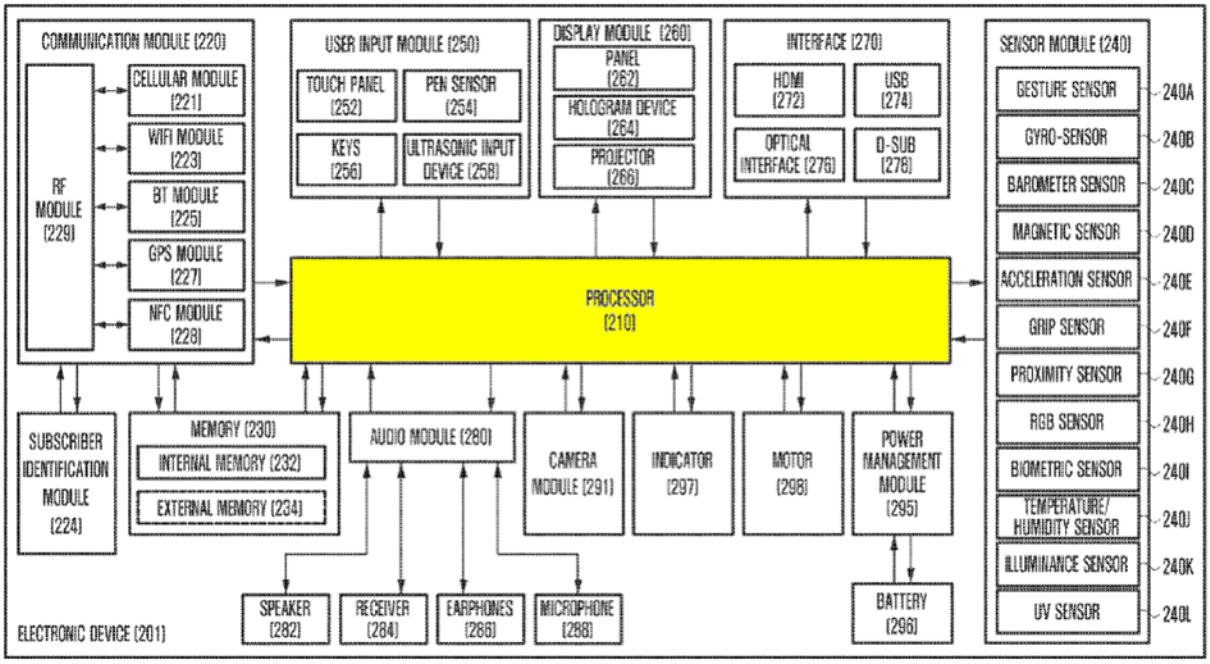


Figure 2 of *Jung* discloses a "processor 210." Because the electronic components of *Jung* are depicted as positioned in the enclosed volume, a POSITA would have understood that the processor is positioned in the enclosed volume (Ex. 1005, Fig. 4A). Elsewhere, *Jung* defines the relationship between the processor and other components of the electronic device (Ex. 1005, Figs. 1-3, [0039], [0041]-[0044], [0050]-[0051]; Ex. 1003, ¶¶255-257).

iv. Claim 1: [1.c]

Jung in view of *Meyers* renders element [1.c] obvious. Specifically, *Meyers* discloses a button assembly within the opening, as illustrated in at least *Meyers*' Figure 1 (Ex. 1003, ¶¶258-259).

Ex. 1007, Fig. 1

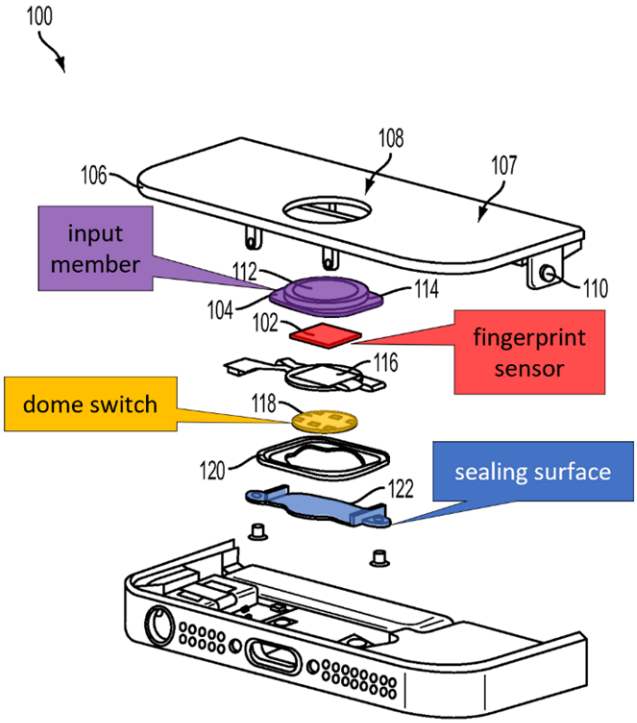


FIG. 1

Claim element [1.c] contains two sub-elements:

(a) Claim 1: [1.c.i]

Jung in view of *Meyers* renders element [1.c.i] obvious. The button assembly of *Meyers* includes a button 104 (*i.e.*, an input member) (purple) that includes a lens 112 (*i.e.*, an input surface) (Ex. 1007, ¶[0044] ("button 104 includes a lens 112, at least a portion of the lens 112 helping to form a recessed shape, with the effect of guiding the user's finger onto the button"); Ex. 1003, ¶¶260-2612).

Ex. 1007, Fig. 1

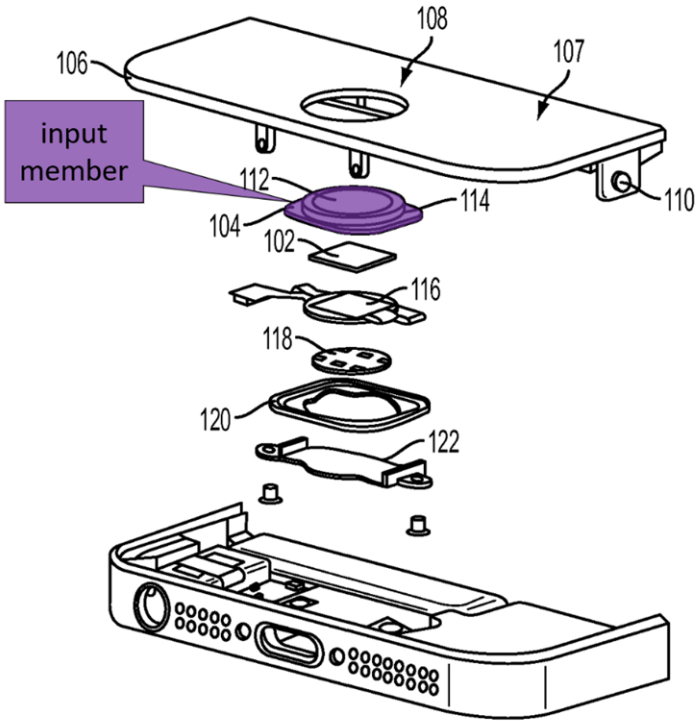


FIG. 1

(b) Claim 1: [1.c.ii]

Jung in view of *Meyers* renders element [1.c.ii] obvious. *Meyers'* fingerprint recognition sensor 102 (*i.e.*, the biometric sensor) (red) is located below the input member (purple) (Ex. 1007, ¶[0045] ("button 104 is ***disposed above*** and coupled to a fingerprint recognition sensor 102 circuit"), Fig. 1; Ex. 1003, ¶¶263-264).

Ex. 1007, Fig. 1

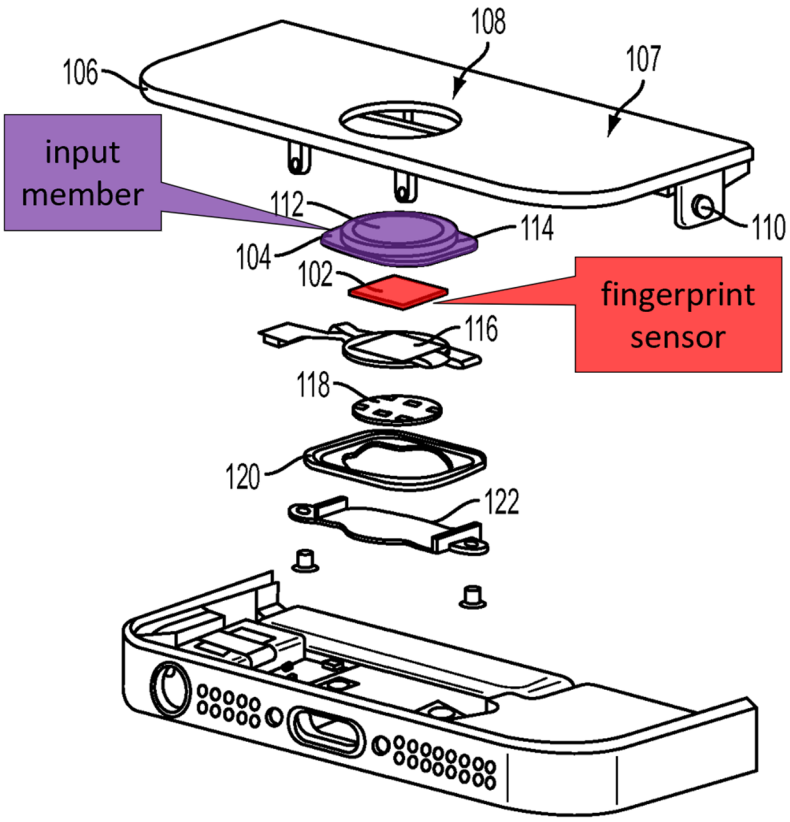


FIG. 1

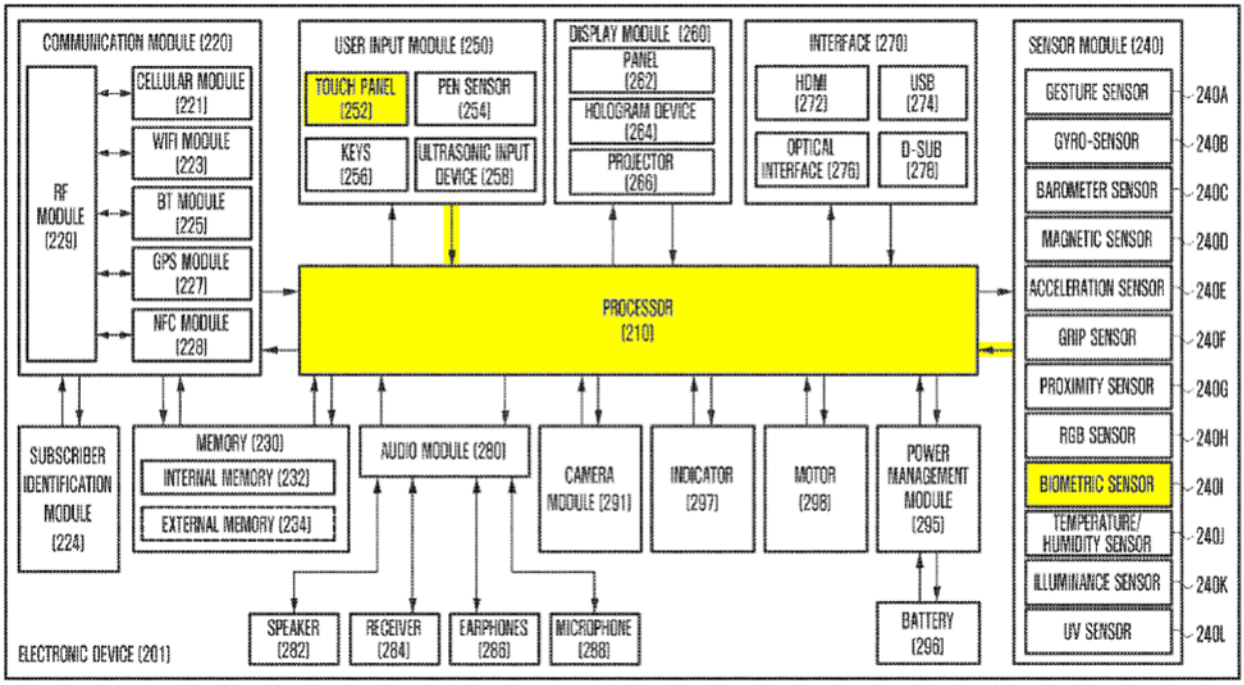
Meyers also discloses "fingerprint recognition sensor 102" is configured to produce a biometric characteristic in response to a touch on the input surface (Ex. 1007, ¶[0047]). *Meyers'* fingerprint sensor "can be used to determine substantial features of the user's fingerprint" for user authentication (Ex. 1007, ¶[0048]; Ex. 1003, ¶265).

Notably, *Meyers* discloses that the fingerprint sensor (1) is a capacitive fingerprint sensor disposed for capacitive coupling to the epidermis of the user's

finger, and (2) produces as an output a 2D array of fingerprint information. (Ex. 1007, ¶¶[0047]-[0048]). A POSITA would have understood capacitive fingerprint sensors respond to a user's touch on the input surface, and 2D arrays of fingerprint information constitute output signals corresponding to biometric characteristic (Ex. 1003, ¶266).

Jung discloses a biometric sensor connected to both a processor, which controls the sensor module 240, and a touch panel for user input (Ex. 1005, Fig. 2, [0060, [0070]; Ex. 1003, ¶267).

Ex. 1005, Fig 2



Jung in view of *Meyers* discloses a "biometric sensor" the same way as the '619 Patent, which discloses that the "biometric sensor" includes a "fingerprint"

sensor, and "[f]ingerprints and DNA are example biometric characteristics" (Ex. 1001, 4:51-5:14; Ex. 1003, ¶¶268-272).

v. Claim 1: [1.d]

Jung in view of *Meyers* renders element [1.d] obvious. *Jung* discloses a seal, such that when the button assembly of *Meyers* is installed, the seal is positioned between a sealing surface of the button assembly and the enclosure.

Meyers discloses a button assembly with a sealing surface (*i.e.,* button support plate 122) (blue) (Ex. 1007, ¶[0052], Fig. 1; Ex. 1003, ¶¶273-274).

Ex. 1007, Fig. 1

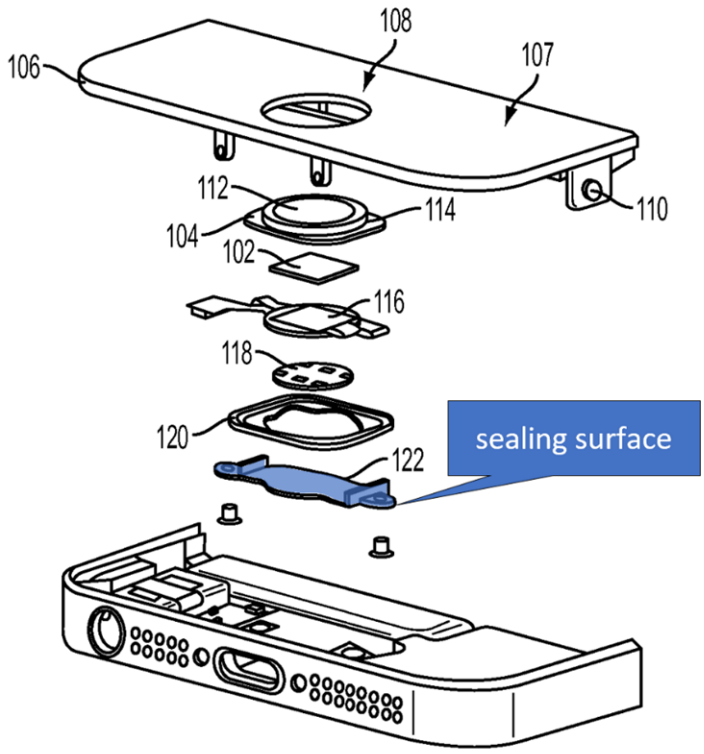
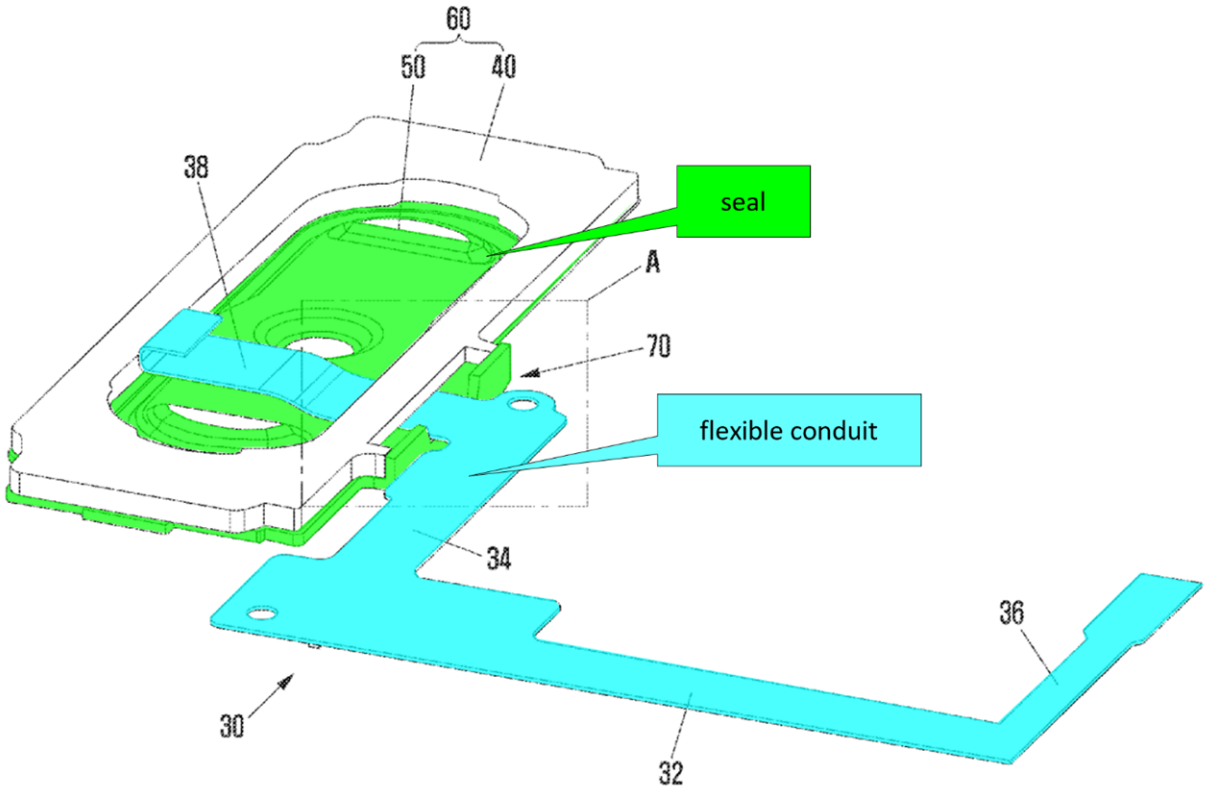


FIG. 1

Jung's Figure 10, below, depicts bracket 40 and silicon rubber 50 (the "seal") (Ex. 1005, Fig. 10; Ex. 1003, ¶275).

Ex. 1005, Fig. 10



When assembled, the button assembly of *Meyers* is inserted into the opening of the bracket 40, and rests on top of (1) the key bonding portion 38 of flexible PCB 30 (teal) and (2) the silicon rubber 50 (green) (Ex. 1003, ¶276).

Ex. 1005, Fig. 10; Ex. 1007, Fig. 1

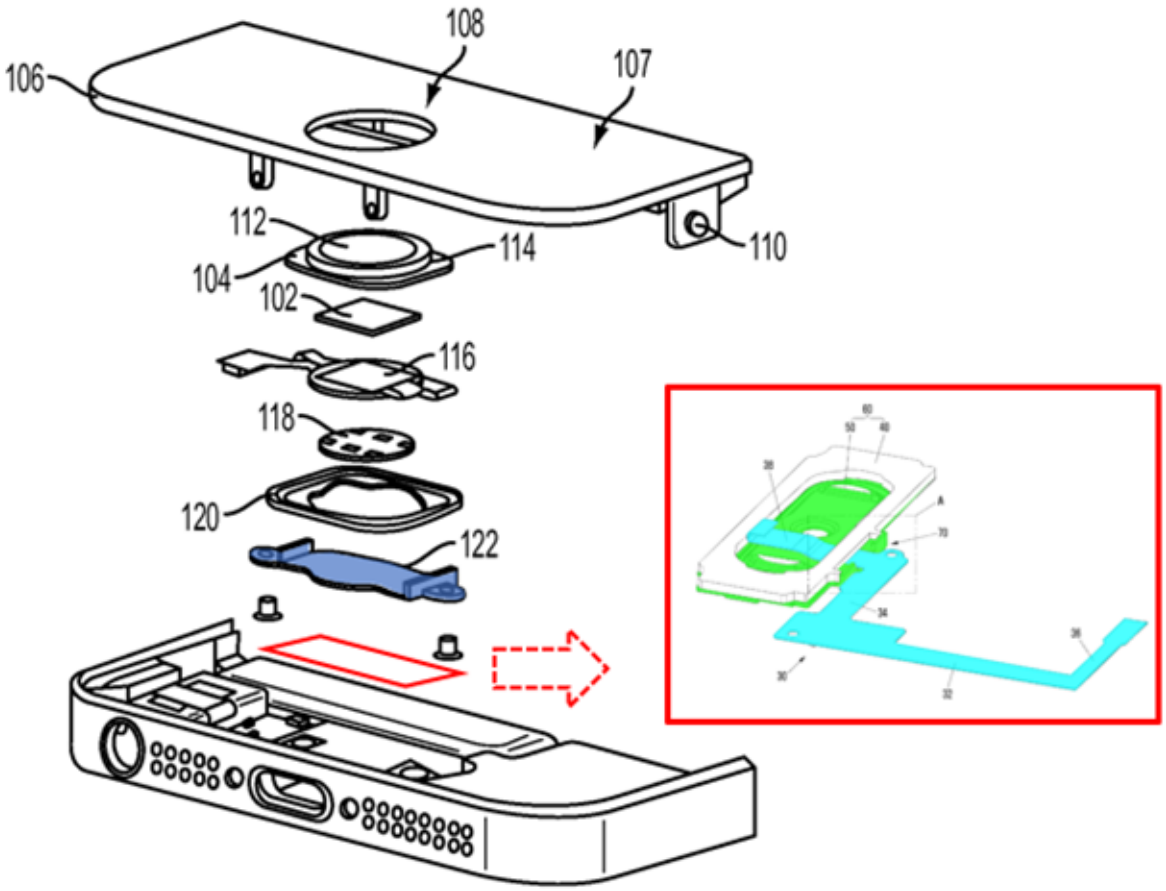


FIG. 1

In this configuration, silicon rubber 50 (*i.e.*, the seal) of *Jung* is located between button support plate 122 (*i.e.*, the sealing surface of the button assembly) of *Meyers* and the enclosure (Ex. 1003, ¶277). Specifically, the entire key waterproofing structure disclosed by *Jung* is located *inside* of the enclosure. Because the enclosure surrounds the button assembly, the seal is located between the bracket

and the portion of the enclosure defining the rear of the electronic device (Ex. 1003, ¶¶277-278).

vi. Claim 1: [1.e]

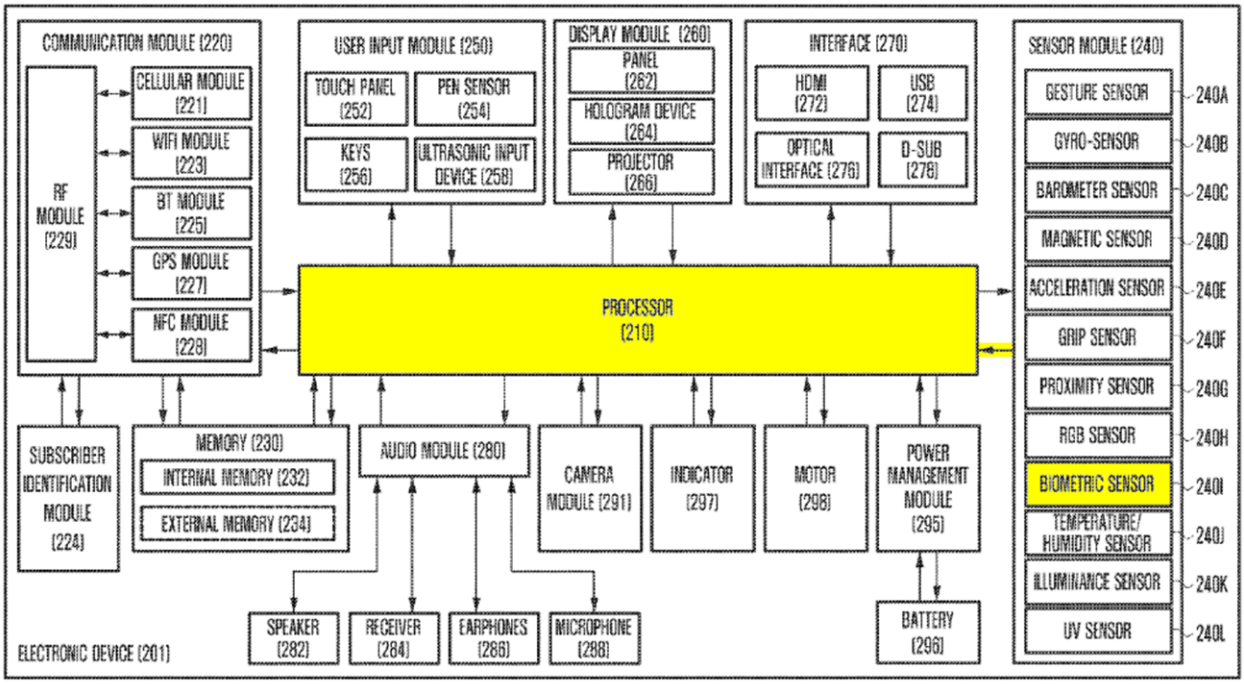
Jung in view of *Meyers* renders element [1.e] obvious.

Jung teaches that the biometric sensor is in communication with the processor. *See* element [1.c.ii].

Additionally, *Jung* discloses a "flexible printed circuit board 30" that includes "key bonding portion 38 … to which the oval home-key H is bonded" (Ex. 1005, [0098], Fig. 10; Ex. 1003, ¶¶279-281).

Figure 2 of *Jung*, below, also shows the processor in communication with the biometric sensor.

Ex. 1005, Fig. 2



A POSITA would have understood that substituting the button assembly of *Meyers* in place of *Jung's* home-key H for the reasons disclosed above with respect to motivation to combine would result in *Jung's* flexible conduit being electrically coupled to *Meyers'* biometric sensor, so it can communicate with *Jung's* processor (Ex. 1003, ¶¶282-283). A POSITA would have further understood that *Jung's* Figure 2 depicts this connection, such that the biometric sensor will transmit an output signal to the processor (Ex. 1003, ¶¶283-284).

vii. Claim 1: [1.f]

Jung in view of *Meyers* renders element [1.f] obvious. The annotated figure below discloses a portion of *Jung's* flexible conduit (teal) sandwiched between *Jung's* seal (green) and the sealing surface of *Meyers'* button assembly (blue) (Ex. 1003, ¶285).

Ex. 1005, Fig. 10; Ex. 1007, Fig. 1

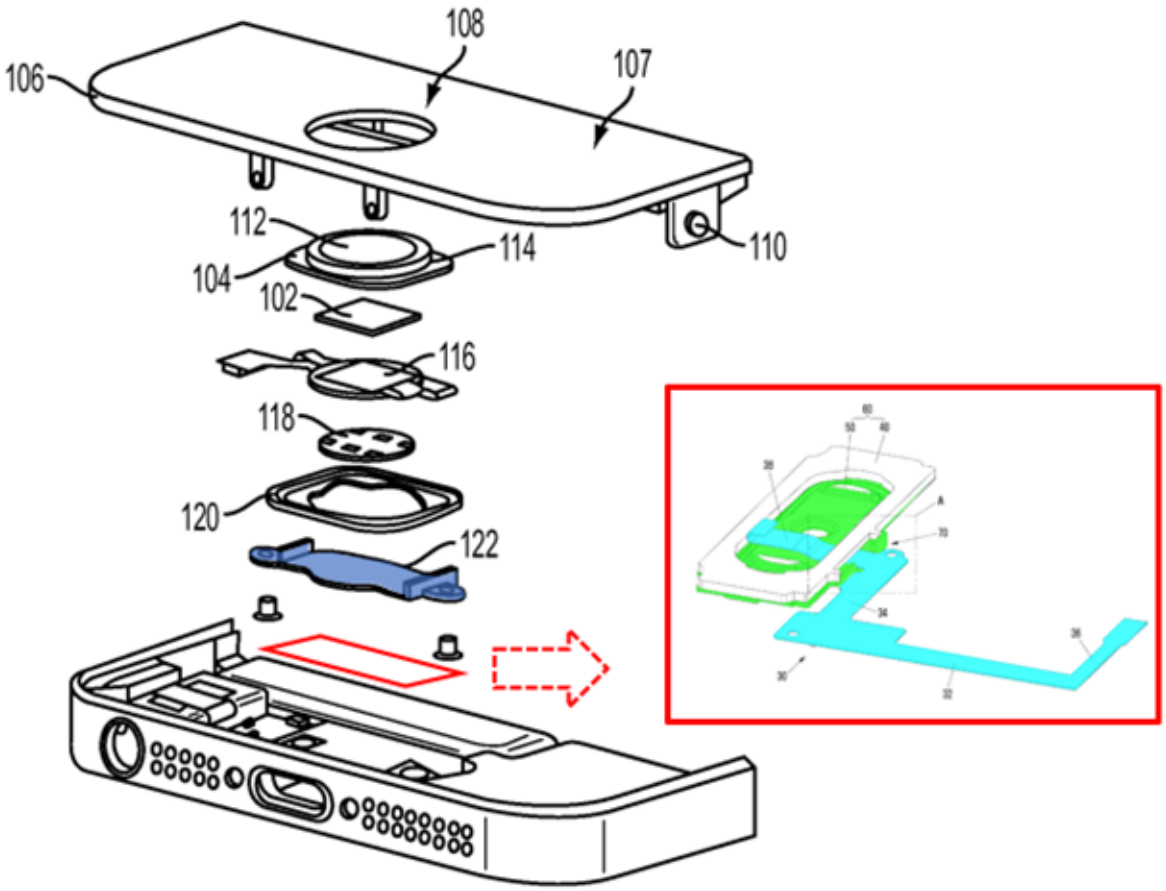


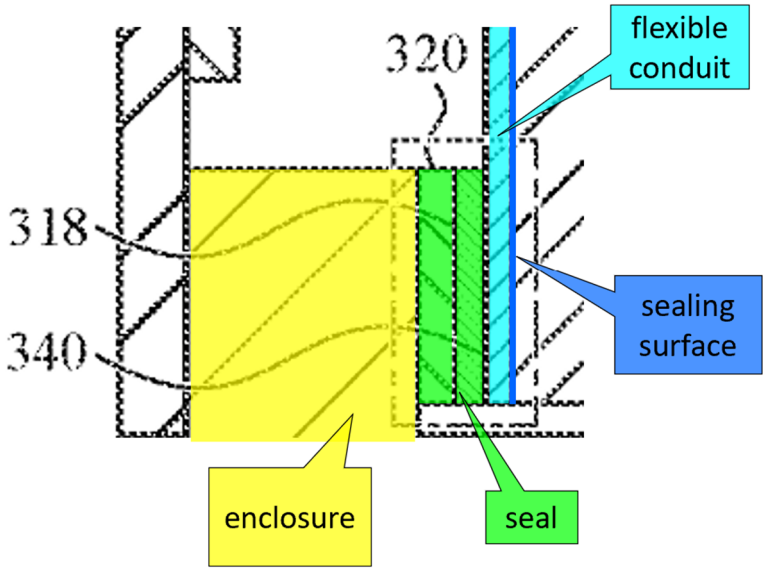
FIG. 1

Jung discloses the claimed "flexible conduit," "seal," and "enclosure" (elements [1.a], [1.d]-[1.e]). Furthermore, a POSITA would have understood that when the button assembly of *Meyers* is combined with the waterproof-key assembly of *Jung* (as depicted above), a portion of *Jung's* "flexible printed circuit board 30,"

(teal) is sandwiched between its seal (*i.e.*, "silicon rubber 50") (green) and *Meyers'* button support plate 122 (blue) (Ex. 1003, ¶286).

Indeed, *Jung* in view of *Meyers* discloses this limitation in the same way as the '619 Patent, which teaches "a gasket seal (such as face seal 318) may further be applied below the lower PSA portion, such that ***a sandwich ... is formed of PSA, flexible conduit 340, PSA, and then the gasket seal***" (Ex. 1001, 17:35-46; Ex. 1003, ¶287). "Sandwiching" is illustrated in at least the '619 Patent's Figure 3A (excerpted and annotated below). The '619 Patent discloses that "sandwiching" includes a "stack" of elements (Ex. 1001, 23:39-43; Ex. 1003, ¶287).

Ex. 1001, Fig. 3A (excerpted and annotated)



Likewise *Jung* in view of *Meyers* discloses a "stack" of elements including "a portion of the flexible conduit," a "seal," and a "sealing surface" of the button assembly, (Ex. 1003, ¶288).

Furthermore, a POSITA would have known a common way to electrically connect a fingerprint sensor to a processor was with a flexible PCB (Ex. 1003, ¶289), and button assemblies would be sealed to prevent ingress of potentially damaging substances (Ex. 1003, ¶289). From this, a POSITA would have been motivated to provide the seal by sandwiching existing, known components, such as a sealing surface of the button assembly and flexible conduit. Using these existing, known components would have saved costs and promoted an efficient use of limited space within the mobile device (Ex. 1003, ¶¶289-290; *see also* Ex. 1015, 12:12-19; Ex. 1011, [0055]; Ex. 1008, 6:67-7:2).

3. Claim 3

i. Claim 3: [3.pre]

Jung in view of *Meyers* renders element [3.pre] obvious. *See* claim 1.

ii. Claim 3: [3.a]

Jung in view of *Meyers* renders element [3.a] obvious.

The '619 Patent explains the claimed seal may be "a composite of more than one material … that may form a water-tight seal" (Ex. 1001, 11:32-41; Ex. 1003, ¶¶293-295).

Jung teaches "a seal positioned between a sealing surface of the button assembly and the enclosure." *See* element [1.d].

Meyers, likewise, teaches the use of both gaskets and adhesives to "provide an environmental seal" and "prevent dirt, sweat, water and the like from entering the interior of the electronic device" (Ex. 1007, ¶[0113], ¶[0130]; Ex. 1003, ¶296).

A POSITA would have understood to use the gasket and adhesives disclosed by *Meyers* to better insulting *Jung's* key-waterproof structure, because button assemblies and fingerprint sensors in mobile electronic devices would be sealed to prevent ingress of potentially damaging substances (Ex. 1003, ¶¶297-299).

A POSITA would also have known common sealing techniques included using a rubber gasket and/or a PSA layer. For example, common sealing techniques included tape, adhesive (including two-sided pressure sensitive adhesive film), waterproof dispensing, silicon, waterproof rubber, and urethane, as well as gaskets generally (Ex. 1003, ¶300). Using these existing, known components would have saved costs and promoted an efficient use of limited space within the mobile device. Consequently, this limitation would have been obvious and well within the skill of a POSITA (Ex. 1003, ¶301).

iii. Claim 3: [3.b]

Jung in view of *Meyers* renders element [3.b] obvious (Ex. 1003, ¶¶302-305). *See* element [1.f], [3.a].

4. Claim 4

Jung in view of *Meyers* renders claim 4 obvious. *See* claim 1.

With respect to the seal, *Jung* teaches "a process of forming the silicon-not-attached portion for assembling the flexible printed circuit board in the insert-injected product after the circuit board bracket and the silicon rubber are sealed through the insert injection" (Ex. 1005, [0122]; Ex. 1003, ¶¶306-308).

A POSITA would have known overmolding refers to a technique in which a material (such as an epoxy resin) is injected, poured or otherwise loaded into a space to surround another component, then cured to form a hard casing or overmold around the component (Ex. 1003, ¶¶309-310). Furthermore, a POSITA would also have known that components can be sealed by an overmolding process so they are liquid-tight (Ex. 1003, ¶¶309-310). Similarly, a POSITA would have understood there were other, mechanical methods of fastening a control feature into the housing, but that overmolding, unlike mechanical fasteners such as screws, bolts, snap fit components, etc., provides for a liquid-tight seal (Ex. 1003, ¶¶309-310).

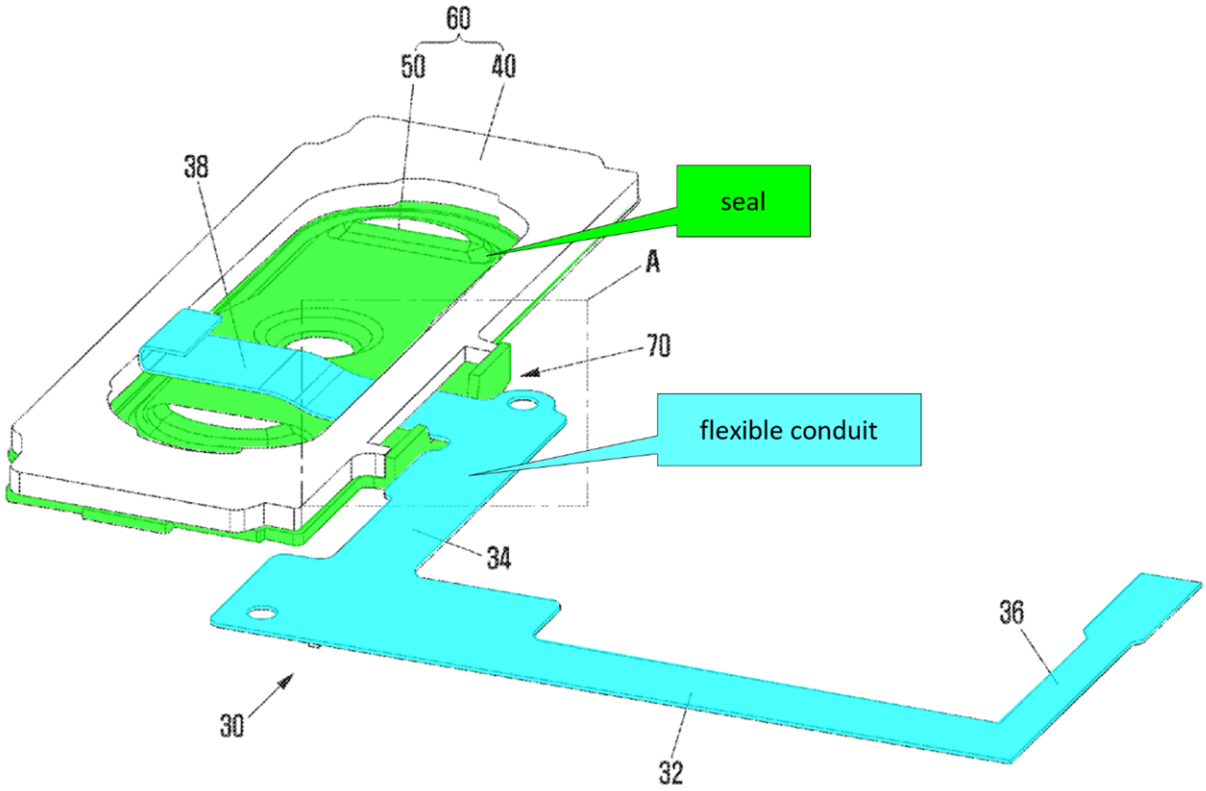
In light of this knowledge, a POSITA would have understood the seal of *Jung*, which is disclosed as being injected, would be overmolded around the portion of the flexible conduit to enhance the quality of the seal (Ex. 1003, ¶¶311-312).

5. Claim 5

Jung in view of *Meyers* renders claim 5 obvious (Ex. 1003, ¶313). *See* claim 1.

As pictured below, the *Jung's* flexible conduit (teal) passes through an aperture 70 in its seal (green) (Ex. 1003, ¶314).

Ex. 1005, Fig. 10



Jung discloses this configuration, stating "[i]n the key-waterproof structure, according to various embodiments of the present disclosure, the flexible printed circuit board 30 is assembled ***through*** the silicon-not-attached portion 70 of the insert-injected product 60" (Ex. 1005, [0111]; Ex. 1003, ¶¶315-316).

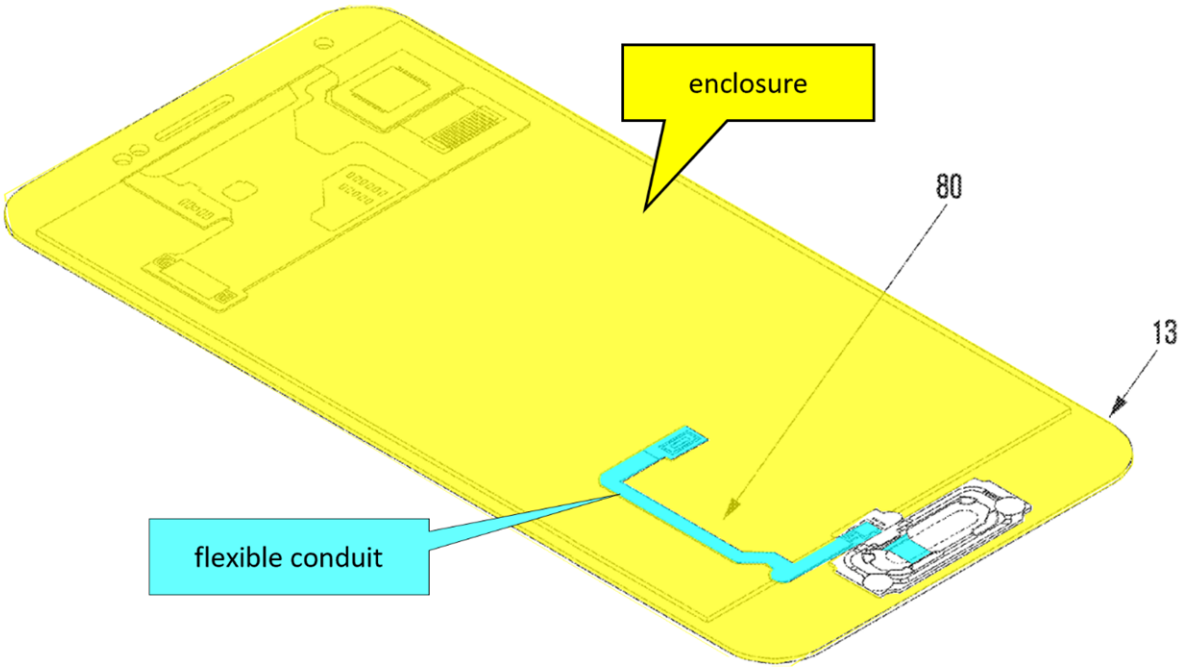
6. Claim 6

Jung in view of *Meyers* renders claim 6 (Ex. 1003, ¶317). *See* claim 1.

Jung discloses "an enclosure having an enclosed volume and an opening formed in a sidewall." *See* element [1.a]. Likewise, *Jung* discloses "a flexible conduit coupled to the biometric sensor and configured to transmit the output signal to the processor." *See* element [1.e]. As explained therein, the processor of *Jung* is shown to be in communication with the biometric sensor.

Jung's flexible PCB 30 provides for communication between the processor and the biometric sensor, passing from the biometric sensor (in the opening of the enclosure) to the processor (in the enclosed volume) (Ex. 1003, ¶318).

Ex. 1005, Fig. 12



As depicted in Figure 12, the flexible conduit (teal) extends through a passageway from the opening (uncolored) in the outer wall (yellow) of the enclosure into the enclosed volume of the device (Ex. 1003, ¶¶319-320).

7. Claim 7

i. Claim 7: [7.pre]

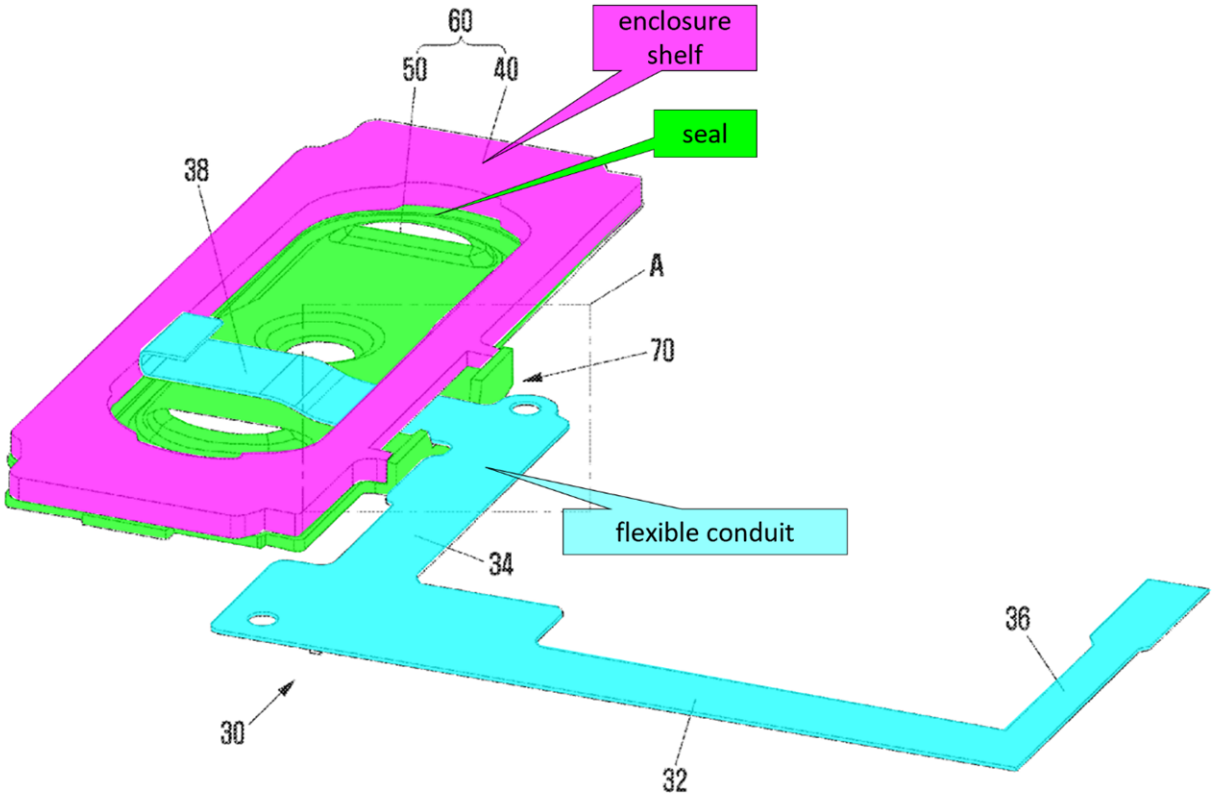
Jung in view of *Meyers* renders element [7.pre] obvious. *See* claim 6.

ii. Claim 7: [7.a]

Jung in view of *Meyers* renders element [7.a] obvious (Ex. 1003, ¶¶323-324).

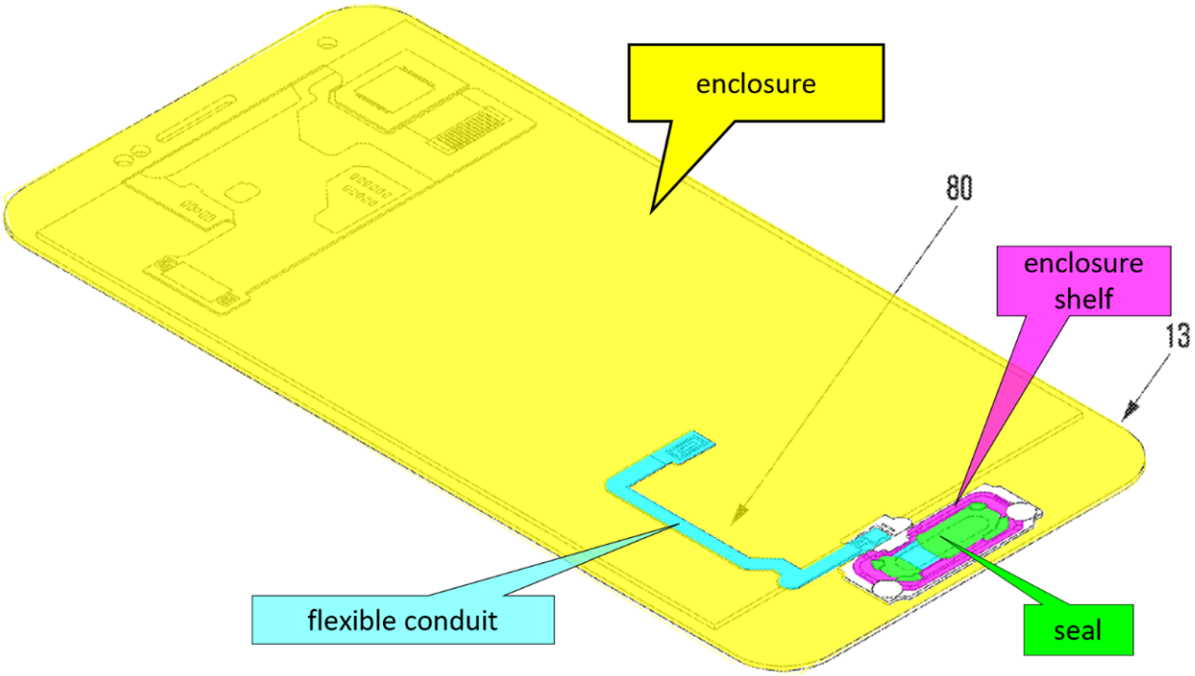
Jung's Figure 10, below, depicts bracket 40 (the "enclosure shelf") (pink) and silicon rubber 50 (the "seal") (green).

Ex. 1005, Fig. 10



Bracket 40 is located at the bottom of the opening in the enclosure in Figure 12, below. The '619 Patent likewise discloses "enclosure shelf 223 [is] formed at a lower or distal portion of the opening" (Ex. 1001, 12:40-47; Ex. 1003, ¶325).

Ex. 1005, Fig. 12



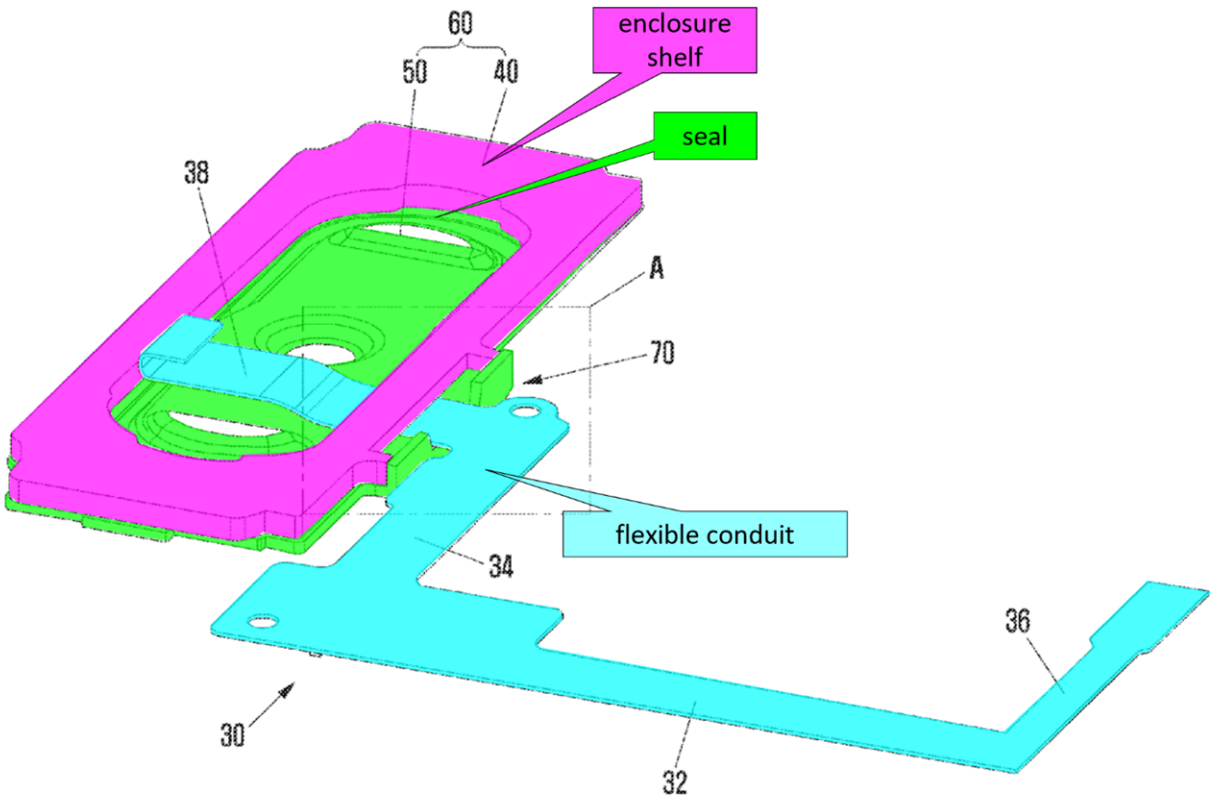
A POSITA would have understood that annotated Figure 10 of *Jung*, above, discloses an "enclosure shelf" in the same way as the '619 Patent (Ex. 1003, ¶¶326-327).

iii. Claim 7: [7.b]

Jung in view of *Meyers* renders element [7.b] obvious (Ex. 1003, ¶328).

Jung discloses a passage extending from the opening to the enclosed volume, wherein the flexible conduit passes through the passage. *See* claim 6. *Jung's* Figure 10 depicts this passage is formed in the enclosure shelf (Ex. 1003, ¶329).

Ex. 1005, Fig. 10



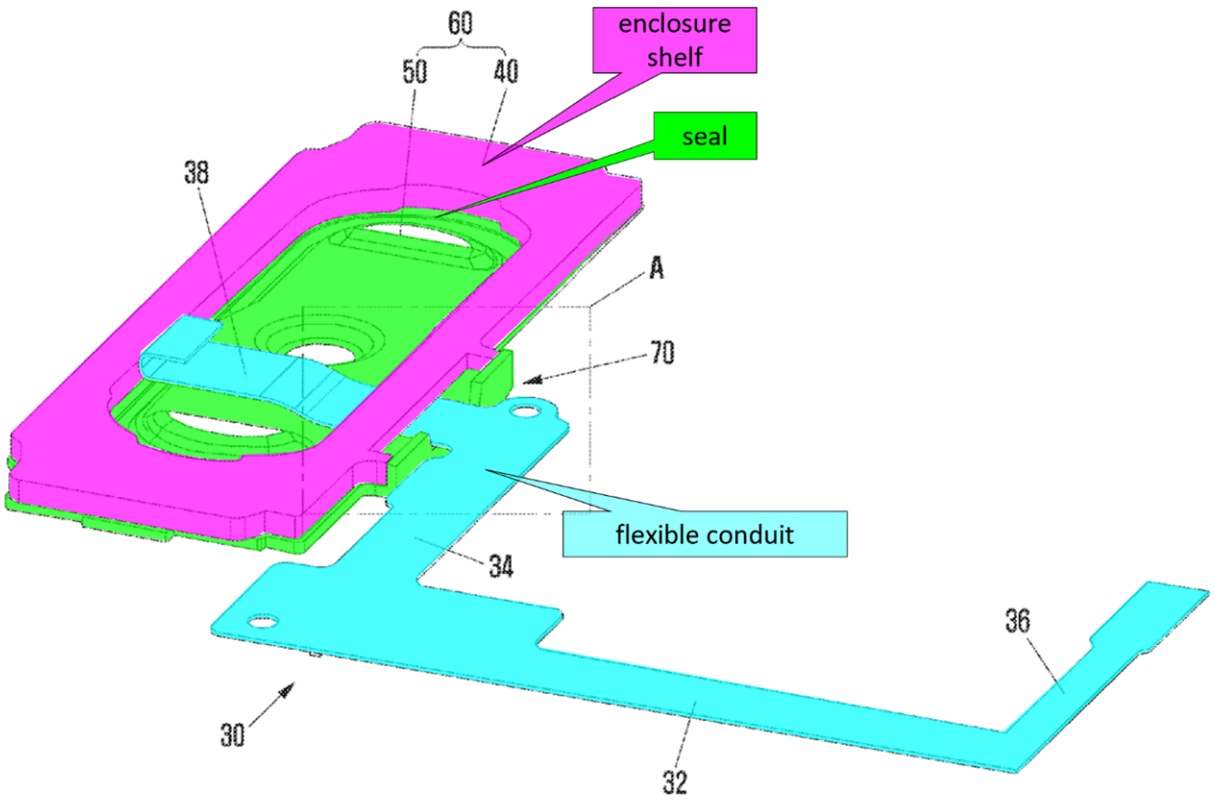
The enclosure shelf depicted by bracket 40 (pink) contains a large, roughly-oval shaped opening (*i.e.*, the passage). Flexible conduit (teal) extends from above the passage (segment 38, left) to below the passage (segment 34, right) (Ex. 1005, Fig. 10; Ex. 1003, ¶¶330-331).

iv. Claim 7: [7.c]

Jung in view of *Meyers* renders element [7.c] obvious (Ex. 1003, ¶¶332-334).

Jung's seal (green), is depicted in annotated Figure 10. It encircles the periphery of the opening in the enclosure shelf (pink) which defines the passage.

Ex. 1005, Fig. 10



8. Claim 8

Jung in view of *Meyers* renders claim 8 obvious (Ex. 1003, ¶¶335-336). *See* claim 6.

The ’619 Patent describes the relationship between the flexible conduit and the passage, stating that in Fig. 2A (depicted below) “both the seal 262 and ***a portion of the flexible conduit 240 encircle or surround the passage 227***” (Ex. 1001, 9:26-44; Ex. 1003, ¶337).

Ex. 1001, Fig. 2A

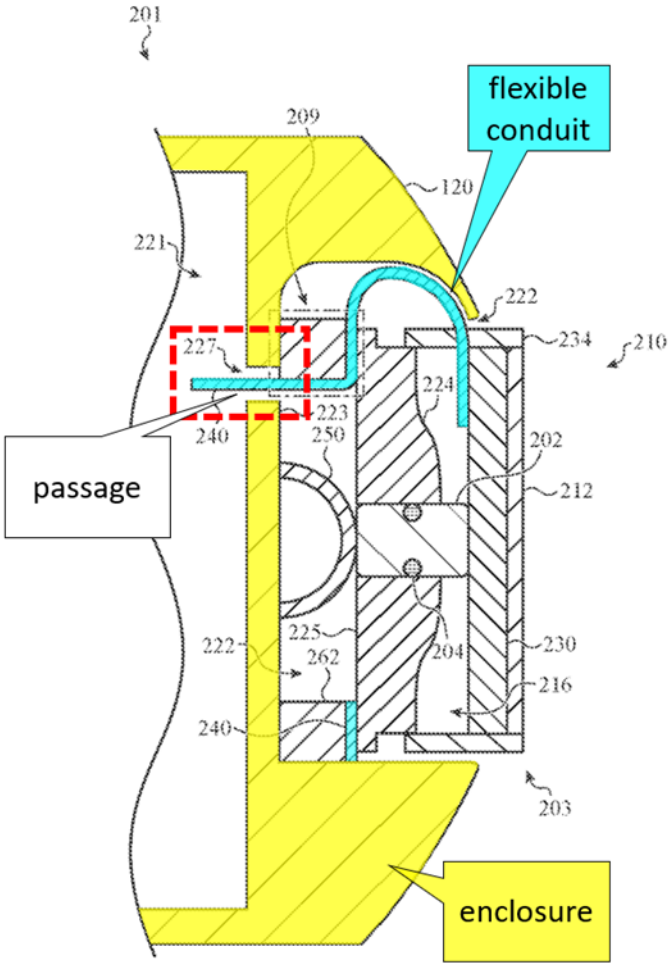


FIG. 2A

Given this, a POSITA would have understood the flexible conduit of *Jung* encircles the passage in the same way as the '619 Patent (Ex. 1003, ¶338; claim 6). A POSITA would have understood there is no reason to make the passage larger than the conduit itself, to prevent contaminants from entering the enclosed volume, and avoid weaking the structure of the enclosure (Ex. 1003, ¶339). Thus, a POSITA

would be motivated to create a passage so the flexible conduit can be said to encircle surround the passage (*i.e.*, encompass it on all sides) (Ex. 1003, ¶¶339-340).

9. Claim 9

Jung in view of *Meyers* renders claim 9 obvious (Ex. 1003, ¶¶341-342). *See* claims 1, [1.c], [1.c.ii]. *Jung* teaches sensor module 240 may include a fingerprint sensor (Ex. 1005, [0060]), which a POSITA would understand creates a fingerprint as an output signal (Ex. 1003, ¶¶343-345).

10. Claim 10

Jung in view of *Meyers* renders claim 10 obvious (Ex. 1003, ¶¶346-347). *See* claim 1.

Meyers' fingerprint sensor includes "one or more capacitive plates arranged in a two dimensional (2D) array" which create "fingerprint image information in response to the ridges and valleys of the user's finger" (Ex. 1007, ¶[0048]; Ex. 1003, ¶348). Moreover, a POSITA would have understood that capacitive fingerprint sensors were configured to detect the ridges and grooves of a user's finger (element [1.c.ii]; Ex. 1003, ¶¶348-349).

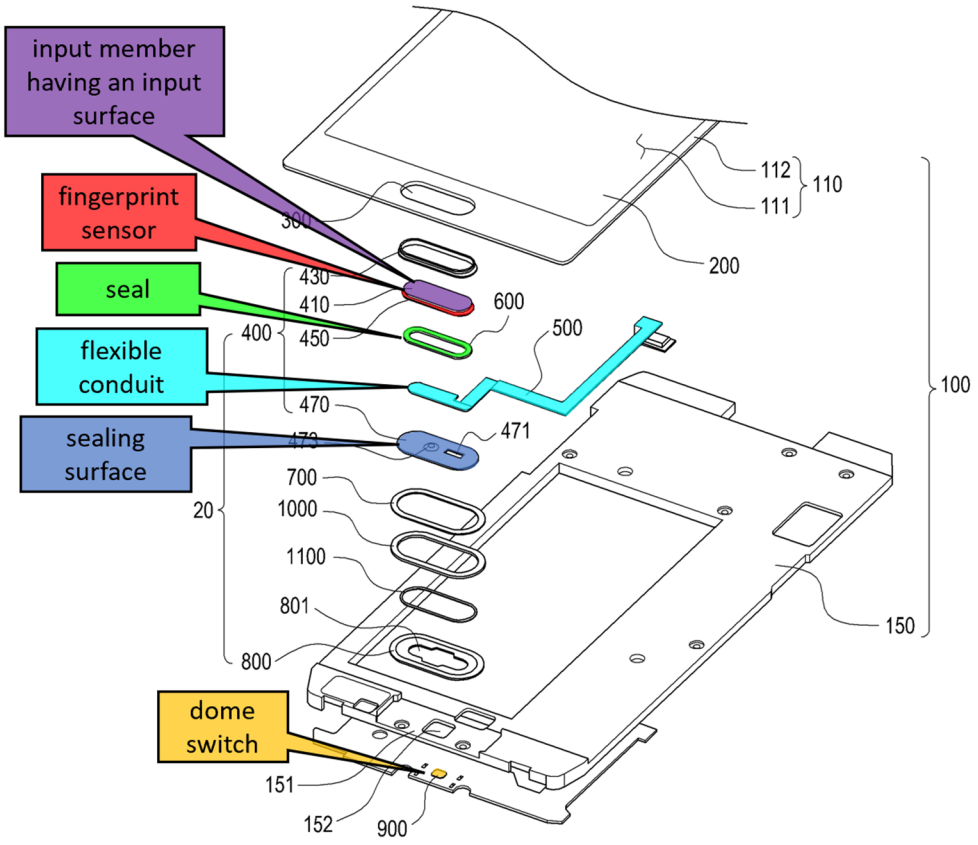
D. Ground 4: Claims 1-2, 6, and 9 are Unpatentable Under 35 U.S.C. §§102 and/or 103 over *Chang*

Chang discloses and/or renders obvious claims 1-2, 6, and 9 of the '619 Patent.

1. Overview of Ground 4 (Chang)

Chang discloses "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" (Ex. 1015, 1:54-57). *Chang's* "key module may include: a fingerprint recognizing member" (Ex. 1015, 2:25-39). Annotated Figure 3, below, shows the relationship between key module 20 (and sub-components thereof), and dome switch 900 (Ex. 1015, Fig. 3; Ex. 1003, ¶¶92-97).

Ex. 1015, Fig. 3



2. Claim 1

i. Claim 1: [1.pre]

Chang discloses element [1.pre]. *Chang* discloses "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" (Ex. 1015, 1:54-57; Ex. 1003, ¶351).

Figure 1 illustrates an "electronic device" (Ex. 1015, 3:12-15, *see also* Figs. 1-3; Ex. 1003, ¶¶352-354).

Ex. 1015, Fig. 1

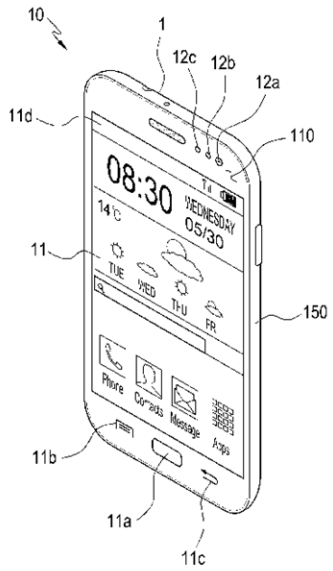
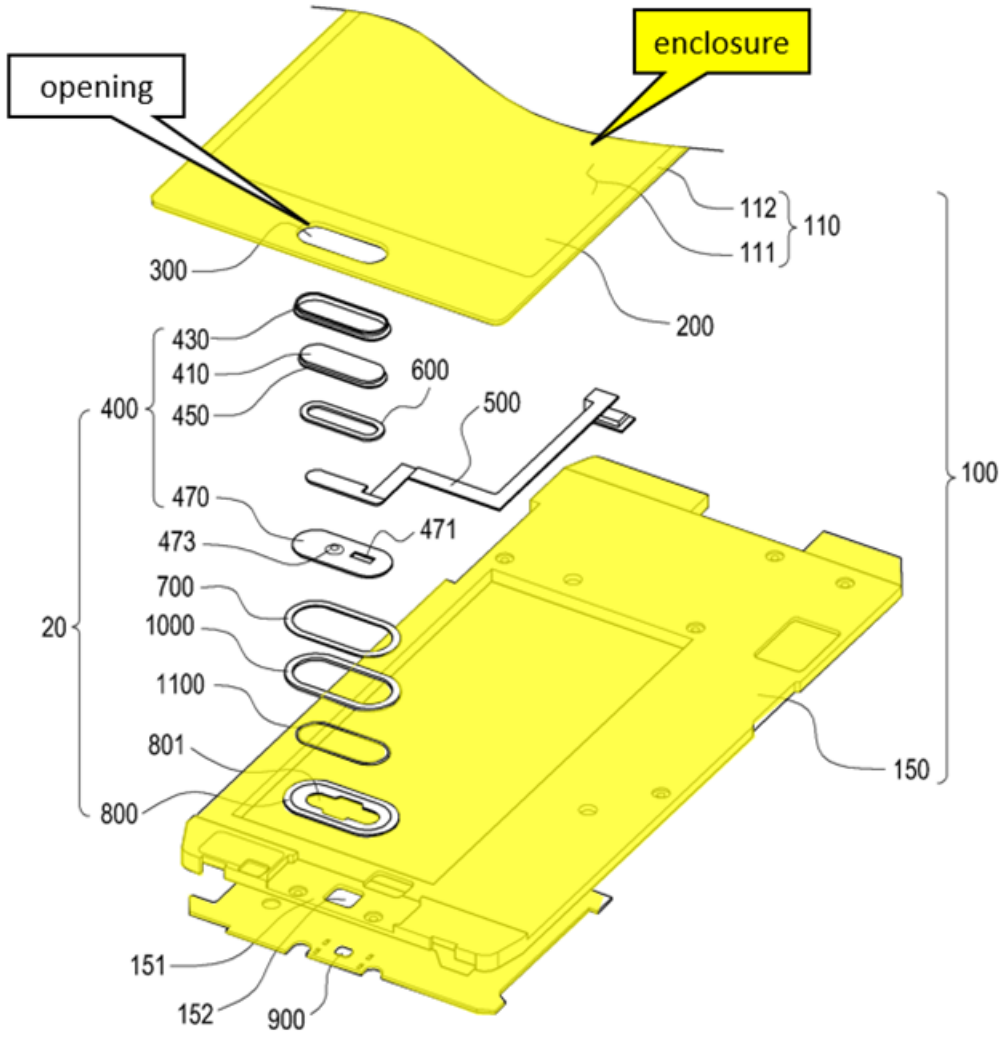


FIG.1

ii. Claim 1: [1.a]

Chang discloses element [1.a].

Ex. 1015, Fig. 3



First, *Chang* discloses "a housing 100, a display 200, a first opening 300, and a key module 20" located in first opening 300 (Ex. 1015, 7:35-40; Ex. 1003, ¶¶355-357).

Chang's housing 100 is an enclosure having an enclosed volume bounded by a "first plate 110," a "second plate 130," and "a side member 150" (Ex. 1015, 7:41-52). A POSITA would have understood that the "enclosure" would also include the

display of *Chang*, insofar as *Chang* teaches that "the display 200 may be disposed in the space formed between the first plate 110 and the second plate 130 and may be configured to include a screen region exposed through the first region 111 of the first plate 110" (Ex. 1015, 8:10-16; Ex. 1003, ¶¶358-359).

Although the key module opening depicted above is on the front of the electronic device, *Chang* explicitly teaches that the depiction in Figure 3 is exemplary only, and that key module 20 "may be variously applied to various keys such as a side key" (Ex. 1015, 7:18-26; Ex. 1003, ¶¶360-361).

iii. Claim 1: [1.b]

Chang discloses element [1.b], as depicted in at least Figure 13.

Ex. 1015, Fig. 13

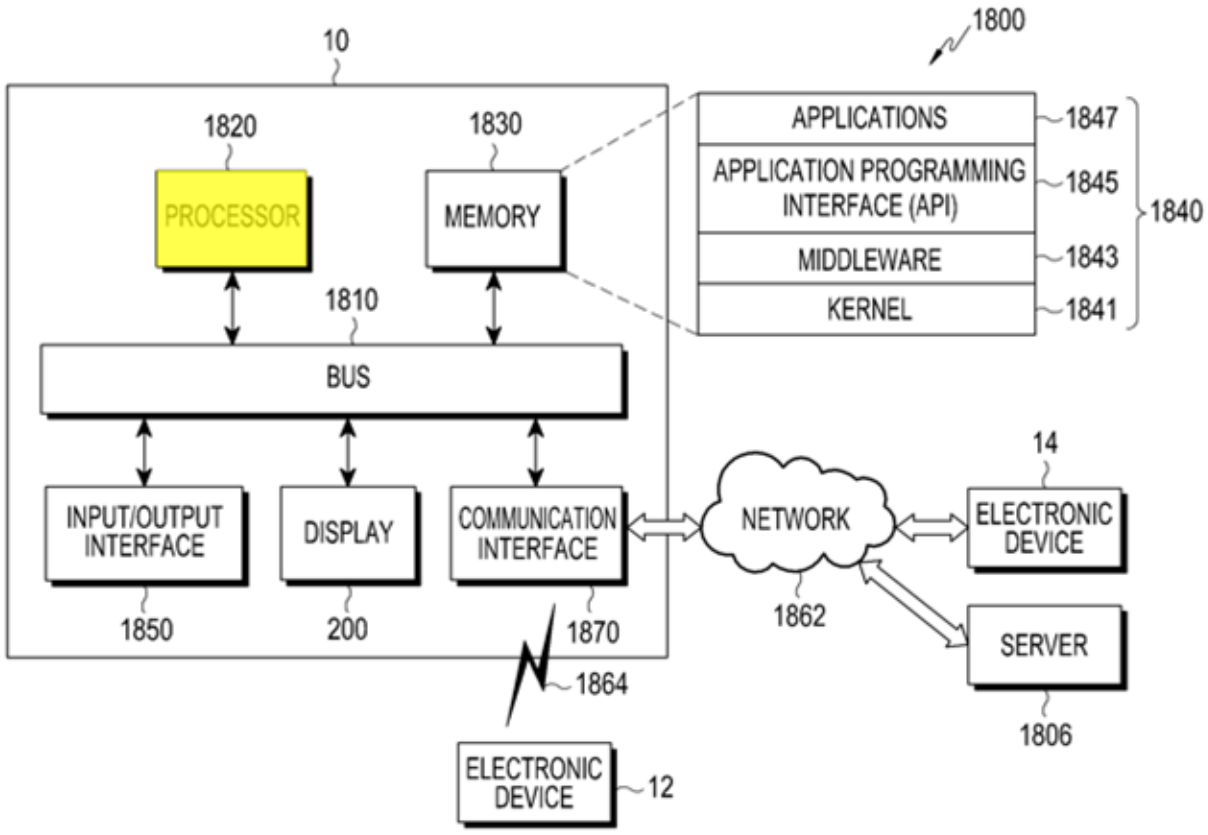


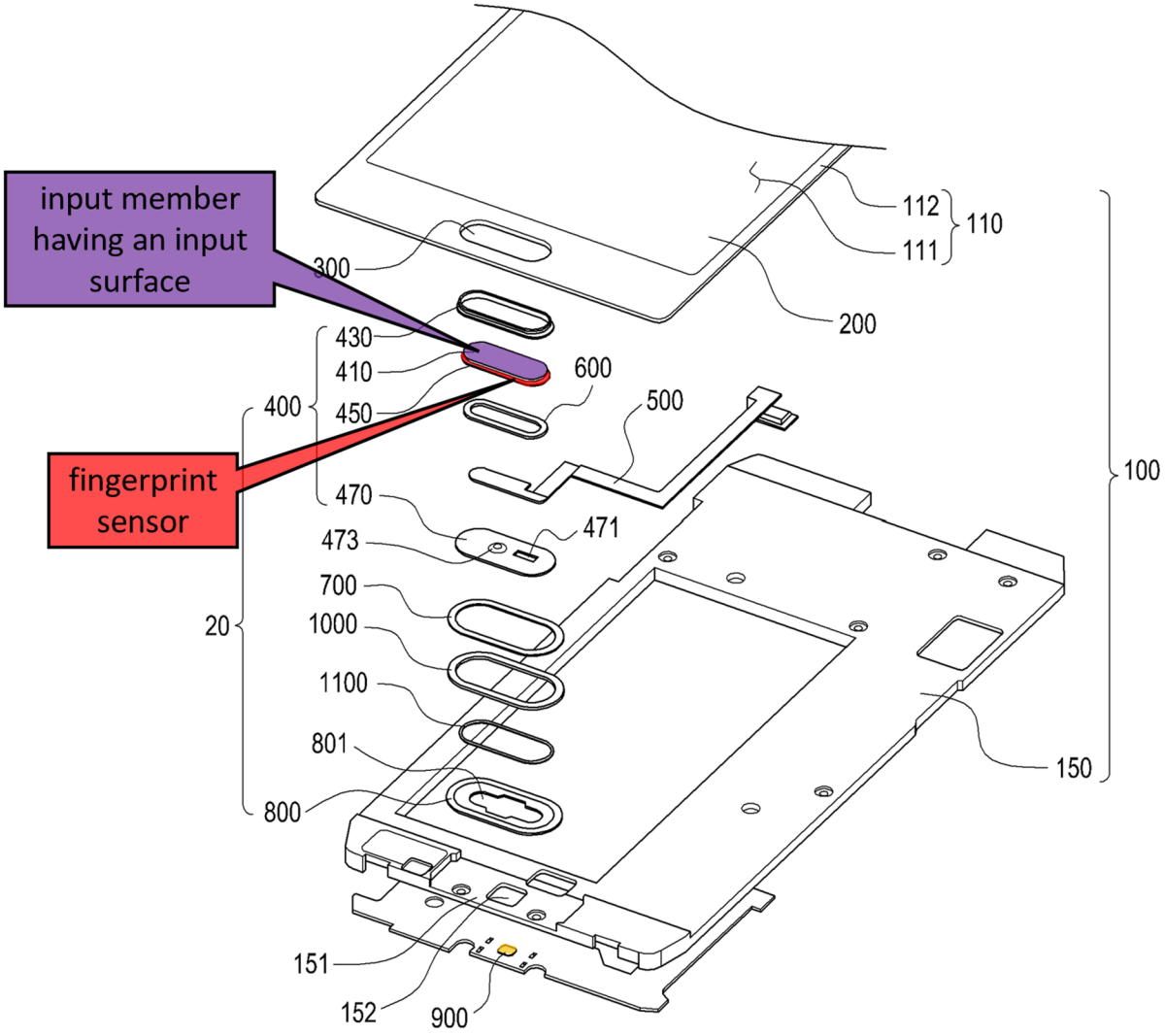
FIG.13

Chang teaches "electronic device 10 may include … a processor" (Ex. 1015, 18:64-19:7, 21:46-61, 22:59-23:16, Figs. 13-15), which is located in "a space" bounded by side member 150, first plate 110, and second plate 130 (Ex. 1015, 7:62-8:9; Ex. 1003, ¶¶362-364).

iv. Claim 1: [1.c]

Chang discloses element [1.c], as depicted in at least Figure 3 (Ex. 1003, ¶¶365-366).

Ex. 1015, Fig. 3



Claim element [1.c] includes two sub-elements:

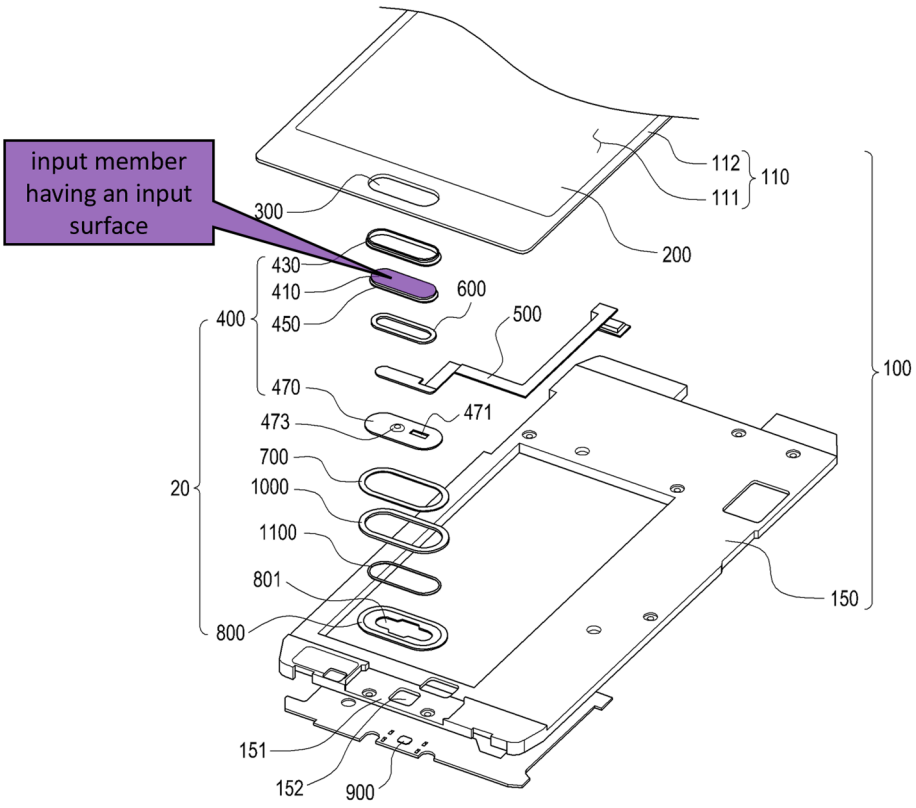
(a) Claim 1: [1.c.i]

Chang discloses element [1.c.i].

Chang teaches the button assembly (*i.e.*, the "key module 20") "may include a button structure 400 that is partially exposed to the first opening 300" (Ex. 1015,

8:31-74, 9:59-67; Ex. 1003, ¶¶367-368), and an input member having an input surface (*i.e.*, cover layer 410) (purple).

Ex. 1015, Fig. 3

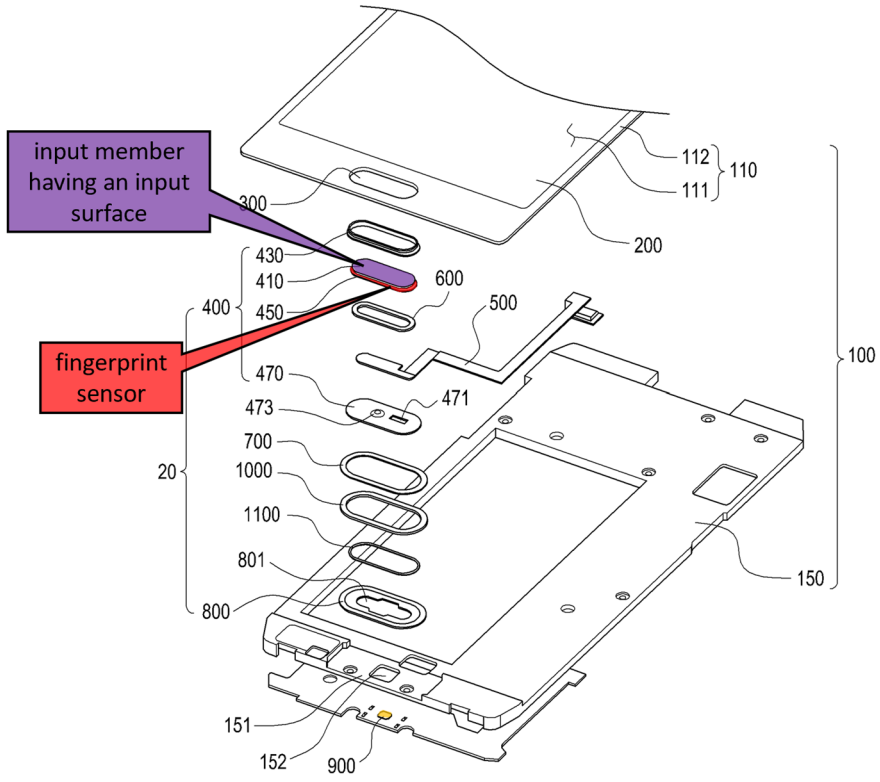


A POSITA would have understood cover layer 410 is responsible for user input, based on *Chang's* explanation that "[t]he cover layer 410 may be a portion that is exposed to the outside of the housing 100, and is to come in direct contact with the user's fingerprint" (Ex. 1015, 10:22-31; Ex. 1003, ¶¶369-371).

(b) Claim 1: [1.c.ii]

Chang discloses claim element [1.c.ii] (Ex. 1003, ¶372). *Chang* discloses a "button structure 400" with an input member (purple) located above the fingerprint sensor (red). *See* element [1.c.i].

Ex. 1015, Fig. 3



First, *Chang* teaches the disclosed button assembly "may include a fingerprint recognizing member 450" (*i.e.*, "biometric sensor") used "to recognize a fingerprint" (*i.e.*, "biometric characteristic") (Ex. 1015, 1:58-2:24, 9:59-63; Ex. 1003, ¶373).

Chang further discloses the fingerprint recognizing member is configured to produce an output signal, stating it "may transfer a signal … from the fingerprint recognizing member 450, to the inside of the electronic device 10" (Ex. 1015, 13:1-

10; Ex. 1003, ¶373). A POSITA would have understood the "signal" is an electrical representation of a fingerprint. *Chang* also discloses operation of the fingerprint recognizing member "may be performed merely by a touch" (Ex. 1015, 11:43-59; Ex. 1003, ¶373).

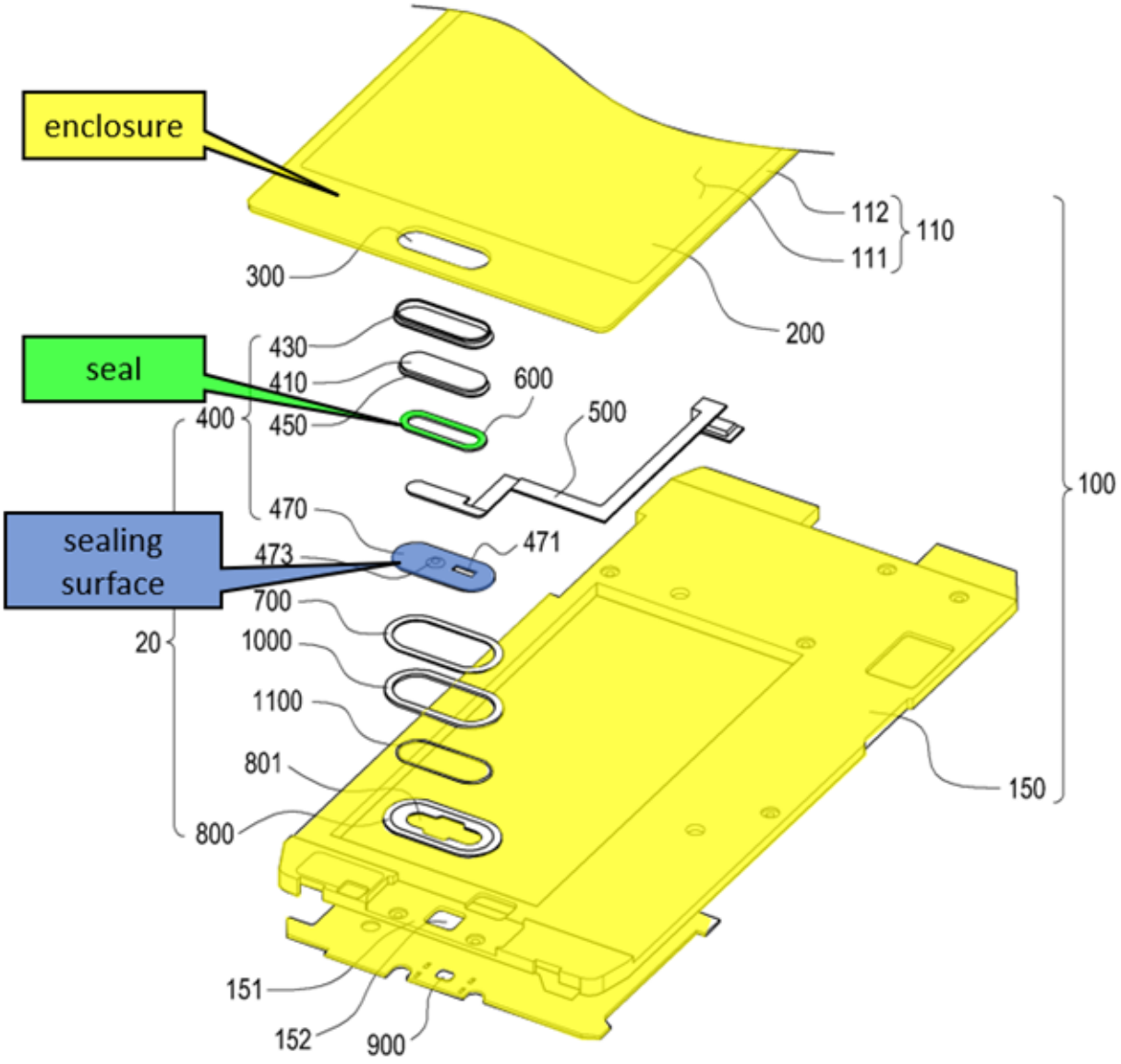
Chang discloses a "biometric sensor" the same way as the '619 Patent, which discloses that the "biometric sensor" includes a "fingerprint" sensor, and "[f]ingerprints and DNA are example biometric characteristics" (Ex. 1001, 4:51-5:14; Ex. 1003, ¶374).

Second, a POSITA would have understood that because the cover layer "may be formed above the fingerprint recognizing member 450," the fingerprint recognizing member is "positioned below" the input member. (Ex. 1015, 10:22-31; Ex. 1003, ¶¶375-376).

v. Claim 1: [1.d]

Chang discloses element [1.d], as depicted in at least Figure 3:

Ex. 1015, Fig. 3



First, *Chang* discloses "key module 20 may include … sealing members 600, 700, and 1100" (Ex. 1015, 7:35-40), which are "provided for the waterproof function of the key module" (Ex. 1015, 8:31-41; *see also* Ex. 1015, 12:9-23, 14:16-19; Ex. 1003, ¶¶377-378). A POSITA would have understood sealing member 600 is the claimed "seal" (Ex. 1003, ¶378).

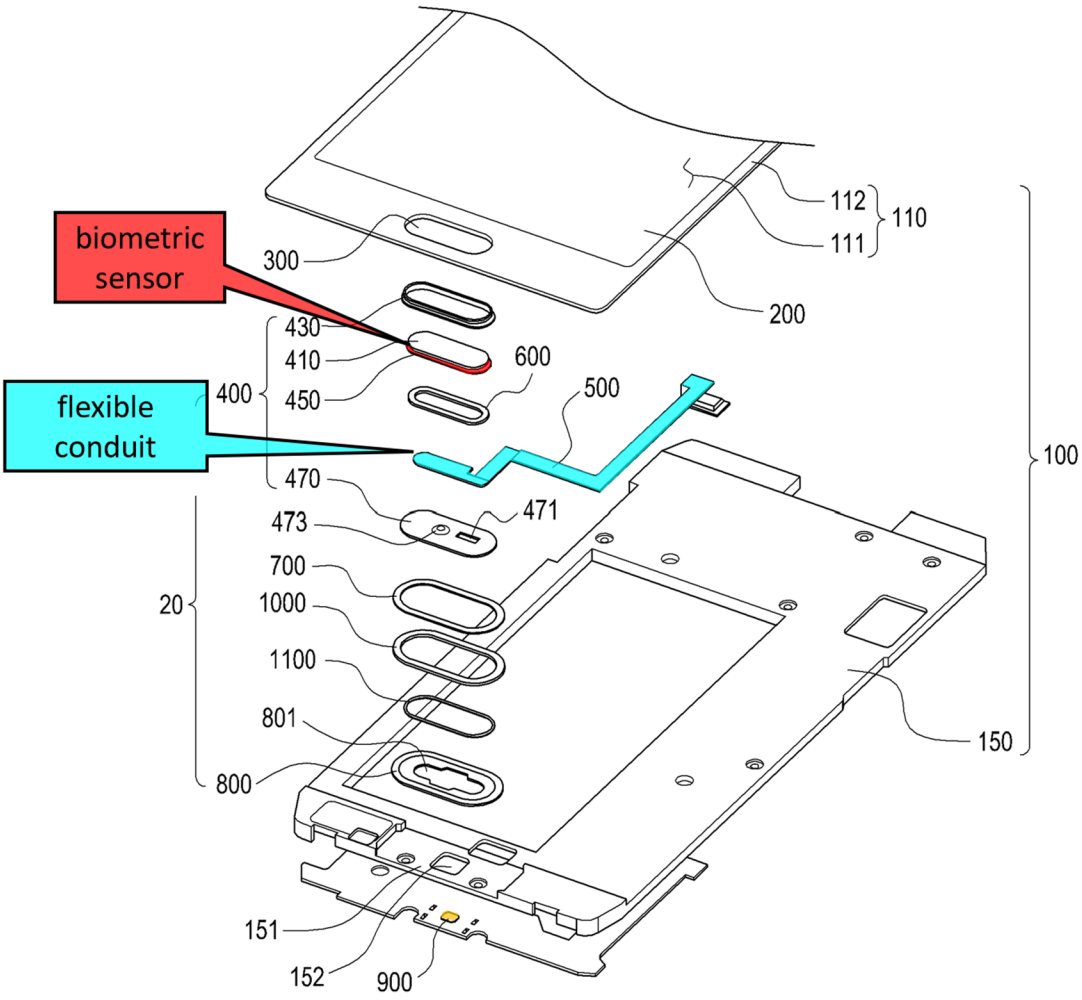
Second, *Chang* discloses button structure 400 includes "lower plate 470" which is the claimed "sealing surface" (Ex. 1015, 9:64-67; Ex. 1003, ¶379). A POSITA would have understood that "lower plate 470" constitutes a sealing surface of the button assembly, because *Chang* teaches the seal "may be interposed between the lower plate 470 and the fingerprint recognizing member 450 in order to block external foreign matter" (Ex. 1015, 12:9-19; Ex. 1003, ¶379).

Finally, the seal (green) is positioned between a sealing surface of the button assembly (blue) and the enclosure (yellow) (Ex. 1015, Fig. 3; Ex. 1003, ¶¶380-381).

vi. Claim 1: [1.e]

Chang discloses element [1.e] (*see* Ex. 1015, Fig. 3).

Ex. 1015, Fig. 3



First, *Chang* discloses that flexible conductive member 500 (*i.e.*, a flexible conduit) is "connected with the fingerprint recognizing member 450" (Ex. 1015, 11:28-35; *see also* Ex. 1015, 11:22-42, 12:32-36, 12:62-67; Ex. 1003, ¶¶382-383).

Chang also teaches that the flexible conduit is configured to transmit the output signal (element [1.c.ii], above) to the processor, and "is electrically connectable to other electronic components" (Ex. 1015, 11:28-35). A POSITA would have understood "other electronic components" to include the processor (Ex.

1003, ¶384). Likewise, "the flexible conductive member … may transfer a signal … to the inside of the electronic device 10" (Ex. 1015, 13:1-10). Similarly, *Chang* teaches the disclosed electronic device "may further include a processor configured to control the sensor module" which includes the disclosed biometric sensor (Ex. 1015, 22:59-23:16; Ex. 1003, ¶385).

Figure 14, below, depicts the biometric sensor configured to communicate with the application processor.

Ex. 1015, Fig. 14

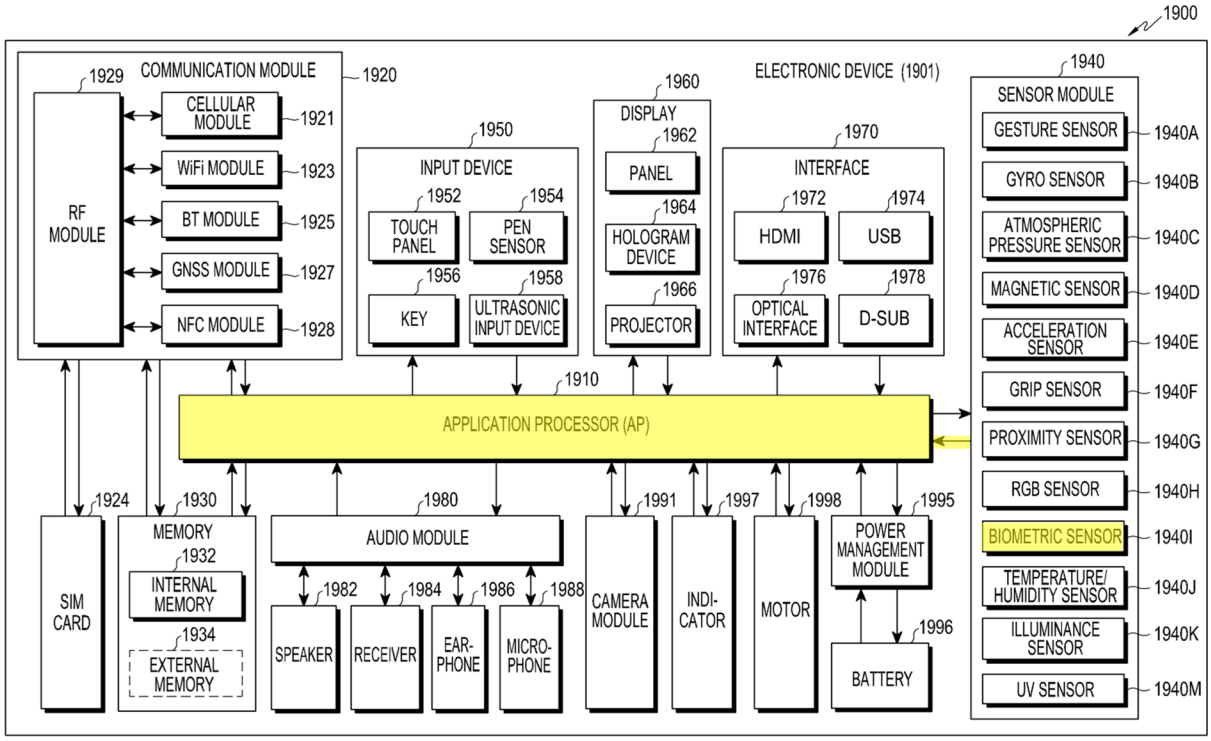


FIG.14

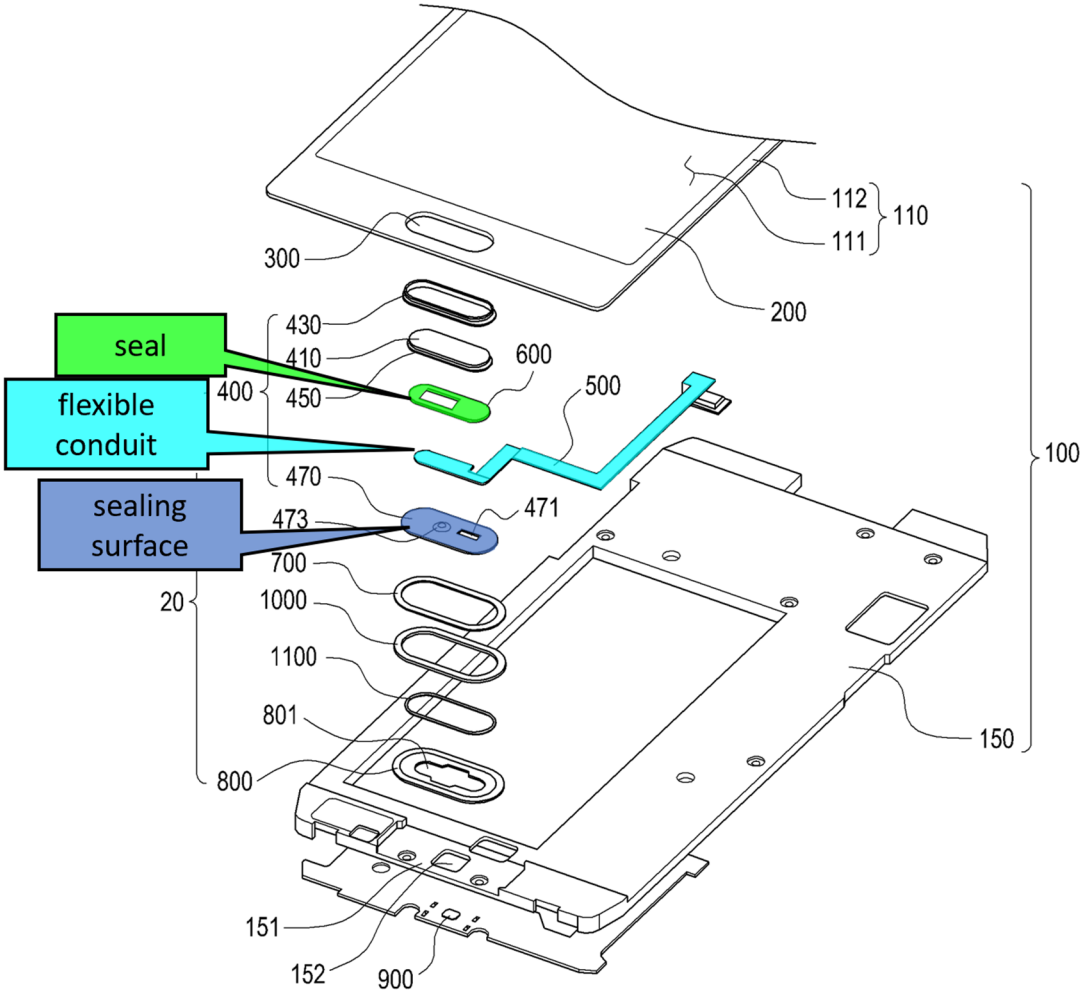
A POSITA would have understood that Figure 14 depicts an electrical connection, such that the biometric sensor 1940I will transmit an output signal to the

application processor 1910, and that this connection is enabled by flexible conductive member 500 (Ex. 1003, ¶¶386-388).

vii. Claim 1: [1.f]

Chang renders element [1.f] obvious (Ex. 1003, ¶389). A portion of the flexible conduit is sandwiched between the seal and the sealing surface, as depicted in Figure 3 (altered and annotated below).

Ex. 1015, Fig. 3 (altered and annotated)



Chang discloses the claimed "flexible conduit," "seal," and "sealing surface." *See* elements [1.a], [1.d]-[1.e]. Furthermore, Figure 3 shows a portion of the flexible conduit (*i.e.*, "flexible conductive member 500," teal) sandwiched between the seal (*i.e.*, "sealing member 600," green) and the sealing surface (*i.e.*, "lower plate 470," blue) (Ex. 1003, ¶390).

Chang describes sealing member 600 as "provid[ing] for the waterproof function of the key module" (Ex. 1015, 7:35-40, 8:31-41) and that it "may block moisture that flows in from the outside" (Ex. 1015, 14:16-19; Ex. 1003, ¶391).

Chang discloses 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)" (Ex. 1015, 12:12-19, 14:20-24, Fig. 3; Ex. 1003, ¶¶392-393). *Chang* also describes sealing member 600 as having two faces (Ex. 1015, Fig. 3), which are "respectively attached to the top face of the lower plate 470 and the bottom face of the fingerprint recognizing member 450 via taping" (Ex. 1015, 12:12-19; Ex. 1003, ¶394).

Moreover, *Chang's* fingerprint sensor includes a "circuit region 453," which "may be a printed circuit board (PCB), and may include a plurality of contact points formed on the lower portion thereof to be electrically contacted with another printed circuit board" such as the flexible PCB (Ex. 1015, 10:13-21, 12:44-49; Ex. 1003, ¶395).

A POSITA would have understood that sealing member 600 is (1) located between lower plate 470 and fingerprint recognizing member 450, (2) has at least two planar faces, wherein the first face is attached to lower plate 470 and the second face is attached to fingerprint recognizing member 450, and (3) contains an opening to allow fingerprint recognizing member 450 to be connected to flexible conductive member 500 (Ex. 1003, ¶396).

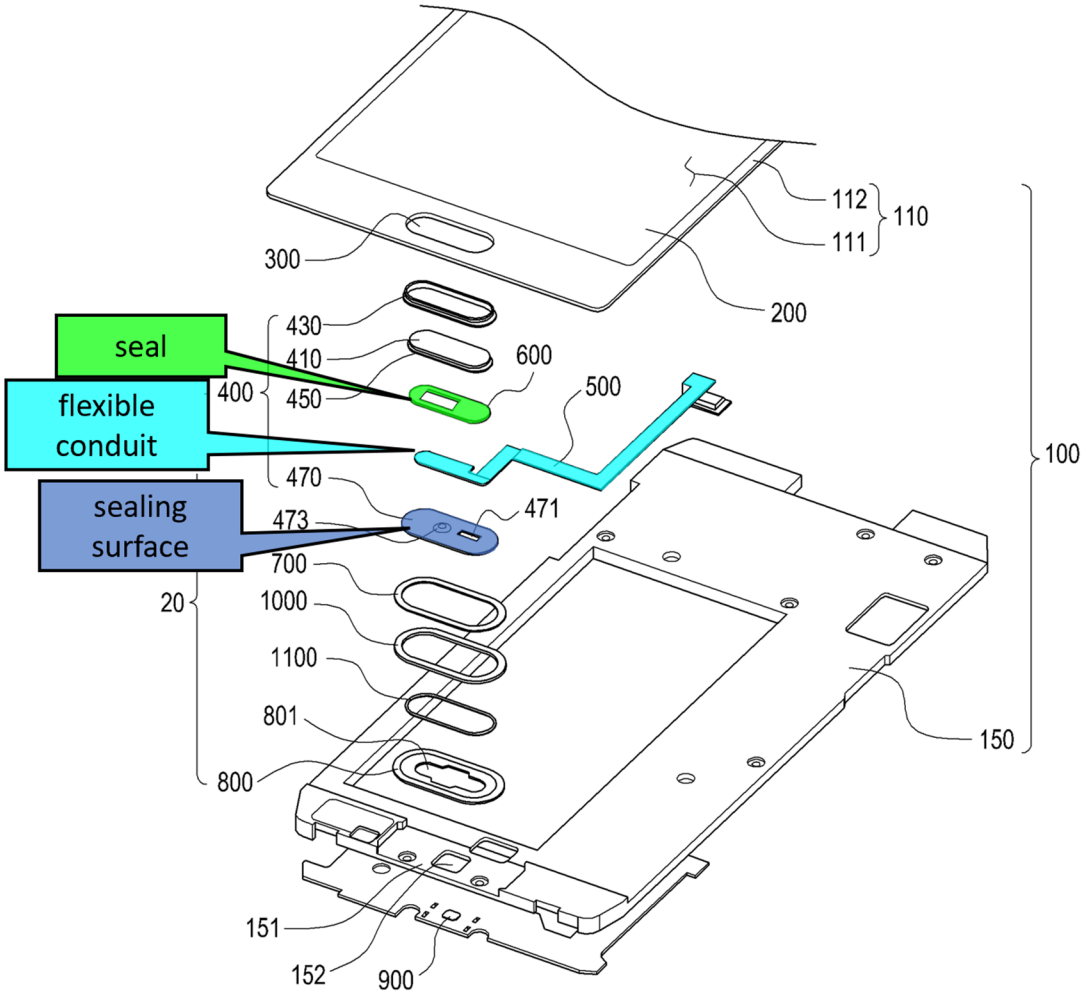
Chang teaches the sealing member 600 ***may*** be constructed in a ring shape (Figure 3) but explains that is an "[a]lternative" embodiment (Ex. 1015, 14:24-29). Given that, a POSITA would have understood that *Chang* ***also*** teaches a sealing member 600 that ***is not*** designed in an annular or ring shape (Ex. 1015, 14:24-29; Ex. 1003, ¶¶397-398).

Therefore, a POSITA would have understood that sealing member 600 would be constructed as depicted below, such that the planar faces are adjacent to both lower plate 470 and fingerprint recognizing member 450, and the opening is in the shape of the "contact points formed on the lower portion [of the fingerprint recognizing member 450] to be electrically contacted with another printed circuit board" such as flexible conductive member 500 (Ex. 1015, 10:13-21; Ex. 1003, ¶399).

For example, *Chang* teaches its button structure "may be variously modified and designed according to the structural shape or design of the electronic device 10

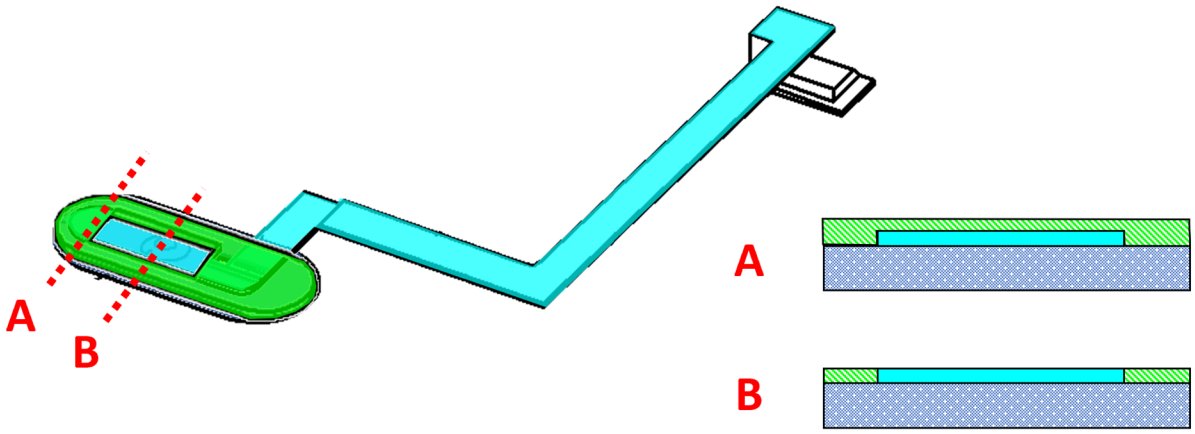
and the user's convenience" (Ex. 1015, 10:32-42; Ex. 1003, ¶400). In addressing the design characteristics which should be considered while adapting the depicted configuration, *Chang* teaches the disclosed design is "not limited to the ring shape, and may be subjected to a design change to various shapes as long as they may prevent respective components from being separated to the outside and safely fix the respective components" (Ex. 1015, 10:59-11:3; Ex. 1003, ¶400). Specifically, *Chang* teaches the "second opening 471 is provided in a rectangular shape having a size that allows the flexible conductive member 500 to pass therethrough, but may be implemented in various shapes such that ***various shapes of conductive members 500 may pass therethrough***" (Ex. 1015, 11:36-42; Ex. 1003, ¶400). The configuration depicted below would allow for the maximum sealing surface, while still providing an open in the size and shape of "circuit region 453" located on fingerprint recognizing member 450 (*see, e.g.,* Ex. 1015, Fig. 7A).

Ex. 1015, Fig. 3 (altered and annotated)



The seal (green), flexible conduit (teal), and sealing surface (blue) are depicted in a condensed configuration, below left. Section cuts along the red dashed lines "A" and "B" are depicted below right (Ex. 1003, ¶401).

Ex. 1015, Fig. 3 (altered and annotated)

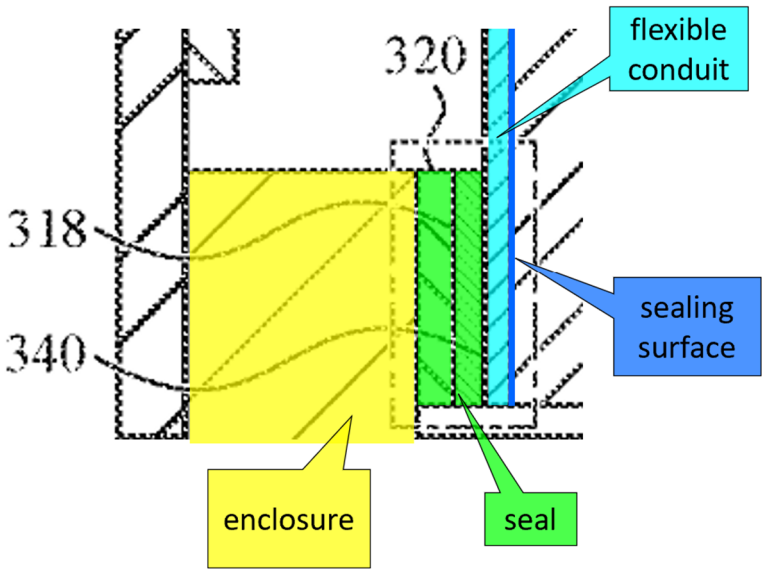


As shown in section cut A, at least a portion of the flexible conduit (teal) is sandwiched between the seal (green) and the sealing surface (blue). A POSITA would have understood this embodiment of *Chang*'s sealing member would have included additional "sealing" material and, therefore, further promoted *Chang's* stated goal of providing a "waterproof structure in order to prevent a fluid from infiltrating into the interior of the portable terminals" (Ex. 1015, 1:23-50, *see also* Ex. 1015, 2:53-67, 12:62-67; Ex. 1003, ¶402).

Indeed, *Chang* discloses this limitation the same way as the '619 Patent, which states "a gasket seal (such as face seal 318) may further be applied below the lower PSA portion, such that ***a sandwich ... is formed of PSA, flexible conduit 340, PSA, and then the gasket seal***" (Ex. 1001, 17:35-46; Ex. 1003, ¶403). "Sandwiching" is illustrated in the '619 Patent's Figure 3A (excerpted and annotated below). The '619

Patent also discloses that "sandwiching" includes a "stack" of elements (Ex. 1001, 23:39-43; Ex. 1003, ¶403).

Ex. 1001, Fig. 3A (excerpted and annotated)



Because *Chang* discloses a "stack" of elements including "a portion of the flexible conduit," a "seal," and a "sealing surface," *Chang* discloses element [1.f] the same way as the '619 Patent (Ex. 1003, ¶404).

To the extent a POSITA would not find element [1.f] explicitly disclosed by *Chang*, it is nevertheless rendered obvious. In summary, a POSITA would have understood 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 so as to ensure a sufficient seal is formed. 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 (Ex. 1003, ¶405). In order to meet the stated purpose of ensuring the electronic components are separated to the outside and safely affixed, a POSITA would have understood that the seal would need to be modified in accordance with the button assembly (Ex. 1003, ¶405). In making these modifications, a POSITA 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, ¶¶405-406).

3. Claim 2

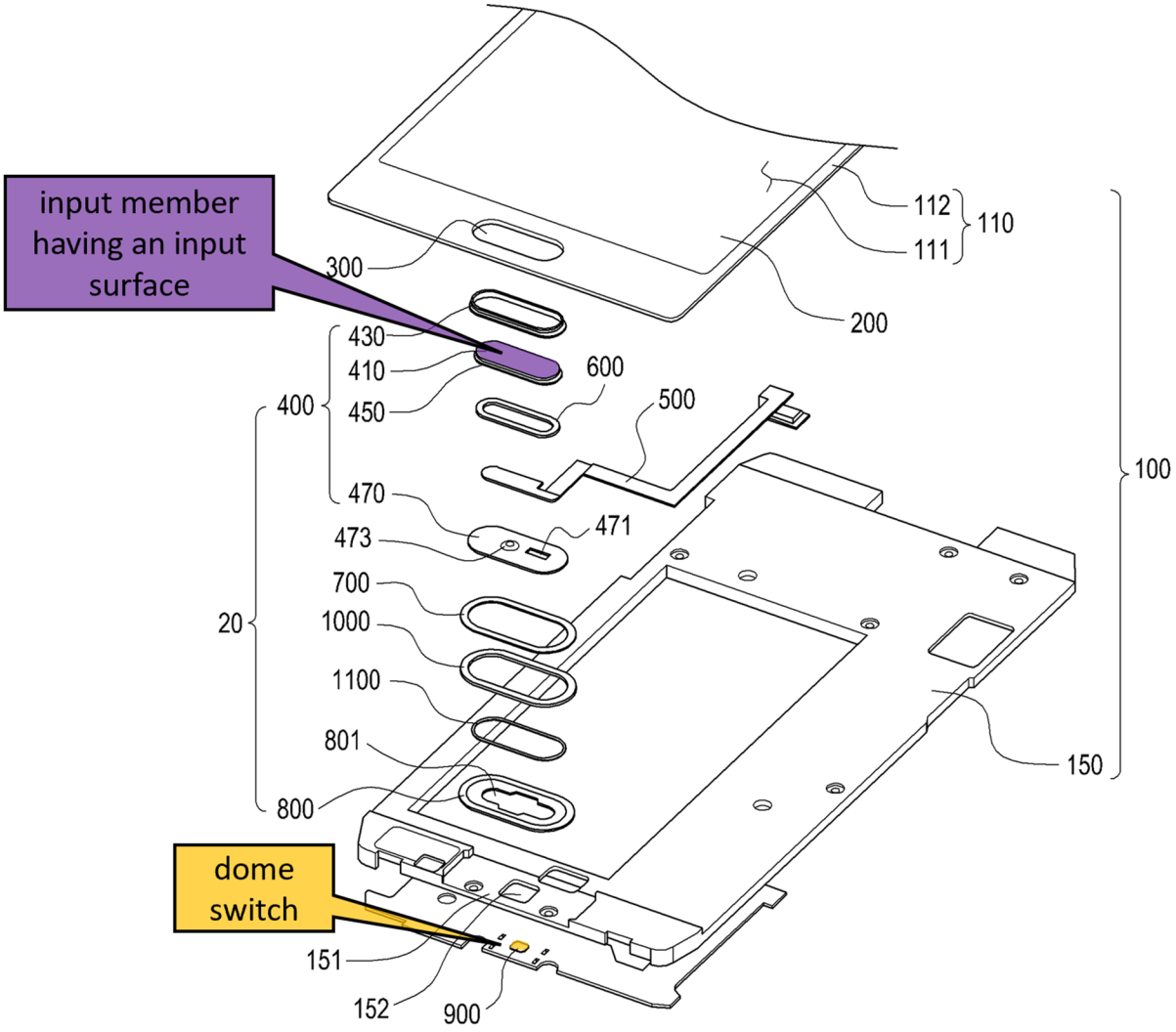
i. Claim 2: [2.pre]

Chang discloses element [2.pre]. *See* claim 1.

ii. Claim 2: [2.a]

Chang discloses element [2.a], as illustrated in at least Figure 3:

Ex. 1015, Fig. 3



Chang discloses its button assembly is activated via dome switch 900, which "may be elastically and mechanically deformed by the user's click to transmit the signal to the inside of the electronic device" (Ex. 1015, 9:1-19, 9:38-49; Ex. 1003, ¶411).

Both *Chang* and the ’619 Patent teach that the dome switch is mounted to the enclosure underneath the moving portions of the button assembly (Ex. 1015, 9:38-49, Fig. 3; Ex. 1003, ¶¶409-413).

iii. Claim 2: [2.b]

Chang discloses element [2.b], as illustrated in at least Figure 7B:

Ex. 1015, Fig. 7B

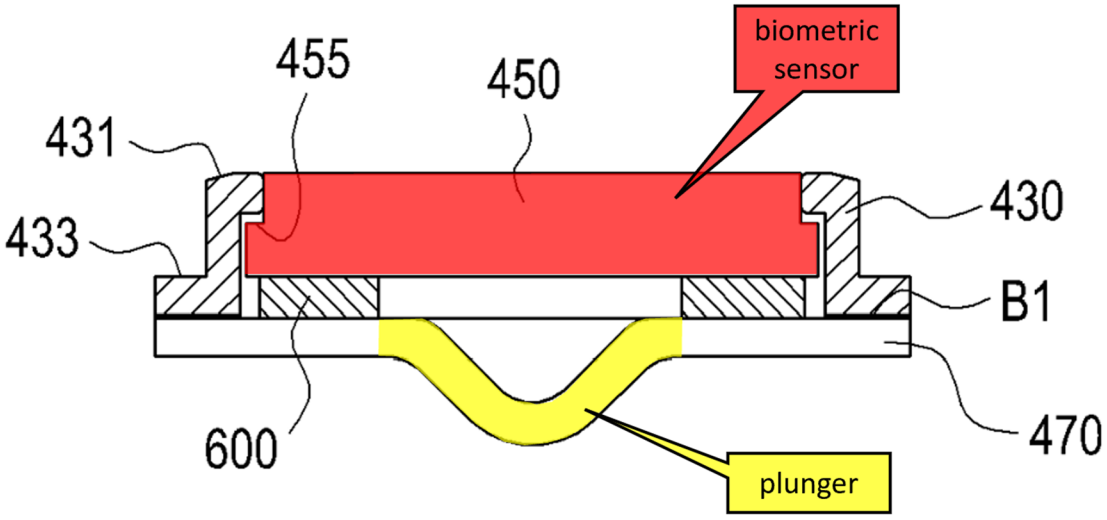


FIG.7B

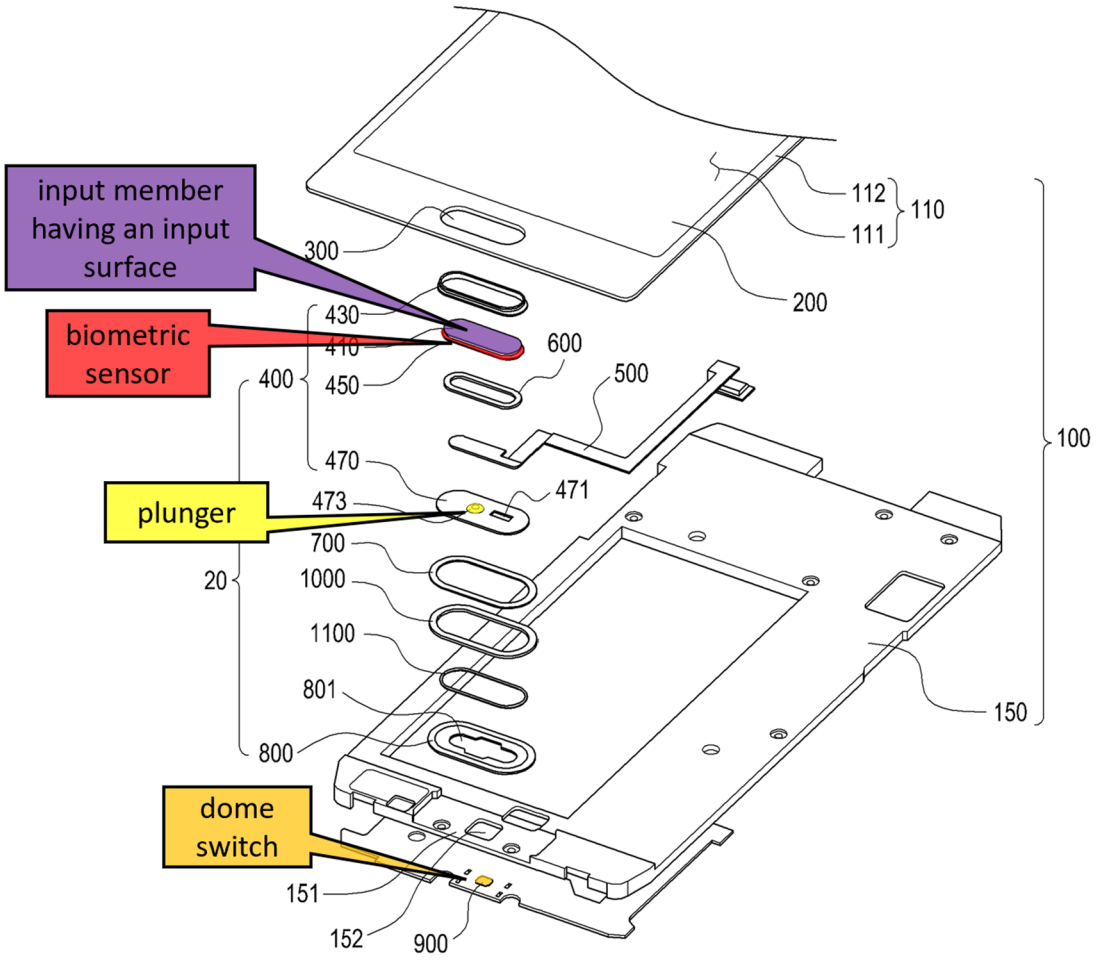
Chang discloses a plunger (concave recess 473) which is “formed in the inside of the lower plate 470,” “disposed to face the dome switch 900,” “formed of an elastic material,” and “designed in a convexly protruding shape when viewed from the rear side” (Ex. 1015, 9:29-37; Ex. 1003, ¶¶414-415).

Chang’s plunger is positioned below the biometric sensor, and above the tactile dome switch (Ex. 1015, Figs. 3, 7B; Ex. 1003, ¶416).

Moreover, *Chang* teaches that the tactile dome switch "may be elastically and mechanically deformed by the user's click to transmit the signal to the inside of the electronic device 10" (Ex. 1015, 9:38-49; Ex. 1003, ¶417). Specifically, the plunger (*i.e.*, concave recess 473) "may be utilized in order to transfer the pressure to the dome switch in the other various input processes" (Ex. 1015, 11:36-59; Ex. 1003, ¶417).

Chang's Figure 3, below, depicts the relationship between the disclosed input member, biometric sensor, plunger, and dome switch (Ex. 1003, ¶¶418-419).

Ex. 1015, Fig. 3



iv. Claim 2: [2.c]

Chang discloses element [2.c]. The retainer, plunger, and aperture of *Chang* are depicted in Figure 11, below.

Ex. 1015, Fig. 11

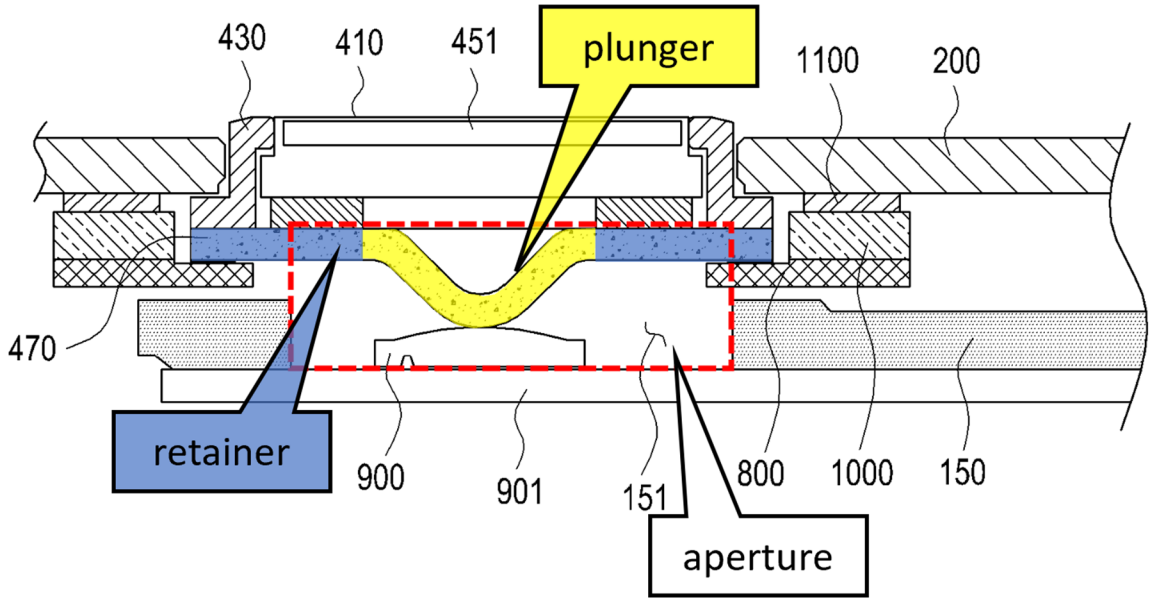
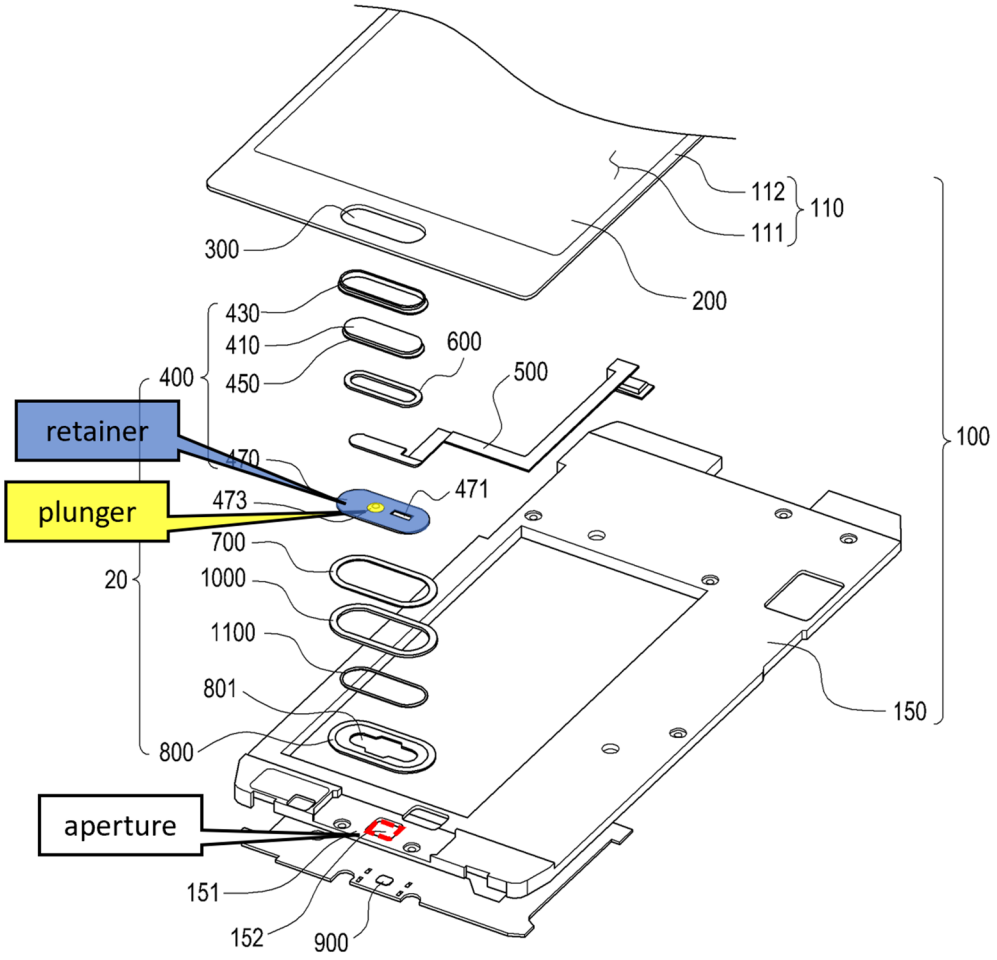


FIG.11

As depicted in Figures 3 and 11, the retainer (*i.e.*, lower plate 470), defines the top surface of aperture 152. Specifically, *Chang* teaches "seating portion 151 may be formed with a hole 152 through which a dome switch 900 may protrude" (Ex. 1015, 7:63-8:9; Ex. 1003, ¶¶420-422). "[D]ome switch 900 may be disposed inside the seating portion 151 through the hole 152 of the seating portion 151" (Ex. 1015, 9:38-49; Ex. 1003, ¶423).

Ex. 1015, Fig. 3



The '619 Patent teaches the retainer provides "a stop to displacement of the button housing" and its "lower surface forms a sealing surface 225 for the button assembly" (Ex. 1001, 16:54-60). As depicted above, a POSITA would have understood lower plate 470 of *Chang* likewise serves as "a stop to the displacement of the button housing" and includes a "lower surface [that] forms a sealing surface … for the button assembly." As such, a POSITA would have understood lower plate 470 constitutes the claimed retainer (Ex. 1003, ¶424).

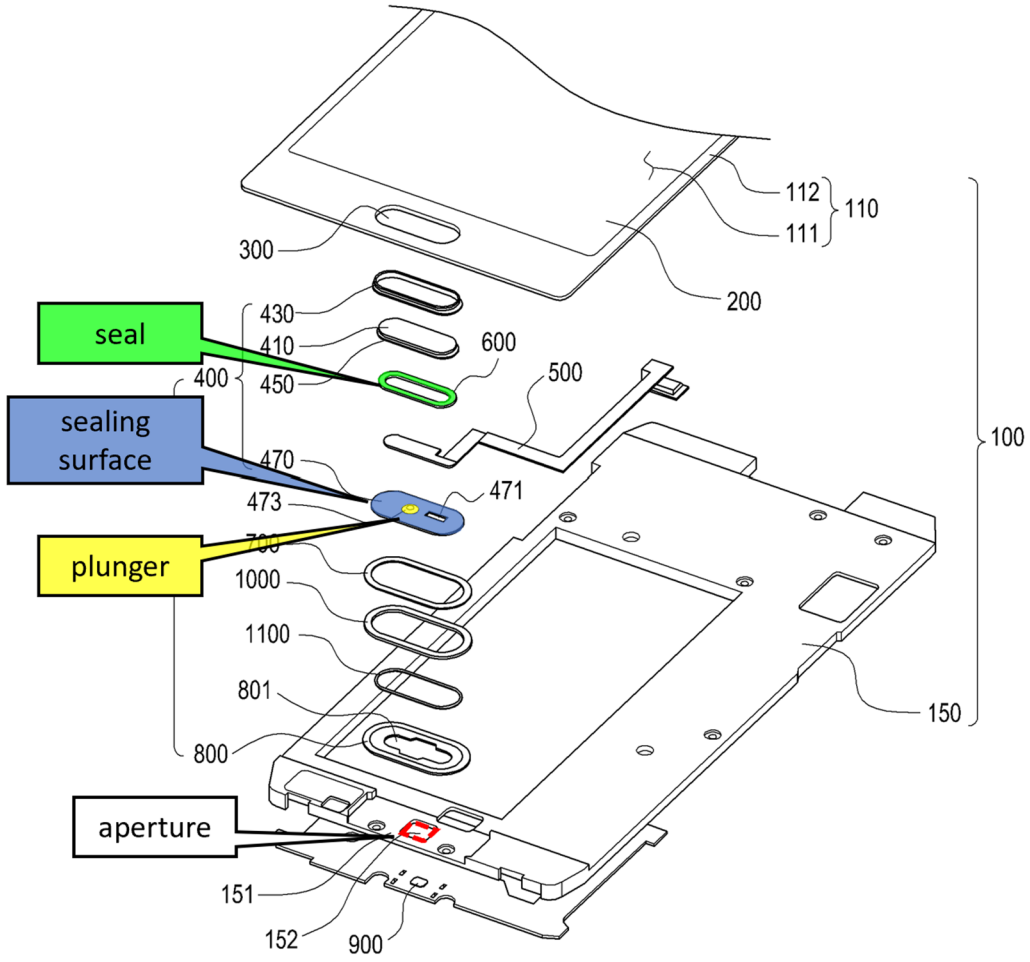
Furthermore, a POSITA would have understood that because the lower plate 470 defines an aperture housing the plunger, the retainer would be formed of a rigid, durable material that would withstand repeated user presses on the input surface (Ex. 1003, ¶425). A POSITA would further have understood that a rigid, durable retainer would be one of a limited number of surfaces that could be used as a sealing surface of the button assembly and would be the preferred surface when designing a surface that necessarily must withstand repeated user presses (Ex. 1003, ¶¶425-426).

v. Claim 2: [2.d]

Chang discloses element [2.d].

The upper surface of lower plate 470 (blue) constitutes the claimed "sealing surface." *See* element [1.d]. Lower plate 470 also constitutes the claimed "retainer" defining the top surface of the aperture 152. *See* element [2.c]. Thus, a POSITA would have understood that the top surface of the "retainer" defines the claimed sealing surface (Ex. 1003, ¶¶427-429).

Ex. 1015, Fig. 3



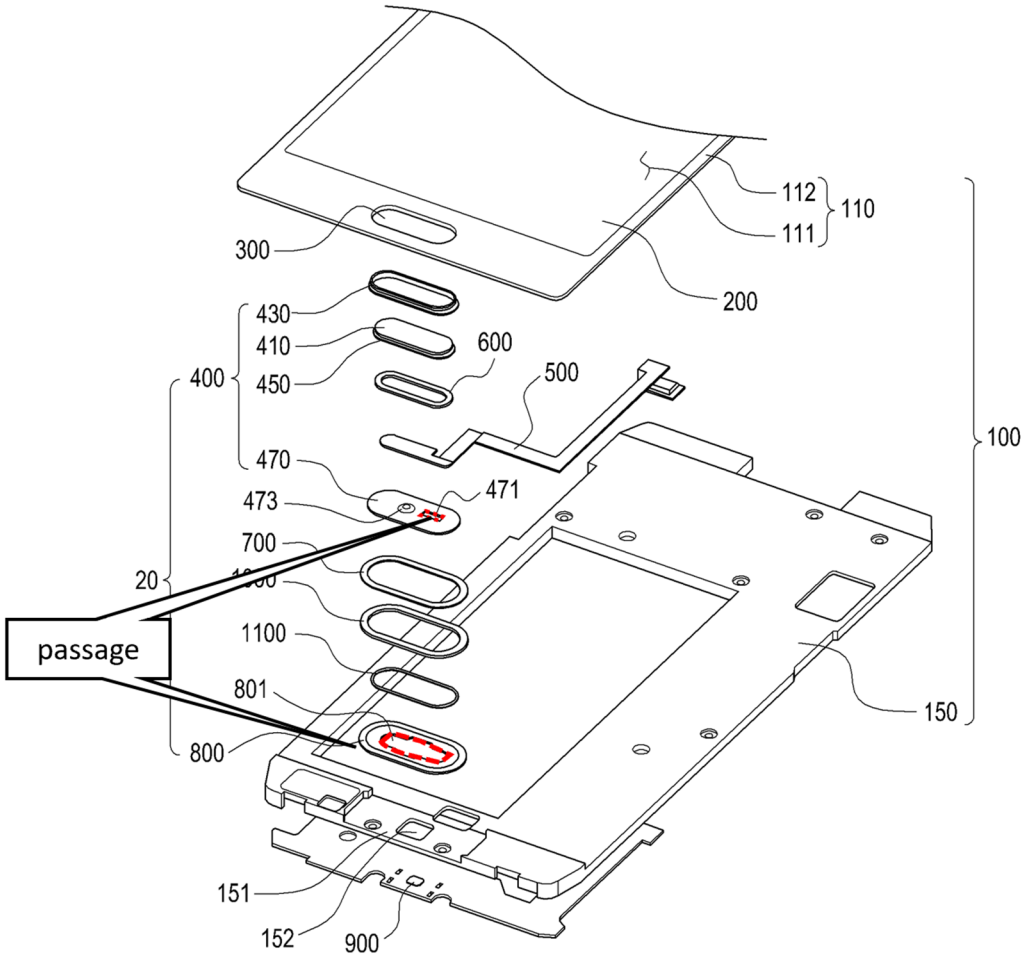
4. Claim 6

Chang discloses claim 6. *See* claim 1.

Chang teaches "flexible conductive member 500 may finally 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. 1015, 9:20-28, Fig. 3; Ex. 1003, ¶¶430-432).

As shown, the passage begins in the opening of the enclosure (which houses the button assembly), and extends to the enclosed volume (Ex. 1003, ¶432).

Ex. 1015, Fig. 3



This configuration is further depicted in Figure 4B (Ex. 1003, ¶¶433-435):

Ex. 1015, Fig. 4B

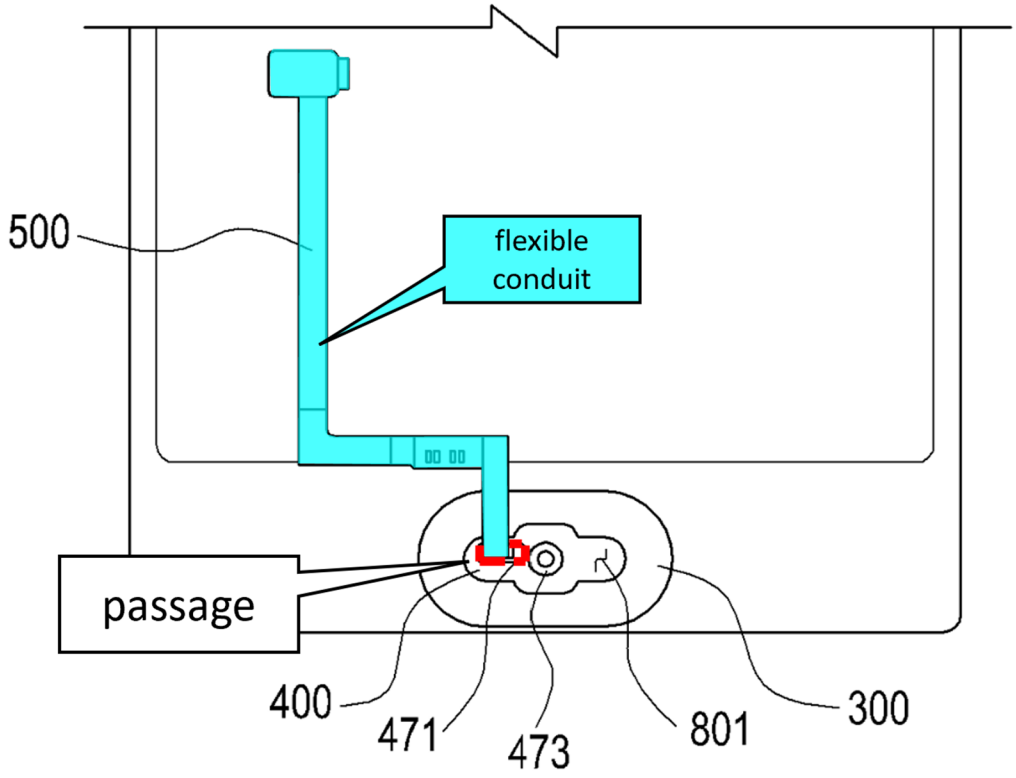


FIG.4B

5. Claim 9

Chang discloses claim 9. *See* claim 1.

Specifically, *Chang* discloses a fingerprint recognizing member 450 (*i.e.*, "biometric sensor") which operates "to recognize a fingerprint" (*i.e.*, "biometric characteristic") (Ex. 1015, 1:58-2:24). *Chang* further discloses the fingerprint sensor "may transfer a signal … to the inside of the electronic device 10" (Ex. 1015, 13:1-10; Ex. 1003, ¶¶436-438). A POSITA would have understood the "signal" discussed

herein is an electrical signal that represents the fingerprint image recognized by the sensor (Ex. 1003, ¶438). *Chang* also teaches "[i]n order to recognize only a fingerprint, the operation of the electronic device 10 may be performed merely by a touch" (Ex. 1015, 11:43-59; Ex. 1003, ¶438).

Indeed, *Chang* teaches this limitation the same as the '619 Patent, which discloses the "biometric sensor" includes a "fingerprint" sensor, and "[f]ingerprints and DNA are example biometric characteristics" (Ex. 1001, 4:51-5:14; Ex. 1003, ¶¶439-440).

VIII. PRIOR ART NOT PREVIOUSLY PRESENTED TO THE OFFICE

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

IX. THE *FINTIV* FACTORS FAVOR INSTITUTION

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

Fintiv Factor 1 (potential for stay) is at least neutral given that no stay motion has yet been filed. *See Sand Revolution II, LLC v. Cont'l Intermodal Grp. – Trucking*

LLC, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) (declining to speculate about a district-court stay).

Fintiv Factor 2 (timing of trial) favors institution. It is a practical impossibility that a trial would occur before the Final Written Decision because these Petitions are being filed prior to the District Court's case management conference, and no schedule or trial date has been set. The median-time-to-trial for civil cases in N.D. Cal. is 31.1 months (Ex. 1024 (National Judicial Caseload Profile), 66). Assuming that timing from the original filing date of December 2, 2022, the trial date is July 7, 2025, over 7 months after the final written decision.

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

Fintiv Factor 4 (overlap of issues) favors institution. At the time of filing this Petition, Patent Owner has not served infringement contentions. These Petitions nonetheless address all claims of the '619 Patent. Moreover, Petitioners stipulate herein that if this IPR proceeding is instituted, they will withdraw any identical grounds from the District Court litigation, eliminating any overlap in issues. The

Board has found that such stipulations weigh in favor of institution. *See Sand Revolution II, LLC v. Continental Intermodal Grp – Trucking LLC*, IPR2019-01393, Paper 24 at 12 n.5 (PTAB June 16, 2020).

Fintiv Factor 5 (overlap in parties) weighs against institution because Petitioner is a party in this Petition as well as in the parallel district court litigation.

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

As discussed above, the '619 Patent was only granted after the applicant amended the claims to identify an allegedly unique configuration of the seal, sealing surface, and enclosure (§VII). Each of Grounds 1-4 are highly likely to prevail with respect to at least one challenged claim, insofar as they each sets out a distinct configuration which meets the point of alleged novelty found in the '619 Patent.

X. CONCLUSION

Petitioner respectfully requests cancellation of the Challenged Claims.

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

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

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

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

A claim of infringement of the '619 Patent was asserted in *Apple Inc. v. AliveCor, Inc.*, Case 4:22-cv-07608-HSG, filed on December 2, 2022. Petitioner is simultaneously filing (1) a petition for IPR of claims 11-20 of the '619 Patent under the case heading IPR2023-00949, and (2) a petition for IPR of related U.S. Patent No. 10,076,257 under the case heading IPR2023-00950. Petitioner's explanation of the need for parallel petitions accompanies this filing.

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

Petitioner provides the following designation of counsel.

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

D. Service Information

Please address all correspondence and service to the address listed above. Petitioner consents to electronic service directed to apple-alivecor-ndcal@alston.com.

Date: June 7, 2023

By: /Christopher Douglas /
Christopher Douglas

CLAIMS APPENDIX

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

Claim	**Recitation**
[3.pre]	The electronic device of claim 1, wherein:
[3.a]	the seal includes a gasket and a pressure sensitive adhesive (PSA) layer; and
[3.b]	the portion of the flexible conduit is positioned between the gasket and the sealing surface of the button assembly.
4	The electronic device of claim 1, wherein the seal is overmolded around the portion of the flexible conduit.
5	The electronic device of claim 1, wherein the flexible conduit passes through an aperture in the seal.
6	The electronic device of claim 1, further comprising a passage extending from the opening to the enclosed volume, wherein the flexible conduit passes through the passage.
[7.pre]	The electronic device of claim 6, wherein:
[7.a]	an enclosure shelf is defined at the bottom of the opening;
[7.b]	the passage is formed in the enclosure shelf; and
[7.c]	the seal encircles the passage.
8	The electronic device of claim 6, wherein the portion of the flexible conduit encircles the passage.
9	The electronic device of claim 1, wherein the biometric sensor is a fingerprint sensor and the biometric characteristic is a fingerprint.
10	The electronic device of claim 1, wherein: the biometric sensor comprises an array of capacitive sensing elements that are configured to detect either or both of ridges and grooves of a user's finger.

CERTIFICATION UNDER 37 C.F.R. §42.24

Under the provisions of 37 CFR §42.24, the undersigned hereby certifies that the word count for the foregoing Petition for inter partes review totals 13,951 words (Sections I-X), which is less than the 14,000 allowed under 37 CFR §42.24(a)(i).

Date: June 7, 2023

By: / Christopher Douglas /
Christopher Douglas

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e), 42.105, the undersigned hereby certifies that true and correct copies of the above-captioned PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,866,619, all associated exhibits, and Petitioner's Power of Attorney were served in their entireties on June 7, 2023, upon the following parties via UPS Next Day Air®:

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Date: June 7, 2023

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