

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner

Case IPR2024-00294
U.S. Patent 10,736,507

**PETITIONER'S OPPOSITION TO
PATENT OWNER'S MOTION TO AMEND**

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APPLE-1006	U.S. Patent No. 6,658,276 to Kianl et al. (“Kianl”)
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APPLE-1011	Y. Mendelson, et al., A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring, Proceedings of the 28th IEEE EMBS Annual International Conference New York City, USA, Aug 30-Sept 3, 2006
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APPLE-1098	Press Release, EDN, Nonin Medical Launches Low Power Xpod® Model 3012LP, OEM Pulse Oximeter Globally (May 3, 2011) available at https://www.edn.com/nonin-medical-launches-low-power-xpod-model-3012lp-oem-pulse-oximeter-globally/
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APPLE-1101	U.S. Patent No. 7,650,176 to Sarussi et al.
APPLE-1102	U.S. Patent No. 7,468,036 to Rulkov et al.
APPLE-1103	U.S. Patent Application Pub. No. 2009/0231960 to Hutcheson
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LISTING OF SUBSTITUTE CLAIMS

Claim 21 (Substitute for claim 1)	
[21pre]	A <u>wristwatch</u> mobile pulse oximetry system for informing a user of mobile measurement of oxygen saturation (“SpO ₂ ”), the <u>wristwatch</u> mobile pulse oximetry system comprising:
[21a]	an SpO ₂ measurement system including:
[21b]	an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and
[21c]	a processing board in <u>non-wireless</u> data communication with the optical sensor and <u>non-wireless data communication with</u> a mobile computing device <u>comprising the wristwatch</u> , <u>which includes</u> ~~including~~ a display and cellular communication <u>capabilities</u> , wherein the processing board is configured to:
[21d]	receive [[said]] one or more <u>unprocessed</u> signals <u>through</u> <u>a non-wireless connection</u> from the optical sensor;

[21e]	process said one or more <u>unprocessed</u> signals to generate SpO ₂ measurement values; and
[21f]	output the SpO ₂ measurement values <u>nonwirelessly</u> to the mobile computing device; and
[21g]	one or more hardware processors of the mobile computing device configured to execute an application, the application configured to execute commands to:
[21h]	generate a graphical user interface <u>of the wristwatch</u> having a plurality of display portions;
[21i]	display <u>on a touch sensitive screen</u> , in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO ₂ measurement values; and
[21j]	display <u>on the touch sensitive screen</u> , in a different portion of the plurality of display portions, a plurality of user inputs, <u>the touch sensitive screen</u> configured to allow the user to interact

	with at least one of the plurality of display portions or the application;
[21k]	wherein the processing of the one or more signals to generate SpO ₂ measurement values is performed only on the processing board, thereby freeing up memory available to the mobile computing device; and
[21l]	wherein the processing board is configured to draw <u>all</u> power for operation from the mobile computing device;
[21m]	<u>the wristwatch mobile pulse oximetry system further comprising a substantially water-tight enclosure for at least the processing board, the enclosure including impact resistant upper and lower shells.</u>
Claim 22 (Substitute for claim 2)	
[22pre]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to:
[22a]	perform a trend analysis on received SpO ₂ measurement values; and

[22b]	display results of the trend analysis in at least one portion of the plurality of display portions.
Claim 23 (Substitute for claim 3)	
[23]	The mobile pulse oximetry system of claim <u>22</u> , ~~wherein the display is touch sensitive, and~~ wherein the application is configured to execute commands to narrow or expand the displayed results of the trend analysis in response to the user using a pinch gesture.
Claim 24 (Substitute for claim 4)	
[24]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to set reminders to take future measurements.
Claim 25 (Substitute for claim 5)	
[25]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to output one or more alarms associated with SpO ₂ measurement values that are above or below threshold SpO ₂ measurement values.

Claim 26 (Substitute for claim 6)	
[26]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to output one or more reminders to use the optical sensor to take measurements of SpO ₂ measurement values at predetermined times or cycles.
Claim 27 (Substitute for claim 7)	
[27]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to update the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO ₂ measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.
Claim 28 (Substitute for claim 8)	
[28]	The mobile pulse oximetry system of claim <u>21</u> , wherein the application is configured to execute commands to output an alert, via a network to a designated physician or other care provider, regarding abnormal SpO ₂ readings.

Claim 29 (Substitute for claim 13)	
[29pre]	A computer-implemented method of <u>using a wristwatch system to inform</u> ~~informing~~ a user of mobile measurement of oxygen saturation (“SpO ₂ ”), the computer-implemented method comprising:
[29a]	outputting, from an optical sensor of an SpO ₂ measurement system, one or more <u>unprocessed nonwireless</u> signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more <u>unprocessed nonwireless</u> signals responsive to an oxygen saturation of said tissue; and
[29b]	via a processing board of the SpO ₂ measurement system, the processing board in <u>nonwireless</u> data communication with the optical sensor and <u>with a wristwatch</u> mobile computing device including a display, <u>the processing board powered by the wristwatch mobile computing device:</u>
[29c]	receiving said one or more <u>unprocessed nonwireless</u> signals from the optical sensor;

[29d]	processing said one or more <u>unprocessed nonwireless</u> signals to generate the SpO ₂ measurement values; and
[29e]	<u>nonwirelessly</u> outputting the SpO ₂ measurement values to <u>one or more hardware processors of the wristwatch</u> mobile computing device; and
[29f]	via an application configured to execute commands on the <u>one or more hardware processors of the wristwatch</u> mobile computing device:
[29g]	generating a <u>wristwatch</u> graphical user interface <u>on a touch sensitive screen and</u> having a plurality of display portions;
[29h]	displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO ₂ measurement values; and
[29i]	displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact

	<u>via the touch sensitive screen</u> with at least one of the plurality of display portions or the application.
Claim 30 (Substitute for claim 14)	
[30pre]	The computer-implemented method of claim ~~[[13]]~~ 29 , further comprising, via the application:
[30a]	performing a trend analysis on received SpO ₂ measurement values; and
[30b]	displaying results of the trend analysis in at least one portion of the plurality of display portions.
Claim 31 (Substitute for claim 15)	
[31]	The computer-implemented method of claim ~~[[13]]~~ 29 , further comprising, via the application, outputting one or more alarms associated with SpO ₂ measurement values that are above or below threshold SpO ₂ measurement values.
Claim 32 (Substitute for claim 16)	

[32]	The computer-implemented method of claim ~~[[13]]~~ <u>29</u> , further comprising, via the application, outputting one or more reminders to use the <u>optical sensor</u> ~~-opticeal snesor~~ to take measurements of SpO ₂ measurement values at predetermined times or cycles.
Claim 33 (Substitute for claim 17)	
[33]	The computer-implemented method of claim ~~[[13]]~~ <u>29</u> , further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO ₂ measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.
Claim 34 (Substitute for claim 18)	
[34]	The computer-implemented method of claim ~~[[13]]~~ <u>29</u> , further comprising, via the application, outputting an alert, via a network to a designated physician or other care provider, regarding abnormal SpO ₂ readings.

Claim 35 (Substitute for claim 20)	
[35]	The computer-implemented method of claim ~~[[13]]~~ <u>29</u> , further comprising, via the application, enabling the user to set reminders to take future measurements.
Claim 35 (Additional substitute for claim 13)	
[36]	<u>The computer-implemented method of claim 29,</u> <u>wherein wristwatch system comprises impact resistant upper</u> <u>and lower shells that help enclose at least the processing board</u> <u>in a substantially water-tight manner.</u>

LISTING OF GROUNDS

Ground	Claim(s)	35 U.S.C. § 103
MTA 1A	29-31, 33-34	Brady, Goldsmith, D'Angelo
MTA 1B	32, 34-35	Brady, Goldsmith, D'Angelo, Tran
MTA 1C	30, 33	Brady, Goldsmith, D'Angelo, Kianl
MTA 1D	21-22, 25, 27-28, 36	Brady, Goldsmith, D'Angelo, Goldreich
MTA 1E	23	Brady, Goldsmith, D'Angelo, Goldreich, Ording
MTA 1F	24, 26, 28	Brady, Goldsmith, D'Angelo, Goldreich, Tran
MTA 1G	22, 27	Brady, Goldsmith, D'Angelo, Goldreich, Kianl
MTA 2A	29-31, 33-34	Brady, Goldsmith, D'Angelo, Tseng
MTA 2B	32, 34-35	Brady, Goldsmith, D'Angelo, Tseng, Tran
MTA 2C	30, 33	Brady, Goldsmith, D'Angelo, Tseng, Kianl
MTA 2D	21-22, 25, 27-28, 36	Brady, Goldsmith, D'Angelo, Tseng, Goldreich
MTA 2E	23	Brady, Goldsmith, D'Angelo, Tseng, Goldreich, Ording
MTA 2F	24, 26, 28	Brady, Goldsmith, D'Angelo, Tseng, Goldreich, Tran
MTA 2G	22, 27	Brady, Goldsmith, D'Angelo, Tseng, Goldreich, Kianl
MTA 3A	29-31, 33-34	Hudson, Goldsmith, Brady
MTA 3B	32, 34-35	Hudson, Goldsmith, Brady, Tran

Ground	Claim(s)	35 U.S.C. § 103
MTA 3C	21-22, 25, 27-28, 36	Hudson, Goldsmith, Brady, Goldreich
MTA 3D	23	Hudson, Goldsmith, Brady, Goldreich, Ording
MTA 3E	24, 26, 28	Hudson, Goldsmith, Brady, Goldreich, Tran

Petitioner, Apple Inc., respectfully requests that Patent Owner (“PO”) Masimo’s Motion to Amend (MTA) be denied. Not only does Masimo improperly attempt to broaden the claims of the ’507 patent far beyond its inventors’ contemplation and intent, its MTA claims fail to comply with § 112 requirements and are rendered obvious by the prior art.

I. SUB. CLAIMS 29-36 ARE IMPROPERLY BROADENING

Substitute claims 29-36 improperly broaden the claimed invention of the ’507 patent in its effort to cover a watch mobile computing device (“MCD”) that includes both the optical sensor and processing board as internal components. Sub. claim 29 improperly read on a system in which the processing board is an internal component of a MCD *and* where the MCD receives signals from a *separate and external* processing board, while original claim 13 only claimed that the MCD received signals from a *separate and external* processing board. “[A]mended claims ‘may not enlarge the scope of the claims of the patent.’” *Sisvel Int’l S.A. v. Sierra Wireless, Inc.*, 81 F.4th 1231, 1237 (Fed. Cir. 2023) (quoting 35 U.S.C. § 316(d)(3)).

A. Original Claim 13

Original claim 13 recites “via a processing board of the SpO₂ measurement system, the processing board *in data communication with* ... a mobile computing

device ... [,] outputting the SpO₂ measurement values to the mobile computing device” (emphases added). The plain language of claim 13 makes clear that the processing board of the SpO₂ measurement system be *separate and distinct* from the MCD to which the SpO₂ measurement values are outputted. APPLE-1083, ¶¶62-64. Indeed, it would be nonsensical for the processing board to be “in data communication with” a MCD and to output measurement values “to” the MCD if the processing board were *itself* a component of the MCD. *Id.*

B. Sub. Claim 29 Improperly Broadens Original Claim 13

Substitute claim 29 amends original claim 13 to recite that the processing board “output[s] the SpO₂ measurement values to one or more hardware processors of the wristwatch mobile computing device.” Although these amendments appear to incorporate additional limitations into claim 13, they actually introduce an improper broadening effect. In particular, by reciting that the SpO₂ measurement values are outputted by the processing board “to *one or more hardware processors* of the wristwatch mobile computing device” rather than simply “to the mobile computing device,” claim 29 has been broadened to cover embodiments in which the processing board is an internal component of the MCD. APPLE-1083, ¶¶62-64.

Whereas the language of claim 13 requires the processing board to be separate and distinct from the entirety of “*the mobile computing device*,” the

amended features of sub. claim 29 simply require that the processing board be separate and distinct from “*one or more hardware processors* of the mobile computing device.” *Id.* In other words, claim 29 allows for the processing board to be a component of the MCD alongside the one or more hardware processors—an embodiment that was previously excluded by the plain language of claim 13. *See supra* §IA.

Unless claim 29 is interpreted such that the claimed processing board is required to be *separate and external* from the MCD, sub. claims 29-36 should be rejected for improper broadening. “[A] claim ‘is broader in scope than the original claim[] if it contains within its scope any conceivable apparatus or process which would not have infringed the original patent.’” 81 F.4th at 1237 (quoting *Hockerson-Halberstadt, Inc. v. Converse Inc.*, 183 F.3d 1369, 1374 (Fed. Cir. 1999); *see also* 37 C.F.R. § 1.175(b)).

II. “NON-WIRELESS”/“NONWIRELESS” IS INDEFINITE

A claim is indefinite under § 112 when, viewed in light of the specification and prosecution history, the claim fails to inform those skilled in the art about “the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901, 910 (2014).

The term “non-wireless”/“nonwireless” (claims 21, 29) is indefinite because a POSITA would not have understood what this term means with reasonable certainty. The ’507 patent specification *never* uses the term “non-wireless” /“nonwireless,” but rather describes only “wired or wireless” connections. APPLE-1001, 5:65-67, 5:35-39, 2:29-32, 4:39-45, 10:17. The specification further discloses “wires” within the first and second cables 120, 140 that connect the sensor 110, the processing module 130, and the smartphone 160. *Id.*, 9:6-11, FIG. 1. The ’507 patent describes only “wired or wireless” connections; thus, it is unclear what “non-wireless” connections encompass. APPLE-1083, ¶¶65-66.

When asked if a POSITA would understand what the term “non-wireless” means and if it is distinct from a “wired” connection, Masimo’s expert repeatedly stated that he was “confused” by the term and had “difficulty understanding [the] question.” APPLE-1087, 25:2-11, 27:3-5, 28:6-29:3. Indeed, when asked to contrast the terms “wired” and “non-wireless,” Masimo’s expert responded “*I don’t understand what you mean by non-wireless.*” *Id.*, 27:18-21. He also further stated that “[t]he term ‘non-wireless’ I believe *is not described in the ’507 patent.*” *Id.*, 32:13-33:1, 30:4-7; *see also id.*, 30:22-31:11, 34:11-15. As such, both experts agree that a POSITA would not have understood the scope of the term “non-wireless” in the context of the ’507 patent. APPLE-1083, ¶¶65-66. Indeed, even

Masimo's counsel repeatedly asserted that the term "non-wireless" is "vague" throughout the deposition. APPLE-1087, 25:5-6 ("vague as to non-wireless"), 27:1-2, 27:16-17.

III. CLAIM CONSTRUCTION

A. "Wherein the processing board is configured to: ... output the SpO₂ measurement values nonwirelessly to the mobile computing device"

Consistent with the scope of original claim 13, Petitioner proposes that claim 21 be construed to require that the MCD is separate and distinct from the processing board of the SpO₂ measurement system. For similar reasons as described above, the plain meaning of "output[ting]...to the mobile computing device" indicates that the devices are separate and distinct from each other. *See supra* §IA. Furthermore, in claim 21, the processing board is in "non-wireless data communication with [the] mobile computing device." It would make little sense for a processing board to be in "data communication with" and output SpO₂ measurement values "*to*" the MCD, if the processing board were *itself* a component of the MCD. Nor does the specification "reveal a special definition ... that differs from the meaning [the claim term] would otherwise possess," e.g., by specifying that the processing board could be part of the MCD. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005). On the contrary, in *all* embodiments disclosed by the specification of the '507 patent, the MCD is separate and distinct

from the processing board. *See, e.g.*, EX1001, 2:24-29; 7:26-36; FIGS. 1A, 5A-5C; APPLE-1083, ¶¶68-70. Masimo’s expert appears to agree. EX2037, ¶60 (stating the “main purpose of the inventions” was to perform all signal processing with a processing board separate from the MCD); *see also id.*, ¶¶84, 106-107, 12. For these reasons, “the construction that stays true to the claim language [of claim 21] and most naturally aligns with the patent's description of the invention” requires that the MCD be separate and distinct from the processing board. *Phillips*, 415 F.3d at 1316.

IV. SUB. CLAIMS 21-36 LACK WRITTEN DESCRIPTION SUPPORT

Should the Board determine that any of claims 21-36 are (i) not broadening and (ii) cover embodiments that include a wristwatch MCD that encompasses the processing board of the SpO₂ measurement system, these claims are invalid for lack of written description support.

“To fulfill the written description requirement, the patent specification ‘must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.’” *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998) (citing *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed.Cir.1989); *see also ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1377 (Fed. Cir. 2009)). To determine whether the specification

“reasonably conveys...that the inventor had possession of the claimed subject matter,” one must conduct “an objective inquiry into the four corners of the specification from the perspective of a [POSITA].” *Rivera v. Int'l Trade Comm'n*, 857 F.3d 1315, 1319 (Fed. Cir. 2017) (citing *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010)). The Federal Circuit has held that applicant is not entitled to claims to which no embodiments are disclosed in the specification. *Gentry Gallery*, 134 F.3d at 1478-80. The Court has acknowledged that a claim may be broader than a specific embodiment disclosed in the specification, but not when the specification makes clear that the disclosed embodiment feature was “essential” to the invention. *Id.* at 1480.

To the extent that the Board interprets sub. claims 21-36 as covering embodiments that include a wristwatch MCD that ***encompasses*** the processing board of the SpO₂ measurement system (“the SpO₂ processing board”), such embodiments are unsupported. The specification provides ***no*** disclosure of an embodiment in which the MCD encompasses the SpO₂ processing board, and therefore a POSITA would have no reason to believe the inventor had possession of such embodiments at the time the ’507 patent was filed. Instead, the specification ***repeatedly and uniformly*** discloses that the SpO₂ processing board is separate and distinct from the MCD. *See, e.g.*, EX1001, 2:21-26; 3:57-62; 4:67-

5:14; 5:25-27; 5:40-44; 6:23-7:17; 7:26-8:2; 9:1-20; 9:47-65; 10:28-34; 10:55-61; 16:43-17:6; 17:22-25; *id.*, FIGS. 1A-1C, 5A-5C. Furthermore, a POSITA would have understood that the separation of the SpO₂ processing board from the MCD was **essential** to the alleged invention of the '507 patent since the stated purpose of the invention is to overcome the issues of “processing overhead” for “implementing physiological measurement technology on mobile computing devices,” and the smaller size of mobile devices. APPLE-1083, ¶¶68-70; EX1001, 7:22-27, 7:64-67. Indeed, a key point of the '507 patent invention was providing “a **separate** processing module 130 to mediate the data flow from the sensor 110 to the mobile device 160” and to “mov[e] the signal processing calculations **away** from the mobile CPU.” *Id.*, 7:3-10; EX2038, ¶16 (The inventor testifying that “[m]easurement values were calculated **only** on the processing board, **not on the iPhone**” was the “main purpose” of the system); APPLE-1107, 10:16-22, 27:7-18, 28:12-15, 29:4-18 (The inventor testifying that Masimo never developed a version of the system in which the processing board was physically integrated into the MCD). Thus, claims 21-36 cannot be valid if they cover embodiments where the processing board is an internal component of the MCD.

V. MASIMO FAILS TO PROVIDE A REASONABLE NUMBER OF SUBSTITUTE CLAIMS

A MTA must have “a reasonable number of substitute claims” with a “presumption...that only one substitute claim would be needed to replace each challenged claim.” 37 C.F.R. § 42.121. Claim 36 should be rejected as improper since Masimo proposes two sub. claims for claim 13 (claims 29 and 36), and fails to “demonstrat[e] a need to present more than one substitute claim per challenged claim.” *Lectrosonics, Inc. v. Zacom*, IPR2018-01129, Paper 15 at 4-5 (PTAB Feb. 25, 2019).

VI. PRIORITY DATE OF MTA CLAIMS

Masimo’s amended claims lack written description support in U.S. Provisional Patent App. No. 61/703,729 (EX2046, the ’729 provisional), filed on September 20, 2012. Sub. claims 21 and 29 recite a “**wristwatch**” system and a device, but the ’729 provisional *never* discloses a “wristwatch,” a “watch,” or a “wrist.” Without specificity, Masimo broadly cites 8 of the 13 pages and *all* of the figures of the ’729 provisional as supporting the totality of amended features. MTA, 11-12. Although the ’729 provisional states that the “the physiological sensor system may be one of a wide range of mobile devices such as a laptop, tablet computer, netbook, PDA, media player, mobile game console, or other microprocessor based device configured to interface with a physiological sensor,”

(EX2046, 4) nothing in this statement nor the other cited portions of the provisional supports a wristwatch mobile pulse oximetry system or a wristwatch MCD. APPLE-1083, ¶3. Accordingly, Masimo's amended claims can benefit only from a post-AIA priority date of September 20, 2013—the filing date of U.S. Patent App. No. 14/033,315 (EX2047). *See Studiengesellschaft Kohle, m.b.H. v. Shell Oil Co.*, 112 F.3d 1561, 1564, 42 USPQ2d 1674 (Fed. Cir. 1997) (An earlier priority date “does not extend to claims with subject matter outside the description in the earlier application.”); *see also New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1295 (Fed. Cir. 2002).

VII. MASIMO'S CLAIMS FAIL TO OVERCOME THE PRIOR ART

Masimo's sub. claims fail to overcome the prior art as provided in the *Listing of Grounds* (*supra*, pp. xix-xx) and as discussed in the sections below. Specifically, Grounds 1A-1G are applicable to an improperly broad claim construction of claim 21 and broadened recitations of claim 29 (§§IA-B, *supra*) in which the claims are construed to **not** require the claimed processing board **to be separate and external** from the MCD. Grounds 2A-3E are alternatively and additionally offered as applicable to claims that are construed to require that the claimed processing board **be separate and external** from the MCD.

To the extent that cls. 21 and 29 are interpreted such that the term “mobile measurement of oxygen saturation (‘SpO₂’)” is interpreted to require active reduction and/or correction of motion artifacts caused by user motion, Moon would have been properly added to all of the above Grounds in the same manner, to achieve the same benefits, as discussed in the Petition. Pet., §III.J; APPLE-1003, ¶¶212-244.

**A. MTA Ground 1A: The Brady-Goldsmith-D’Angelo Combination
Renders Obvious Sub. Claims 29-31, 33-34**

1. Overview of Brady

Brady discloses a wrist-worn watch that includes (1) an “optical sensor;” (2) a “pulse oximetry board” that receives “radiation-induced current” from the optical sensor and processes the signals to provide, *inter alia*, “blood oxygenation level” data; and (3) a “microprocessor board” that “receives data from the pulse oximetry board and processes the data to display...pulse rate [and] blood oxygenation levels” on a watch display. APPLE-1091, ¶¶[0046]-[0058]; *see also id.*, ¶¶[0058], [0062]-[0065], [0072]-[0079]; APPLE-1083, ¶¶72-73.

2. Combination of Brady, Goldsmith, and D’Angelo

Goldsmith and D’Angelo are summarized in the Petition. Pet., §§III.I, III.D; APPLE-1083, ¶¶75-84. A POSITA would have been motivated to modify Brady’s watch to (1) include a touch screen (as taught by Goldsmith and D’Angelo), (2)

include multiple display portions, including portions for SpO₂ values as well as user inputs (as taught by D'Angelo), and (3) output alarms to the user or a third-party care provider regarding abnormal SpO₂ readings that fall outside of an expected range (based on Goldsmith). APPLE-1083, ¶¶85-89.

First, like Goldsmith, Brady discloses watch displays for presenting representations of physiological measurements including SpO₂ measurements, and a POSITA would have recognized that making the display a touchscreen display, as taught by Goldsmith, would be an obvious variant to the user interface of Brady's watch that would have provided an intuitive user interface as touchscreens were widely employed in consumer products at the time. APPLE-1091, ¶[0058]; APPLE-1009, ¶[0086]; APPLE-1083, ¶86.

Second, Goldsmith's disclosure of activating a touchscreen device by a user's hand renders obvious a portion of the screen for displaying user inputs. Further, a POSITA would have applied the teachings of D'Angelo, which discloses an example user interface that displays physiological measurements and includes separate display portions for allowing the user to interact with the device to allow the user to interact with the watch device, e.g., to alter a view of the display or to allow the user to access application options or historic information, as taught in

D'Angelo and explained in the Petition. *See* Pet., §III.D.3.[1j]; APPLE-1083, ¶87; APPLE-1003, ¶¶121-129.

Third, a POSITA would have applied Goldsmith to Brady's watch to output alarms to the user or a third-party care provider regarding abnormal SpO₂ readings that fall outside of an expected range. Brady already discloses measuring blood oxygenation levels and displaying alerts "when a user enters or exits a target zone" for certain physiological parameters (e.g., heart rate). APPLE-1091, ¶¶[0058], [0064]-[0065], [0072]-[0079]. Goldsmith likewise discloses a watch that measures oxygen levels and uses alarms to indicate "high or low" analyte levels, and Goldsmith further discloses that that a "cellular network could be used to notify parents, physicians, or emergency services of alarms or alert states" based on an abnormal analyte level. APPLE-1009, ¶¶[0017], [0037], [0072]-[0073], [0085], [0092]. A POSITA would have recognized that it would be beneficial to implement similar alarms for SpO₂ measurements and to modify Brady's watch to notify third-party care providers of alarms to improve the monitoring of a user's condition and to provide assistance in the event of a medical emergency. APPLE-1083, ¶88.

3. Claims 29, 30, 31, 33, 34

[29pre]

Brady discloses methods of using a “watch” that “securely attach[es] to a user’s wrist” and “act[s] as a monitoring device.” APPLE-1091, ¶¶[0047]-[0048]. The watch can include an optical sensor (which Brady describes as “a pulse oximetry device”), “a flexible pulse oximetry board,” and a display member that can display “blood oxygenation levels.” *Id.*, ¶¶[0052],[0058]. APPLE-1083, ¶¶89-90.

[29a]

Brady’s watch device includes “an optical sensor 30” that can be a “*pulse oximetry device* with a light source.” APPLE-1091, ¶[0052]. Brady describes that “[a]s the heart pumps blood through the arteries in the wrist of the user, blood cells absorb and transmit varying amounts of the red and infrared radiation [from the light source] depending on how much oxygen binds to the cells’ hemoglobin.” *Id.* The optical sensor also includes a photodetector that “detects transmission at the red and infrared wavelengths, and in response generates a radiation-induced signal.” *Id.*, ¶¶[0051]-[0056]. This signal is not described as being processed in any way prior to being output from the sensor and a POSITA would have recognized that a signal emitted directly from a photodetector is an unprocessed

signal. *Id.*; APPLE-1083, ¶91. Specifically, the photodiode, “generates a radiation-induced current that travels through the connection wires 45 to the circuitry assembly 35.” APPLE-1091, ¶¶[0054], [0049], [0058].

[29b]

Brady discloses the claimed processing board in the form of “a flexible pulse oximetry board” in the circuitry assembly 35 such as a “BCI MICRO POWER oximetry board” and further describes that the optical sensor is “preferably connected to the circuitry assembly 35 by the connection wires.” APPLE-1091, ¶¶[0049], [0054], [0058]. The circuitry assembly 35 of the watch includes both the “pulse oximetry board” and a “flexible microprocessor board” that “receives data from the pulse oximetry board and processes the data to display on the display member 40.” *Id.*, ¶¶[0049], [0054], [0058], FIG. 1A. The “flexible microprocessor board” is thus a component of the wristwatch MCD in communication with the “pulse oximetry board.” The watch further includes the display member 40 (e.g., a liquid crystal display). Therefore, Brady’s watch device (including the microprocessor board) corresponds to *a wristwatch MCD including a display* with which Brady’s pulse oximetry board) is *in non-wireless data communication*. APPLE-1083, ¶¶92-94.

Brady's device 20 is "preferably powered by a power source positioned on the watch 25" such as "a battery accessible at an interior surface of the main body portion," and Brady further discloses that the power source is "preferably connected to the circuit assembly 35," which includes the pulse oximetry board. APPLE-1091, ¶[0061].

[29c]

Brady's optical sensor "detects transmission at the red and infrared wavelengths, and in response generates a radiation-induced current that travels through the connection wires 45 to the circuitry assembly 35," which includes the "pulse oximetry board." APPLE-1091, ¶¶[0054], [0058]. Brady does not disclose any processing prior to the pulse oximetry board. APPLE-1083, ¶95.

[29d-29e]

Brady discloses that an example of the pulse oximetry board is a "BCI MICRO POWER oximetry board, which is a low power, micro-size easily integrated board which *provides blood oxygenation level*," as well as other physiological measurements. APPLE-1091, ¶[0058]. "[T]he microprocessor board *receives data from the pulse oximetry board*" and "processes the data to display ... blood oxygenation levels" as well as other physiological measurements on the display member of the watch. *Id.* Once again, FIG. 1A of Brady shows the pulse

oximetry board and microprocessor board connected as a single circuitry assembly block 35. *See id.*, FIG. 1A. As such, the pulse oximetry board *processes said one or more unprocessed nonwireless signals to generate the SpO₂ measurement values*. APPLE-1083, ¶96.

[29f]

As discussed above, Brady's watch device (including the microprocessor board) corresponds to the claimed "*wristwatch mobile computing device*." *Supra* §VII.A.3.[29b]. Brady's microprocessor board "receives data from the pulse oximetry board," "processes the data to display on the display member," and "can also store data." APPLE-1091, ¶[0058]. APPLE-1083, ¶97.

[29g]

Brady discloses that the microprocessor board "processes the data [received from the pulse oximetry board] to display on the display member," and can include "pulse rate, blood oxygenation levels, calories expended by the user of a pre-set time period, target zone activity, time and dynamic blood pressure." APPLE-1091, ¶[0058]. Furthermore, as shown in FIG. 1 of Brady, the display member can include a portion for displaying a time (e.g., 8:31) and another portion for displaying a physiological measurement (e.g., a heart rate of 133). *Id.*, FIG. 1. Moreover, while Brady does not explicitly disclose that its display member is a

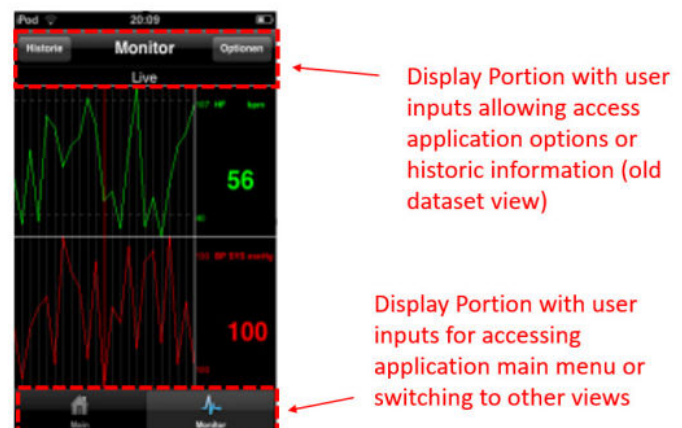
“touch sensitive screen,” Goldsmith discloses an analogous watch controller device with “a touchscreen display” for displaying physiological measurements including “oxygen level.” APPLE-1009, ¶¶[0037]-[0038], [0086], Claim 28. A POSITA would have found it obvious to modify Brady’s display member to incorporate a touch sensitive screen, as taught by Goldsmith, to allow a user to interact with the watch in a well-known, intuitive fashion. *Supra* §VII.A.2; APPLE-1083, ¶¶98-99.

[29h]

Brady discloses a graphical user interface having a plurality of display portions, including a portion that displays physiological measurements including “blood oxygenation levels.” *Supra* §VII.A.3.[29g]; APPLE-1091, ¶[0058]. APPLE-1083, ¶100.

[29i]

Brady-Goldsmith renders obvious a touch sensitive screen having a plurality of display portions, (*supra*, [29g], [29h]). Therefore, a POSITA would have found it obvious, in the context of a watch with a touch sensitive screen, to include a display portion with a plurality of user inputs, and to allow the user to interact with at least one



of the plurality of display portions or an application via the touch sensitive screen.

APPLE-1083, ¶¶101-102.

Nevertheless, to the extent that this limitation is not explicitly described in Brady or Goldsmith, it is disclosed in D’Angelo. Pet., §§III.D.3.[1h] and III.D.3.[1j]. D’Angelo discloses a “Graph View” that includes several display portions, including portions that display physiological measurements and separate portions for allowing the user to interact with the display portions and the application via a touch screen. *Id.*; APPLE-1007, 1530-31. A POSITA would have found it obvious to implement the touch screen user interface taught by D’Angelo with the touchscreen watch device of Brady-Goldsmith, for example, to allow a user to interact with the device to alter a view of the display or to access application options or historic information, as taught in D’Angelo, for the same reasons that such features would have been beneficially added to Mendelson in Ground 1D of the Petition. *Supra* §VII.A.2; APPLE-1083, ¶102; Pet, 40-43; APPLE-1003, ¶¶121-129.

[30]

D’Angelo provides this element by displaying a “Graph view” that includes determined physiological parameters in an automatically scrolling graph that depicts changes in the measured value over time. Pet., §III.D.3[2]; APPLE-1007,

1530-31. SpO₂ values are one of the values displayed as part of the resulting combination of Brady-Goldsmith-D'Angelo. APPLE-1091 ¶[0058]; APPLE-1009, ¶[0037]; APPLE-1083, ¶103.

[31]

Brady discloses that its watch device can measure blood oxygenation levels and display alerts “when a user enters or exits a target zone” for certain physiological parameters such as a heart rate. APPLE-1091, ¶¶[0058], [0064]-[0065], [0072]-[0079]. Similarly, Goldsmith discloses a watch that measures oxygen levels and uses alarms to indicate “high or low” analyte levels. APPLE-1009, ¶¶[0037], [0085], [0092]. Therefore, a POSITA would have found it obvious to combine these teachings to alert users or third-party care providers when a user’s SpO₂ measurement values unexpectedly fall outside of a particular range. *Supra* §VII.A.2; APPLE-1083, ¶104.

[33]

As described in the Petition, D'Angelo provides this element. Pet., §III.D.3.[7]; APPLE-1007, 1529-31; APPLE-1083, ¶105.

[34]

As discussed above, the Brady-Goldsmith-D'Angelo system outputs one or more alarms associated with SpO₂ measurement values that are above or below

threshold SpO₂ measurement values. *Supra* §VII.A.3.[31]. Additionally, Goldsmith discloses that a “cellular network could be used to notify parents, physicians, or emergency services of alarms or alert states” based on an abnormal analyte level. APPLE-1009, ¶¶[0017], [0072]-[0073], [0085], [0092]; APPLE-1083, ¶106.

B. MTA Ground 1B: The Brady-Goldsmith-D’Angelo-Tran Combination Renders Obvious Sub. Claims 32, 34-35

Tran is summarized in the Petition. Pet., §III.B. Like with Mendelson, the watch of the Brady-Goldsmith-D’Angelo system outputs one or more alarms associated with SpO₂ measurement values that are above or below threshold SpO₂ measurement values. *Supra* VII.A.3.[31]; Pet. §III.B.2; APPLE-1083, ¶¶107-112. A POSITA would have applied Tran to the Brady-Goldsmith-D’Angelo system in the same way as applied to Mendelson in the Petition to output reminders to the user to take SpO₂ measurements, allow the user to set such reminders to take future measurements, and to output an alert via a network to a designated physician or other care provider in response to abnormal SpO₂ readings. *Id.*

1. Claims 32, 34, 35

A POSITA would have applied Tran to the Brady-Goldsmith-D’Angelo combination in the same way as they would have applied Tran to Mendelson to the claimed features provided below. APPLE-1083, ¶¶113-115.

Claim Limitation	Refer to Combination Analysis
[32]	<i>See</i> Pet., §III.B.3.[16]; APPLE-1005, ¶¶[0054], [0246], [0255].
[34]	<i>See</i> Pet., §III.B.3.[18]; APPLE-1005, ¶¶[0255], [0252], [0054], [0246], [0335], [0417]; APPLE-1003, ¶97.
[35]	<i>See</i> Pet., §III.B.3.[20]; APPLE-1005, ¶¶[0255], [0257], [0418].

C. MTA Ground 1C: The Brady-Goldsmith-D’Angelo-Kianl Combination Renders Obvious Sub. Claims 30, 33

A POSITA would have been prompted to modify the Brady-Goldsmith-D’Angelo system based on Kianl in the same way as the Petition describes with respect to Mendelson to perform a trend analysis on received SpO₂ data, display the trend analysis results, and to display SpO₂ measurement values in a plurality of graphical representations including charts. *See* Pet., § III.C.2; APPLE-1003, ¶¶103-109; APPLE-1083, ¶¶116-120. A POSITA would have been motivated to do so—with a reasonable expectation of success—in order to (1) allow health practitioners to readily identify abnormal patterns, conditions, and other health concerns based on SpO₂ data; (2) allow users to easily switch between various data views; (3) allow healthcare providers and other users to more easily mentally process SpO₂ data; and (4) improve the overall usability of the system. *Id.*

1. Claims 30, 33

[30]

A POSITA would have applied Kianl to the Brady-Goldsmith-D’Angelo combination in the same way as they would have applied Kianl to Mendelson to provide this feature. *See* Pet., §III.C.2.[14]; APPLE-1006, 2:32-36, 11:6-31, 15:11-40, FIG. 10; APPLE-1083, ¶121.

[33]

A POSITA would have applied Kianl to the Brady-Goldsmith-D’Angelo combination in the same way as they would have applied Kianl to Mendelson to provide this feature. *See* Pet., §III.C.2.[17]; APPLE-1006, 2:18-31, 1:33-37, 5:65-6:15, 11:6-49, 6:1-3; APPLE-1083, ¶122.

D. MTA Ground 1D: The Brady-Goldsmith-D’Angelo-Goldreich Combination Renders Obvious Sub. Claims 21-22, 25, 27-28, 36

1. Overview of Goldreich

Goldreich discloses a “wrist-mounted device for measuring at least one physiological parameter of the user,” e.g., “oxygen saturation in the blood.” APPLE-1092, 3:25-52; APPLE-1083, ¶¶123-127. Goldreich’s device can include a sensor-connected microprocessor that “operates a software program to process and analyze the data...to compute medical information,” and can also transfer the extracted information to a “gateway device” capable of communicating with a

contact center via a cellular telephone connection, or to a “remote server.” *Id.*, 2:63-65, 4:34-42. Goldreich discloses that its processor, which “extracts medical information from the measurement of the physiological parameter,” can be “mounted on a PCB board 308,” and further discloses a cover 304 and case 306 that can hold the components of the device (e.g., PCB 308) in a waterproof sealing manner. *Id.*, 10:52-53, 11:6-24, FIG. 2.

2. Brady-Goldsmith-D’Angelo-Goldreich Combination

A POSITA would have been prompted to apply the teachings of Goldreich to the Brady-Goldsmith-D’Angelo system to design the body of the watch to include a substantially water-tight enclosure for at least the processing board, the enclosure including impact resistant upper and lower shells. APPLE-1083, ¶¶126-127. First, such modifications would improve the durability of the device and the ability to use the device in the presence of water—both properties that were well-known to be desirable for similar wrist-worn watch devices. APPLE-1095, 14-15 (describing shock resistance and water resistance as functional requirements of a wearable pulse oximeter design); APPLE-1083, ¶¶126-127. Second, the enclosure disclosed by Goldreich would be readily applicable to Brady’s watch to make the main body of the watch modular and easy to disassemble for maintenance. APPLE-1083, ¶¶126-127.

3. Claim 21

Brady-Goldsmith-D’Angelo-Goldreich renders obvious claim 21 as explained for the corresponding limitations listed in the table. APPLE-1083, ¶¶128-141.

Claim Limitation	Refer to Corresponding Limitations
[21pre]	§VII.A.3.[29pre]
[21a]	§VII.A.3.[29pre]
[21b]	§VII.A.3.[29a]
[21c]	<i>See further discussion below</i>
[21d]	§VII.A.3.[29c]
[21e]-[21f]	§VII.A.3.[29d-29e]
[21g]	§VII.A.3.[29f]
[21h]	§VII.A.3.[29g]
[21i]	§VII.A.3.[29h]
[21j]	§VII.A.3.[29i]
[21k]	<i>See further discussion below</i>
[21l]	<i>See further discussion below</i>
[21m]	<i>See further discussion below</i>

[21c]

See supra §VII.A.3.[29b]. Brady’s watch also includes a transceiver that can operate on a wireless protocol “such as that used in cordless telephones” to communicate with an external device such as a laptop computer or cellular telephone. APPLE-1091, ¶¶[0046], [0059], [0063]. To the extent that this wireless

protocol does not constitute “cellular communication capabilities,” Goldsmith discloses that “the watch controller device may further be adapted to include cellular phone, PDA and/or smart phone capabilities,” and a POSITA would have found it obvious to apply Goldsmith’s teaching to Brady to predictably achieve the same objective of enabling the watch device to communicate with external devices such as cellular telephones. APPLE-1009, ¶[0097], APPLE-1083, ¶¶131-132. Therefore, Brady’s watch device (including the microprocessor board) and/or Brady’s watch device modified by Goldsmith correspond to *a MCD comprising the wristwatch, which includes a display and cellular communication capabilities* and with which Brady’s pulse oximetry board (the “*processing board*”) is *in non-wireless data communication. Id.*

[21k]

Brady’s pulse oximetry board can be a “BCI MICRO POWER oximetry board, which ... provides blood oxygenation level,” (corresponding to “*SpO₂ measurement values*”) as well as other physiological measurements. APPLE-1091, ¶[0058]. Further, Brady’s microprocessor board can be a distinct component from the pulse oximetry board that later “receives data from the pulse oximetry board.” *Id.* As Dr. Kenny explains, a POSITA would have understood Brady’s disclosure as teaching that all the processing of the one or more signals to generate

measurements of “blood oxygenation level” is performed on the pulse oximetry board prior to sending the data to the microprocessor board. APPLE-1083, ¶139. The POSITA would also have recognized that this configuration would have freed up memory and processing capacity of the mobile device, including the separate microprocessor board, since the microprocessor board would not have to generate these measurements. *Id.*

[21l]

See supra §VII.A.3.[29b]. Although this claim limitation further requires the processing board to be configured to draw *all* power for operation from the MCD, Brady does not disclose any power source for the pulse oximetry board (“*the processing board*”) *other* than the “power source positioned on the watch 25” in Brady’s preferred embodiment. APPLE-1091, ¶[0061]; APPLE-1083, ¶140.

[21m]

Brady discloses a “main body portion” of its watch, (APPLE-1091, ¶[0047]), but it does not explicitly disclose a “substantially water-tight enclosure for at least the processing board” that “includ[es] impact resistant upper and lower shells.” However, Goldreich discloses this feature by holding components of a wrist-mounted device (e.g., PCB 308) with a “waterproof sealing” between a cover 304 and a case 306. APPLE-1092, 10:52-53, 11:6-24, FIG. 2; *supra* §VII.D.1. A

POSITA would have found it obvious to combine the Brady-Goldsmith-D’Angelo-Goldsmith system with the teaching of Goldreich to (1) improve the waterproofing and durability of the system—properties which were well-known to be desirable characteristics for wrist-worn devices used for physiological measurements—and (2) to make the main body of Brady’s watch easy to disassemble for maintenance. *Supra* §VII.D.2; APPLE-1095, 14-15; APPLE-1083, ¶141. Moreover, to the extent that the cover and case taught by Goldreich do not render obvious ***impact resistant*** upper and lower shells (which Applicant does not concede), it would have been obvious to a POSITA to select the materials and shape of Goldreich’s cover and case to make them impact resistant, as was already being done for analogous devices prior to the Critical Date. APPLE-1095, 54-58; APPLE-1083, ¶141.

4. Claims 22, 25, 27, 28, 36

Brady-Goldsmith-D’Angelo-Goldreich renders obvious these claims as explained for the corresponding limitations listed below. APPLE-1083, ¶¶142-146.

Claim Limitation	Refer to Corresponding Limitations
[22]	§VII.A.3.[30]
[25]	§VII.A.3.[31]
[27]	§VII.A.3.[33]
[28]	§VII.A.3.[34]
[36]	§VII.D.3.[21m]

E. MTA Ground 1E: The Brady-Goldsmith-D’Angelo-Goldreich-Ording Combination Renders Obvious Sub. Claim 23

The watch of the Brady-Goldsmith-D’Angelo-Goldreich system includes a touchscreen interface just like the Mendelson-D’Angelo system discussed in the Petition. *See supra* §§VII.A.2, VII.D.2; APPLE-1083, ¶¶147-149; Pet., §III.E.2. Therefore, a POSITA would have been prompted to modify the Brady-Goldsmith-D’Angelo-Goldreich system based on Ording in the same way as the Petition describes with respect to the Mendelson-D’Angelo system to provide claim [23] to allow users to manipulate and navigate the display of physiological parameter information through use of touchscreen gestures including a pinch gesture to narrow or expand displayed results. *See* Pet., §III.E.2, APPLE-1083, ¶149.

F. MTA Ground 1F: The Brady-Goldsmith-D’Angelo-Goldreich-Tran Combination Renders Obvious Sub. Claims 24, 26, 28

A POSITA would have applied Tran to the Brady-Goldsmith-D’Angelo-Goldreich combination for the reasons discussed in Ground 1B. *See supra* §VII.B; APPLE-1083, ¶¶152-156.

Claim Limitation	Refer to Corresponding Limitations
[24]	§VII.B.1.[35]
[26]	§VII.B.1.[32]
[28]	§VII.B.1.[34]

G. MTA Ground 1G: The Brady-Goldsmith-D'Angelo-Goldreich-Kianl Combination Renders Obvious Sub. Claims 22, 27

A POSITA would have applied Kianl to the Brady-Goldsmith-D'Angelo-Goldreich combination for the reasons discussed in Ground 1C. *See supra* §VII.C; APPLE-1083, ¶¶157-160.

Claim Limitation	Refer to Corresponding Limitations
[22]	§VII.C.1.[30]
[27]	§VII.C.1.[33]

H. MTA Grounds 2A: The Brady-Goldsmith-D'Angelo-Tseng Combination Renders Obvious Sub. Claims 29-31, 33-34

Ground 2A-2G closely track respective Grounds 1A-1G. However, to the extent that independent claims 21 and/or 29 are interpreted to require the MCD to be separate and distinct from the processing board, Tseng has been added to each of the combinations of Ground 1A-1G to provide this additional disclosure and form Grounds 2A-2G. APPLE-1083, ¶¶161-165. Other than the addition of Tseng to the respective combinations to demonstrate how the combinations disclose such embodiments, all other analysis of the respective combinations remains the same as Grounds 1A-1G. *Id.*

1. Overview of Tseng

Tseng discloses medical and health care-related expansion hardware that can be connected, via wire, to a separate mobile device 150 and a power module 110 secured to the mobile device. APPLE-1093,

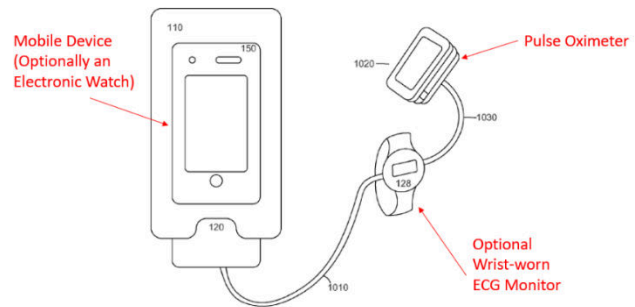


FIG. 10

¶¶[0036], [0062], FIG. 10; APPLE-1083, ¶163. Tseng's expansion hardware can include a pulse oximeter 1020 and a wrist-worn ECG monitor 128 that collects oximeter information and sends the information to the mobile device. *Id.*, ¶¶[0062]-[0063], FIG. 10 (above). Tseng's expansion hardware can be powered by the internal built-in battery of the mobile device. *Id.*, ¶[0064]. Furthermore, Tseng discloses a wrist-worn device (e.g., wrist-worn ECG monitor 129) and a separate and distinct mobile device 150 that can itself be an electronic watch. *Id.*, ¶[0047]. Tseng's external accessories can interface with mobile devices "to add functionalities or enhance existing functionalities for mobile devices." *Id.*, ¶[0004]; FIG. 10.

2. Brady-Goldsmith-D'Angelo-Tseng Combination

A POSITA would have been prompted to apply Tseng to the Brady-Goldsmith-D'Angelo system to separate out the SpO₂ measurement system (including Brady's optical sensor and pulse oximetry board) from the wristwatch MCD as non-wirelessly connected yet distinct devices. Indeed, as Tseng acknowledges, such an arrangement was well-known to expand the functionalities of MCDs and thus a POSITA would have had a reasonable expectation of success in implementing such a configuration. APPLE-1083, ¶164; APPLE-1093, ¶[0004]. Therefore, a POSITA would have recognized that such an arrangement could decrease the hardware required to be included in the MCD, thereby reducing the size, complexity, and power requirements of the MCD. *Id.* Adding Tseng to the Brady-Goldsmith-D'Angelo would have allowed for measurement of SpO₂ using a wider variety of smartwatches.

3. Claim 29

To the extent that claim 29 is construed to require that the optical sensor and the processing board of the SpO₂ measurement system are separate and distinct from the wristwatch MCD, Tseng discloses this feature. *See supra* §VII.H.1; APPLE-1093, ¶¶[0036], [0047], [0062]-[0063], FIG. 10. A POSITA would have found it predictable to apply Tseng to the Brady-Goldsmith-D'Angelo system to

achieve this arrangement with a reasonable expectation of success as described in Section VII.H.2. *See supra* §VII.H.2; APPLE-1083, ¶165. The Brady-Goldsmith-D’Angelo-Tseng combination provides (or at least renders obvious) all other elements of claims 29-31 and 33-34 for the reasons discussed in Ground 1A, *supra*. *See supra* §VII.A; APPLE-1083, ¶165.

I. MTA Grounds 2B-2G: The Modifications to the Brady-Goldsmith-D’Angelo Combination Render Obvious the Remaining Claims

A POSITA would have been prompted to apply the teachings of Tran, Kianl, Goldreich, and Ording to the Brady-Goldsmith-D’Angelo-Moon combination in the same manner and for the same reasons as discussed in Grounds 1B-1G to achieve the combinations identified for Grounds 2B-2G identified in Section VII, *supra*, and would have had a reasonable expectation of success in doing so. APPLE-1083, ¶166. All elements of the claims identified with respect to Grounds 2B-2G are disclosed by the respective combinations for the reasons discussed in respective grounds 1B-1G. *Id.*

J. MTA Ground 3A: The Hudson-Goldsmith-Brady Combination Renders Obvious Sub. Claims 29-31, 33-34

1. Overview of Hudson

Hudson discloses a pulse oximeter that interfaces to a separate and distinct mobile phone, for “high-density power storage,” “integrated display,” and “power-

efficient processing capabilities [of mobile phones] suitable for the processing and analysis of oximetry signals.”¹ APPLE-1094, 957-58; APPLE-1083, ¶¶168-169. Hudson discloses using a iPod Touch® as the mobile device “hardwired to a certified Xpod® OEM pulse oximeter module.” *Id.*, 958, FIG.1 (above). According to Hudson,



“[t]he Xpod module *provides the raw photoplethysmography waveform and processed trend values for oxygen saturation*[.]” *Id.*, 958.

Hudson’s user interfaces display parameters, e.g., “oxygen saturation,” on the iPod Touch’s screen that shows, *inter alia*, “a trend graph ... for each parameter,” “[a]larm thresholds,” and “touch icons” for application navigation and to adjust settings. *Id.*, 959, 962, FIGS. 2-3.

2. Combination of Hudson, Goldsmith, and Brady

A POSITA would have found it obvious to modify Hudson’s system by replacing its 2nd generation iPod Touch® (mobile device) with a touch-screen

¹ Exhs. 1094, -1099, and -1106 were each publicly available and accessible prior to the Critical Date. APPLE-1108, ¶¶1-17.

wristwatch, as taught by Goldsmith. APPLE-1083, ¶¶170-172. Wristwatch mobile devices have many of the same benefits of portability, “high-density power storage,” “an integrated display,” and “power-efficient processing capabilities” as the iPod Touch used in Hudson, and Hudson itself describes that “[t]he ultimate goal ... is to make the Phone Oximeter compatible with a variety of mobile phone platforms.” APPLE-1094, 958, 964; APPLE-1009, [0085]-[0105]. A POSITA would have recognized that the touch screen watch controller device of Goldsmith would be fully compatible with Hudson’s system (for the same reasons that Goldsmith is compatible with Mendelson-D’Angelo, as described in the Petition), and would yield benefits such as increasing the ease of use of Hudson’s system. *See* Pet., §III.I.2; APPLE-1083, ¶¶170-172. Indeed, Goldsmith discloses that its wristwatch controller is, for all intents and purposes, a PDA having a wristwatch form factor with all capabilities of a smartphone in “a more socially acceptable embodiment...because it is common for people to wear watches.” APPLE-1009, [0085]-[0105]. Indeed, according to Masimo, the ’507 patent’s single mention of a “wristwatch” as the mobile device (with no discussion of any modifications that would be needed for known smartwatches) suggests that a POSITA would have recognized that a wristwatch was capable of performing all functions of a smartphone/PDA. APPLE-1001, 3:65-4:4. Therefore, by applying Masimo’s logic,

a POSITA would have applied Goldsmith to Hudson in the same way as they would have applied Goldsmith to the Mendelson-D’Angelo combination, as described in the Petition. *See* Pet., §III.I.2; APPLE-1083, ¶170.

Additionally, since Hudson’s pulse oximetry system outputs alarms to a user when abnormal SpO₂ readings fall outside of an expected range, (*see supra* §VII.J.1), a POSITA would have naturally applied outputting alarms to a third-party care provider, as taught by Goldsmith, in the combination. APPLE-1083, ¶171. Like Hudson, Goldsmith discloses a watch that measures oxygen levels and uses alarms to indicate “high or low” analyte levels, and Goldsmith further discloses that that a “cellular network could be used to notify parents, physicians, or emergency services of alarms or alert states” based on an abnormal analyte level. APPLE-1009, ¶¶[0017], [0037], [0072]-[0073], [0085], [0092]. A POSITA would have recognized benefits of implementing notifying third-party care providers of alarms in the combination to improve the monitoring of a user’s condition and to provide assistance in the event of a medical emergency with a reasonable expectation of success without significantly altering or hindering the functions performed by Hudson’s system. APPLE-1083, ¶171; APPLE-1011, 2; APPLE-1005, [0255]-[0257], [0260]-[0261].

To the extent that Hudson-Goldsmith does not explicitly provide technical details about how the Xpod OEM pulse oximeter module operates to calculate SpO₂ values, such details about the Xpod module and other similar pulse oximetry systems (including optical sensors and SpO₂ processing boards) were well-known before the Critical Date. APPLE-1083, ¶172; APPLE-1106,² 24-32; APPLE-1097; APPLE-1098; APPLE-1099.³ For example, Brady discloses an optical sensor and pulse oximetry board, including specific details about how these components operate to calculate SpO₂ measurement values. *Supra* §VII.A.1; APPLE-1091, ¶¶[0046]-[0058]. A POSITA would have recognized that the implementation details taught by Brady would be readily applicable to the sensor and XPod OEM pulse oximeter module shown and described in Hudson. APPLE-1083, ¶172. Applying Brady to the Hudson-Goldsmith system, therefore, would have been merely the application of a known technique to a known system ready for improvement to yield predictable results, and a POSITA would have had a reasonable expectation of success in such a modification. APPLE-1083, ¶172; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

^{2,3} See fn.1

3. Claims 29, 30, 31, 33, 34

[29pre]

Hudson discloses methods of using a system that includes an “iPod Touch hardwired to a Nonin Xpod OEM pulse oximeter module” to display, for a user, mobile measurements of SpO₂ (oxygen saturation). APPLE-1094, 958; *supra* §VII.J.1. As discussed above, Hudson-Goldsmith-Brady provides a “*wristwatch* system” because a POSITA would have found it obvious to replace Hudson’s iPod Touch with Goldsmith’s wrist-worn watch controller device. *Supra* §VII.J.2; APPLE-1083, ¶173.

[29a]

Hudson discloses a finger-worn pulse oximetry sensor connected by wire to a Nonin Xpod OEM pulse oximeter module. APPLE-1094, 958, FIG. 1. Further, in Hudson-Goldsmith-Brady, the sensor is an optical sensor and the sensor outputs unprocessed signals responsive to light from a light source attenuated by tissue indicative of blood oxygen, as taught by Brady’s implementation details. *See supra* §VII.A.5[29a]; APPLE-1083, ¶¶174-175.

[29b]

Hudson discloses a finger-worn pulse oximetry sensor connected by wire to a Nonin Xpod OEM pulse oximeter module, which is in turn “hardwired” to an

iPod Touch (a “*mobile computing device including a display*”). APPLE-1094, 958, FIG. 1; APPLE-1106, 21. Moreover, as discussed in Section VII.J.2, Hudson-Goldsmith-Brady provides a *wristwatch MCD*. *Supra* §VII.J.2. To the extent that Hudson does not explicitly disclose relevant details about the processing board of the Xpod OEM pulse oximeter module, Brady provides these features. *Supra* §VII.A.3.[29b].

A POSITA would have also recognized that Hudson and Brady disclose or at least render obvious, in the combination, that the Xpod OEM pulse oximeter module is *powered by the wristwatch MCD*. APPLE-1094, 958 (discussing the “high-density power storage” of mobile phones as a reason for using them in Hudson’s pulse oximetry system); *id.*, 959 (describing a “power-save mode” that “turns off the screen” of the mobile device); *see also supra* §VII.A.3.[29b]; APPLE-1083, ¶¶176-178.

[29c]

Hudson’s optical sensor and the Xpod are in wired connection. APPLE-1094, 958, FIG. 1; APPLE-1083, ¶179. The Xpod module receives the unprocessed signal from the sensor since it “provides the raw photophethysmograph” to the MCD. *Id.* In the combination, the unprocessed

nature of signals from the optical sensor would have also been rendered obvious based on Brady's implementation details. *Supra* §VII.A.3.[29c].

[29d-29e]

Hudson discloses that “[t]he Xpod module provides the raw photoplethysmography waveform and processed trend values for oxygen saturation” via the “hardwired” connection to the mobile device. APPLE-1094, 958. In the combination, Goldsmith provides that the MCD can be a wristwatch MCD, (*supra* §VII.J.2), and Brady discloses relevant implementation features of this claim limitation (*supra* §VII.A.3.[29d-29e]); APPLE-1083, ¶180.

[29f]

Hudson's mobile device runs a “Phone Oximeter application.” APPLE-1094, 965, FIGS. 1-3; APPLE-1083, ¶181; *see also supra* §VII.A.3.[29f]; APPLE-1083, ¶181.

[29g]

Hudson discloses generating various user interfaces shown on the touch sensitive screen of an iPod Touch, and further discloses that the user interface has multiple display portions including a SpO₂ measurement portion, a respiratory rate measurement portion, a heart rate measurement portion, and a user input portion of the display with “touch

icons.” APPLE-1083, ¶182.

APPLE-1094, FIG. 2 (right).

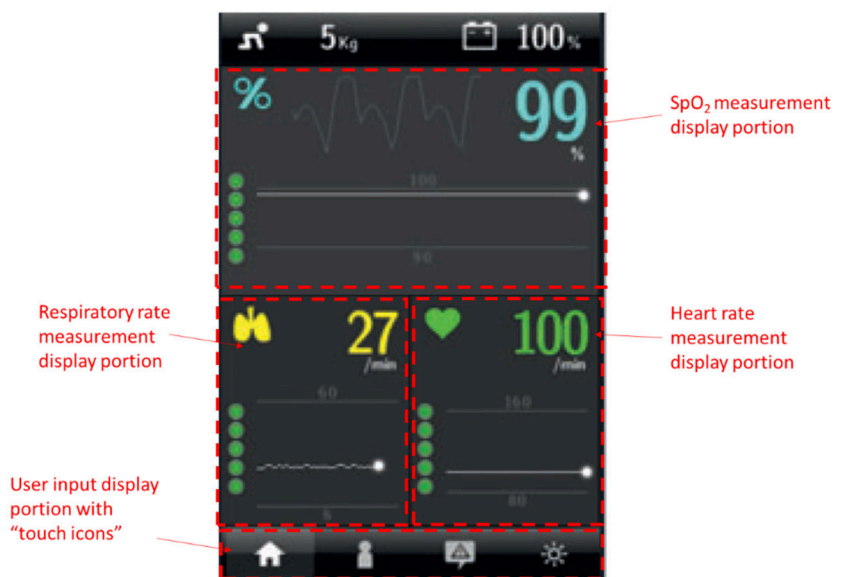
Goldsmith provides a

wristwatch MCD with a

similar touchscreen display.

Supra §VII.J.2. APPLE-

1083, ¶182.



[29h]

See supra §VII.J.3.[29g]. The SpO₂ measurement display portion of the user interface in Hudson provides this element. APPLE-1094, FIG. 2; APPLE-1083, ¶183.

[29i]

See supra §VII.J.3.[29g]. The “touch icons” in Hudson’s user interface provides this element. APPLE-1094, 959, FIG. 2; APPLE-1083, ¶184.

[30]

See supra §VII.J.3.[29g]. In Hudson, a trend analysis on received SpO₂ measurement values is performed and the results are displayed. APPLE-1094, FIGS. 2; *see id.*, 3; *id.*, 958 (“The Xpod module provides ... processed trend values for oxygen saturation ... in a serial data format”); *id.*, 959; *id.*, 962. Therefore, a POSITA would have recognized that Hudson-Goldsmith-Brady renders obvious this claim limitation. APPLE-1083, ¶185.

[31]

Hudson discloses that the “Phone Oximeter software ... collects ... sensor alarms and stores them in a file on the device.” APPLE-1094, 958-59. Hudson also discloses “alarm thresholds,” which can be set through the application and are represented as “horizontal lines on the trend graphs,” representing an “upper limit” and/or “lower limit” for parameters such a O₂ saturation and heart rate. *Id.*, 959, 962, Table 1. Hudson further discloses “alarms and warnings” that can be displayed when the parameter values are above the upper alarm limit or below the lower alarm limit. *Id.*, 959-60, 962-63, FIG. 3; APPLE-1083, ¶186.

[33]

See supra §VII.J.3.[29g]. As shown in the SpO₂ measurement display portion of Hudson’s user interface, the measured values are shown in a plurality of graphical representations

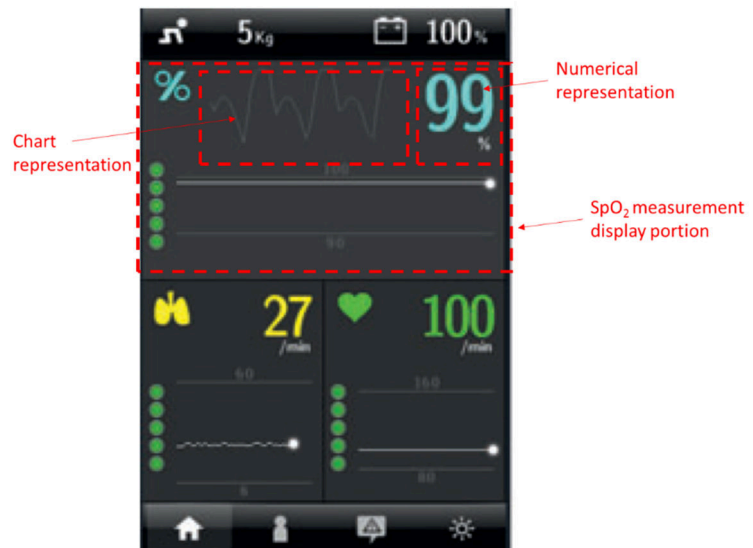
including a chart showing values plotted over time and also a numerical value in a

second graphical

representation. APPLE-1094,

959, FIG. 2; APPLE-1083,

¶187.



[34]

As discussed, the Hudson-Goldsmith-Brady system outputs one or more alarms associated with SpO₂ measurement values that are above or below threshold SpO₂ measurement values. *Supra* §VII.J.3.[31]. The Hudson-Goldsmith-Brady combination also renders obvious that these alerts of abnormal SpO₂ readings are output *via a network to a designated physician or other care provider*. For example, Goldsmith discloses that a “cellular network could be used to notify parents, physicians, or emergency services of alarms or alert states” based on an

abnormal analyte level. APPLE-1009, ¶¶[0017], [0072]-[0073], [0085], [0092].

Therefore, a POSITA would have found it obvious to apply the teachings of Goldsmith to the Hudson-Goldsmith-Brady system to provide this claim limitation. *Supra* §VII.J.2; APPLE-1083, ¶188.

K. MTA Ground 3B: The Hudson-Goldsmith-Brady-Tran Combination Renders Obvious Sub. Claims 32, 34-35

Like with Mendelson, the Hudson-Goldsmith-Brady system outputs one or more alarms associated with SpO₂ measurement values that are above or below threshold SpO₂ measurement values. *Supra* §VII.J.3.[31]; Pet. §III.B.2; APPLE-1083, ¶¶189-193. Therefore, a POSITA would have been prompted to modify the Hudson-Goldsmith-Brady system based on Tran in the same way as the Petition describes with respect to Mendelson to output reminders to the user to take SpO₂ measurements, allow the user to set such reminders to take future measurements, and to output an alert via a network to a designated physician or other care provider in response to abnormal SpO₂ readings and thus the combination provides claims 32 and 34-35. *See* Pet., §III.B.2, *supra* §VII.B. APPLE-1083, ¶¶189-193.

L. MTA Ground 3C: The Hudson-Goldsmith-Brady-Goldreich Combination Renders Obvious Sub. Claims 21-22, 25, 27-28, 36

For the reasons discusses above (§VII.D.1-3, *supra*), a POSITA would have been prompted to apply the teachings of Goldreich to the Hudson-Goldsmith-

Brady system to design the body of the wristwatch MCD to include a substantially water-tight enclosure for at least the processing board, the enclosure including impact resistant upper and lower shells. APPLE-1083, ¶¶194-214.

1. Claim 21

Hudson-Goldsmith-Brady-Goldreich renders obvious these claims as explained above for the corresponding claim limitations listed in the table below. APPLE-1083, ¶¶196-209.

Claim Limitation	Refer to Corresponding Limitations
[21pre]	§VII.J.3.[29pre]
[21a]	§VII.J.3.[29pre]
[21b]	§VII.J.3.[29a]
[21c]	<i>See further discussion below</i>
[21d]	§VII.J.3.[29c]
[21e]-[21f]	§VII.J.3.[29d]-[29e]
[21g]	§VII.J.3.[29f]
[21h]	§VII.J.3.[29g]
[21i]	§VII.J.3.[29h]
[21j]	§VII.J.3.[29i]
[21k]	<i>See further discussion below</i>
[21l]	<i>See further discussion below</i>
[21m]	<i>See further discussion below</i>

[21c]

See supra §VII.J.3.[29b].

Regarding the MCD including *cellular communication capabilities*, Hudson and Goldsmith disclose this feature. Hudson discloses that the “ultimate goal ... is to make the Phone Oximeter compatible with a variety of mobile phone platforms, which would reflect the actual market availability and variability of mobile phones and their use in different regions of the world.” APPLE-1094, 964. A POSITA would have understood this disclosure as including mobile phones with cellular communication capabilities. APPLE-1083, ¶¶198-200. Furthermore, Goldsmith discloses that its “watch controller device may further be adapted to include cellular phone, PDA and/or smart phone capabilities.” APPLE-1009, ¶[0097]; APPLE-1083, ¶¶198-200.

[21k]

Hudson discloses that “[t]he Xpod module provides the ... processed trend values for oxygen saturation ... in a serial data format” to the mobile device (i.e., the iPod Touch) via a wired connection. Therefore, as Dr. Kenny explains, a POSITA would have understood Hudson’s disclosure as teaching that all the processing of the one or more signals to generate the oxygen saturation measurements is performed on the pulse oximetry board prior to sending the data to the mobile device. APPLE-1083, ¶207. In addition, a POSITA would have understood Brady’s disclosure as teaching this feature as well. *See supra*

§VII.D.3.[21k]. The POSITA would further have recognized that this configuration would have freed up memory and processing capacity of the mobile device, since the built-in processors of the mobile device would not have to generate these measurements. APPLE-1083, ¶207.

[21l]

See supra §VII.J.3.[29b]. Hudson does not disclose any power source for the Xpod module (containing “*the processing board*”) ***other*** than the MCD.

Therefore, a POSITA would have understood Hudson as disclosing that the processing board *is configured to draw all power for operation from the MCD*.

APPLE-1083, ¶208. Brady also provides this limitation. *See supra* §VII.D.3.[21l]; APPLE-1083, ¶208.

[21m]

The Hudson-Goldsmith-Brady system includes a wristwatch MCD, (*see supra* §VII.J.4), and Goldsmith discloses that the housing of the watch controller device can be a “water resistant or waterproof housing” (APPLE-1009, ¶[0041]).

Although Hudson, Goldsmith, and Brady do not explicitly disclose [21m], Goldreich does. Goldreich discloses a cover 304 and case 306 of its wrist-mounted device that can come together to hold the components of the device (including a PCB 308) with a “waterproof sealing” between the cover and the case. APPLE-

1092, 10:52-53, 11:6-24, FIG. 2; *supra* §VII.D.1. A POSITA would have found it obvious to combine the Hudson-Goldsmith-Brady system with the teaching of Goldreich to (1) improve the waterproofing and durability of the system—properties which were well-known to be desirable characteristics for wrist-worn devices used for physiological measurements—and (2) to make the main body of Brady’s watch easy to disassemble for maintenance. *Supra* §VII.L; APPLE-1095, 14-15; APPLE-1083, ¶¶___. Moreover, to the extent that the cover and case taught by Goldreich do not render obvious ***impact resistant*** upper and lower shells (which Applicant does not concede), it would have been obvious to a POSITA to select the materials and shape of Goldreich’s cover and case to make them impact resistant, as was already being done for analogous devices prior to the Critical Date. APPLE-1095, 54-58; APPLE-1083, ¶209.

2. Claims 22, 25, 27, 28, 36

The combination renders obvious these claims as explained for the corresponding limitations listed below. APPLE-1083, ¶¶210-213.

Claim Limitation	Corresponding Limitations
[22]	§VII.J.3.[30]
[25]	§VII.J.3.[31]
[27]	§VII.J.3.[33]
[28]	§VII.J.3.[34]

Claim Limitation	Corresponding Limitations
[36]	§VII.L.1.[21m]

M.MTA Ground 3D: The Hudson-Goldsmith-Brady-Goldreich-Ording Combination Renders Obvious Sub. Claim 23

The watch of the combination system includes a touchscreen interface just like the Mendelson-D'Angelo system discussed in the Petition. *See supra* §§VII.J.2, VII.L; APPLE-1083, ¶¶215-218; Pet., §III.E.2. Therefore, a POSITA would have been prompted to modify the combination system based on Ording in the same way as the Petition describes with respect to the Mendelson-D'Angelo system to allow users to manipulate and navigate the display of physiological parameter information through use of touchscreen gestures including a pinch gesture to narrow or expand displayed results to provide claim 23. *See Pet.*, §III.E.2, APPLE-1083, ¶¶215-218.

N. MTA Ground 3E: The Hudson-Goldsmith-Brady-Goldreich-Tran Combination Renders Obvious Sub. Claims 24, 26, 28

A POSITA would have applied Tran to the combination for discussed in Ground 3B, *supra* to provide claims 24, 26, and 28 for the same reasons as claims 35, 32, and 34, respectively. *See supra* §VII.K; §VII.B; §VII.F; APPLE-1083, ¶¶219-223.

VIII. OTHER REFERENCES MATERIAL TO PATENTABILITY

Many MTA claim features are also taught by a host of other references:

Features	Prior Art References
Non-wireless connections between an optical sensor, a processing board, and a MCD	APPLE-1010, ¶¶[0010], [0013], [0060], [0120]; APPLE-1097, 2-3, FIG. 1; APPLE-1101, 14:40-50, 16:4-5; APPLE-1093, ¶¶[0063]-[0064], FIG. 10.
Receiving unprocessed signals from the optical sensor	APPLE-1010, ¶¶[0013],[0060]; APPLE-1102, 12:30-64; FIG. 7, FIGS. 10-11.
Processing board drawing all power from the MCD	APPLE-1013, 2:24-26, 5:14-26, FIG. 1; APPLE-1097, 3, 6.
Wrist-worn/wristwatch MCDs with cellular communication capabilities and touch sensitive screens	APPLE-1010, ¶¶[0023], [0125], [0136]; APPLE-1100, Abstract; APPLE-1103, ¶¶[0002]-[0008], [0092]-[0093].
Water-tight enclosures w/impact resistant upper and lower shells	APPLE-1095, 14-15; APPLE-1104, ¶[0098], FIG. 18; APPLE-1105, ¶¶[0065], [0134]-[0135].

APPLE-1083, ¶224.

IX. CONCLUSION

Petitioner respectfully requests denial of Masimo's MTA.

Respectfully submitted,

Date: 1/13/2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on January 13, 2025, a complete and entire copy of this Petitioner's Opposition to Patent Owner's Motion to Amend was provided via email to Patent Owner by serving the correspondence email addresses of record as follows:

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