

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HTC CORPORATION, HTC AMERICA, INC., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

UNILOC 2017 LLC,
Patent Owner.

IPR2018-01589¹
Patent 7,653,508 B1

Before SALLY C. MEDLEY, JOHN F. HORVATH, and
SEAN P. O'HANLON, *Administrative Patent Judges*.

O'HANLON, *Administrative Patent Judge*.

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

¹ Samsung Electronics America, Inc., which filed a petition in IPR2019-00889, has been joined as a petitioner in this proceeding.

I. INTRODUCTION

A. Background

HTC Corporation and HTC America, Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 1–4, 6–8, 11–16, 19, and 20 of U.S. Patent No. 7,653,508 B1 (Ex. 1001, “the ’508 patent”). Paper 1 (“Pet.”), 1. Concurrently with its Petition, Petitioner filed a Motion for Joinder with *Apple Inc. v. Uniloc 2017 LLC*, IPR2018-00387 (“the Apple IPR”). Paper 3 (“Motion” or “Mot.”). Uniloc 2017 LLC (“Patent Owner”) filed a Preliminary Response. Paper 8.

On February 27, 2019, we instituted an *inter partes* review. Paper 9 (“Institution Decision” or “Inst. Dec.”), 10–12. In the Institution Decision, we granted in part Petitioner’s Motion with respect to claims 1–4, 6–8, 11–16, and 19, and denied in part Petitioner’s Motion with respect to claim 20 (which was not challenged in the Apple IPR). *Id.* We explained,

Given that Petitioner is being joined as a party to the Apple IPR and that “Petitioner[] agree[s] to proceed on the grounds, evidence, and arguments advanced, or that will be advanced, in the Apple IPR as instituted,” Petitioner is bound by the ultimate determination made in the Apple IPR regarding claims 1–4, 6–8, 11–16, and 19. *See* 35 U.S.C. §§ 315(e)(1), 325(d); 37 C.F.R. § 42.73(d)(1). Accordingly, Petitioner shall not advance any arguments regarding these claims in this proceeding; all grounds raised by Petitioner regarding these claims will be addressed in the Apple IPR. The parties are limited to advancing arguments regarding claim 20 in this proceeding.

Id. at 10 (alterations in original).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 11, “PO Resp.”), Petitioner filed a Reply to the Patent

Owner Response (Paper 12, “Pet. Reply”), and Patent Owner filed a Sur-Reply to Petitioner’s Reply (Paper 14, “PO Sur-Reply). An oral hearing was held on December 11, 2019. A transcript of the hearing has been entered into the record. Paper 26 (“Tr.”).

In our Scheduling Order, we notified the parties that “any arguments for patentability not raised in the [Patent Owner] response will be deemed waived.” *See* Paper 10, 5; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide (“CTPG”) 66 (Nov. 2019)² (“The patent owner response . . . should identify all the involved claims that are believed to be patentable and state the basis for that belief.”).

For the reasons that follow, we conclude that Petitioner has proven by a preponderance of the evidence that claims 1–4, 6–8, 11–16, 19, and 20 of the ’508 patent are unpatentable.

B. Related Matters

The parties indicate that the ’508 patent is the subject of the following litigation:

Uniloc USA, Inc. v. Apple Inc., No. 2-17-cv-00522 (E.D. Tex. filed June 30, 2017),

Uniloc USA, Inc. v. Samsung Electronics America, Inc., No. 2-17-cv-00650 (E.D. Tex. filed Sept. 15, 2017),

Uniloc USA, Inc. v. LG Electronics USA, Inc., No. 4-12-cv-00832 (N.D. Tex. filed Oct. 13, 2017),

Uniloc USA, Inc. v. HTC America, Inc., No. 2-17-cv-01629 (W.D. Wash. filed Nov. 1, 2017),

² Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

Uniloc USA, Inc. v. Huawei Devices USA, Inc., No. 2-17-cv-00737 (E.D. Tex. filed Nov. 9, 2017),

Uniloc USA, Inc. v. Apple Inc., No. 4-18-cv-00364 (N.D. Cal. filed Jan. 17, 2018), and

Uniloc USA, Inc. v. LG Electronics USA, Inc., No. 4-18-cv-02918 (N.D. Cal. filed May 17, 2018).

Pet. 2; PO Resp. 2. The '508 patent is also the subject of several *inter partes* reviews:

Apple, Inc. v. Uniloc 2017, LLC, IPR2018-00387 (the Apple IPR),

Apple, Inc. v. Uniloc 2017, LLC, IPR2018-01026,

LG Electronics, Inc. v. Uniloc 2017, LLC, IPR2018-01577,

Samsung Electronics America, Inc. v. Uniloc 2017, LLC, IPR2018-01756, and

Samsung Electronics America, Inc. v. Uniloc 2017, LLC, IPR2019-00889.

C. Real Parties-in-Interest

The statute governing *inter partes* review proceedings sets forth certain requirements for a petition for *inter partes* review, including that “the petition identif[y] all real parties in interest.” 35 U.S.C. § 312(a)(2); *see also* 37 C.F.R. § 42.8(b)(1) (requiring identification of real parties-in-interest in mandatory notices). The Petition identifies HTC Corporation and HTC America, Inc. as the real parties-in-interest. Pet. 2. Patent Owner states that its real parties-in-interest are Uniloc 2017 LLC, Uniloc USA, Inc., and Uniloc Licensing USA LLC. Paper 6, 2.

D. The Challenged Patent

The '508 patent discloses a device and method for counting a user's steps using an inertial sensor. Ex. 1001, 1:5–7, 2:8–9. As used in the '508 patent, a “step” is “any user activity having a periodic set of repeated movements.” *Id.* at 3:32–36. A tri-axis inertial sensor can be used to provide acceleration data as a function of time along three axes. *Id.* at 3:37–44, Fig. 2. Steps are counted by analyzing acceleration data relative to a dominant axis, which can be the axis most influenced by gravity or an axis that is defined as approximately aligned to gravity. *Id.* at 6:22–55. An example acceleration chart is shown in Figure 2, which is reproduced below:

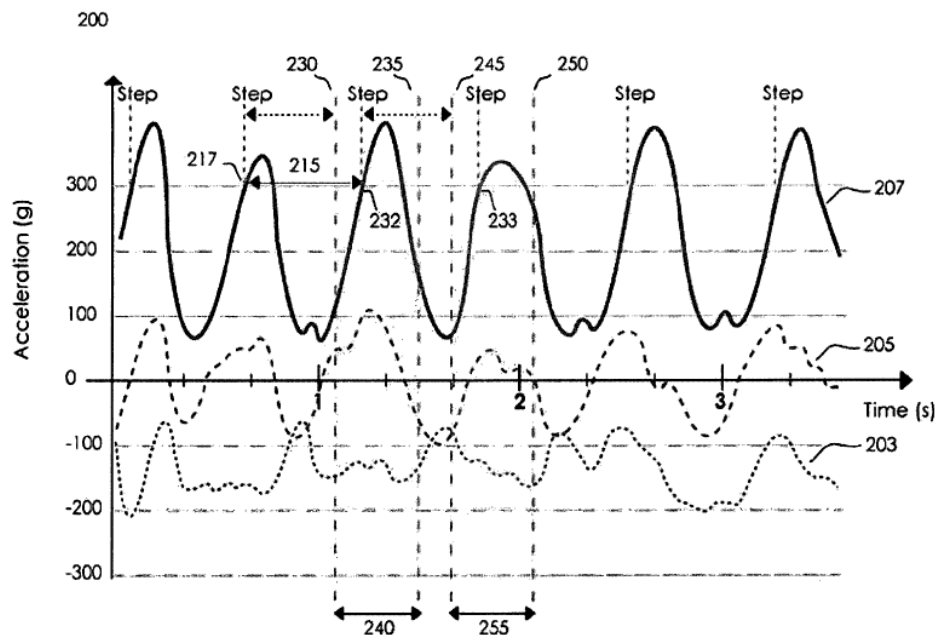


Figure 2

Figure 2 illustrates an exemplary cadence of motion graph displaying acceleration measurements versus time along a first axis 203, a second axis 205, and a third (dominant) axis 207. *Id.* at 1:45–47, 3:42–45.

Step counting may be accomplished by taking an acceleration measurement, filtering the measurement to remove high and/or low frequency data, and determining whether the measurement is within a certain amount of time since the last step was counted. Ex. 1001, 3:65–67, 12:31–51. If the measurement is made within the allowed time, it is further evaluated to determine whether the acceleration along the dominant axis is greater than a lower threshold. *Id.* at 12:52–58. A step may be counted if the measurement is greater than the lower threshold, greater than previous measurements, and less than an upper threshold, and if it is determined that the user is moving away from gravity (e.g., the user is lifting a foot from the ground rather than planting a foot on the ground). *Id.* at 12:59–63, 13:33–14:3, Fig. 8.

In operation, the system is initiated in a sleep mode during which data is collected at a low sampling rate. Ex. 1001, 8:20, 8:64–66. If acceleration is detected, an entry mode is initiated. *Id.* at 8:22–23. If a certain number of steps are detected in a predetermined amount of time, the system shifts to a stepping mode; if not, the system returns to the sleep mode. *Id.* at 8:24–29. In the stepping mode, data is monitored to count steps according to predefined sets of rules and motion criteria. *Id.* at 8:30–35. If a step is not detected within a set time interval, the system shifts into an exit mode. *Id.* at 8:35–37. If a certain number of steps are detected in a predetermined amount of time in the exit mode, the system returns to the stepping mode; if not, the system returns to the entry mode. *Id.* at 8:38–44.

E. The Challenged Claim

As noted above, only claim 20 is considered in this *inter partes* review. Inst. Dec. 10–12. Claim 20 depends from claim 15 through claim 19. Ex. 1001, 16:54–56. Claims 15, 19, and 20 are reproduced below:

15. A device including an inertial sensor, comprising:
a counting logic, to identify and count periodic human motions;
a mode logic, to switch the device from a non-active mode to an active mode after a number of periodic human motions are detected within appropriate cadence windows by the counting logic; and
a buffer, to buffer periodic human motions when the device is in the non-active mode.
19. The device of claim 15, further comprising:
a cadence logic, to set the appropriate cadence windows.
20. The device of claim 19, wherein the cadence logic adjusts the cadence windows based on a measured cadence associated with the periodic human motion.

Ex. 1001, 16:30–39, 16:52–56.

F. Instituted Grounds of Unpatentability

The Petition relies on the following prior art references:

Reference	Date	Exhibit
US 7,463,997 B2 (“Pasolini”)	filed Oct. 2, 2006 issued Dec. 9, 2008	1005
US 7,698,097 B2 (“Fabio”)	filed Oct. 2, 2006 issued Apr. 13, 2010	1006

Petitioner sets forth the following grounds of unpatentability:

Claims Challenged	35 U.S.C. §	Reference(s)
1, 2, 11, 12	103(a) ³	Pasolini
6–8, 15, 16, 19	103(a)	Fabio
3, 4, 13, 14, 20	103(a)	Pasolini, Fabio

Pet. 16. Petitioner submits a declaration of Joseph A. Paradiso, Ph.D. (Ex. 1003) in support of its contentions.

II. ANALYSIS

A. Principles of Law

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

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence,

³ The ’508 patent was filed on December 22, 2006, prior to the date when the Leahy-Smith America Invents Act (“AIA”) took effect.

objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Citing its declarant, Petitioner contends that a person having ordinary skill in the art at the time of the invention (“POSITA”) would have had “a Bachelor’s degree in Electrical Engineering, Computer Engineering, and/or Computer Science, or equivalent training,” and “approximately two years of experience working in hardware and/or software design and development related to MEMS (micro-electro-mechanical) devices and body motion sensing systems.” Pet. 6–7 (citing Ex. 1003, 10). Patent Owner does not refute Petitioner’s definition or offer a competing definition. PO Resp. 3.

We find Petitioner’s definition reasonable, and, because it is consistent with the problems and solutions in the ’508 patent and cited references, we adopt it as our own. *See, e.g.*, Ex. 1001, 1:11–18 (discussing MEMS technology); Ex. 1005, 1:34–39 (same); Ex. 1006, 2:49–52 (same); *see also In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (“In determining this skill level, the court may consider various factors including type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” (citations and internal quotations omitted)).

C. Claim Construction

In an *inter partes* review filed before November 13, 2018, a claim in an unexpired patent shall be given its broadest reasonable construction in

light of the specification of the patent in which it appears.⁴ 37 C.F.R. § 42.100(b) (2018); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Consistent with the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). The presumption may be overcome by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Only those terms which are in controversy need be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

When a claim term does not include the word “means,” a rebuttable presumption that the term is not drafted in means-plus-function language can

⁴ This Petition was filed before the effective date of the amendment to 37 C.F.R. § 42.100 that changed the claim construction standard applied in *inter partes* reviews. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective Nov. 13, 2018). Thus, we use the broadest reasonable interpretation claim construction standard for this proceeding.

be overcome “if the challenger demonstrates that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function.” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015) (en banc in relevant part) (quotation marks and internal citations omitted). If the presumption is overcome, “[a]pplication of § 112, ¶ 6 requires identification of the structure in the specification which performs the recited function,” but does not permit “incorporation of structure from the written description beyond that necessary to perform the claimed function.” *Micro Chem., Inc., v. Great Plains Chem. Co.*, 194 F.3d 1250, 1257–58 (Fed. Cir. 1999).

Petitioner proposes constructions for certain claim terms, asserting that its “claim constructions . . . are based on the broadest reasonable construction.” Pet. 7–15. Patent Owner disagrees with Petitioner’s proposed constructions. PO Resp. 3–6.

1. “logic” terms

We first address the “logic” terms recited in claim 20 via its dependence from claims 15 and 19: “counting logic,” “mode logic,” and “cadence logic.” Pet. 11–14. Petitioner contends that these terms would have been understood to include “hardware, software, or both” to perform the functions recited. *See id.* at 11–13. Petitioner also contends that “to the extent that Patent Owner overcomes the presumption against construction under 35 U.S.C. § 112, sixth paragraph, a POSITA would have understood” certain structures to be associated with the recited functions. *Id.* at 12, 13, 14. More particularly, Petitioner contends that these terms “under the narrower *Phillips* standard,” which does not apply in this *inter partes* review, are directed to “logic,” which “invoke[s] § 112 ¶ 6 but fail[s] to meet

the definiteness requirement of § 112 ¶ 2.” *Id.* at 14. Patent Owner contends that none of these “logic” terms are governed by 35 U.S.C. § 112 ¶ 6, and that no construction is necessary. PO Resp. 5–6.

We determine that the presumption against application of § 112 ¶ 6 has not been overcome, and that express construction of these terms is not necessary. None of these “logic” terms recite the word “means,” and, therefore, there is a presumption that the terms are not drafted in means-plus-function format. *Williamson*, 792 F.3d at 1349. Additionally, although preserving for district court litigation its position that the claims are drafted in means-plus-function format, Petitioner affirmatively argues here, and supports with testimonial evidence, the contention that a person of ordinary skill in the art would interpret each of these “logic” terms to include “hardware, software, or both.” *See* Ex. 1003 ¶¶ 42, 45, 48. Patent Owner similarly contends that none of these “logic” terms are governed by 35 U.S.C. § 112 ¶ 6. PO Resp. 5–6.

Therefore, under *Williamson*, neither party has challenged the rebuttable presumption that § 112 ¶ 6 does not apply to these terms, which do not use the word “means.” Petitioner’s alternative position that these claim terms are indefinite appears to give “notice” of its claim construction position in district court, but is not a position that Petitioner is affirmatively asserting in this proceeding. *See* Pet. 15 (stating that “regardless of whether the recited ‘logic’ is a nonce word requiring the disclosure of an algorithm, the Board may still find that the claims are obvious in view of the software and hardware disclosed in the prior art cited in this [P]etition”). More importantly, there is no record evidence, proposed by either party, to support the construction of these “logic” terms as nonce words under § 112 ¶ 6, and,

therefore, the presumption against application of § 112 ¶ 6 is unrebutted.
See Zeroclick LLC v. Apple Inc., 891 F.3d 1003, 1007–08 (Fed. Cir. 2018).

2. cadence window

Petitioner proposes that “cadence window” includes “a window of time since a last step was counted that is looked at to detect a new step.” Pet. 9 (citing Ex. 1003, 18). Patent Owner does not contest Petitioner’s proposal or offer one of its own. PO Resp. 3–4.

Petitioner relies on language from the Specification of the ’508 patent, namely the statement that “[a] cadence window is a window of time since a last step was counted that is looked at to detect a new step” (Ex. 1001, 3:65–67). We note that the ’508 patent also states: “cadence window (the allowable time window for steps to occur).” *Id.* at 3:58–59. These descriptions are similar in that they are both lengths of time during which a step can be detected, with Petitioner’s definition being narrower due to the requirement that the cadence window occurs “since a last step was counted.” We understand Petitioner to interpret “[a] cadence window *is* a window of time since a last step was counted that is looked at to detect a new step” (*id.* at 3:65–67 (emphasis added)) to indicate that a definition is provided.

We agree with Petitioner’s reasoning regarding “is,” adopt Petitioner’s proposed construction, and determine that a “cadence window” is a window of time since a last step was counted that is looked at to detect a new step.

D. Overview of the Prior Art

1. Pasolini

Pasolini discloses a pedometer and step detection method. Ex. 1005, 1:10–12. The pedometer includes an accelerometer and a processing unit. *Id.* at 2:60–63. The pedometer is carried by the user, and the accelerometer senses vertical accelerations that occur with each step due to impact of the feet on the ground. *Id.* at 2:66–3:29. The accelerometer produces an acceleration signal corresponding to the detected accelerations, and the processing unit acquires, at pre-set intervals, samples of the signal. *Id.* at 3:16–19, 3:30–33. The processing unit processes the acceleration signal to count the number of steps taken by the user. *Id.* at 3:32–34. Figure 2 is reproduced below:

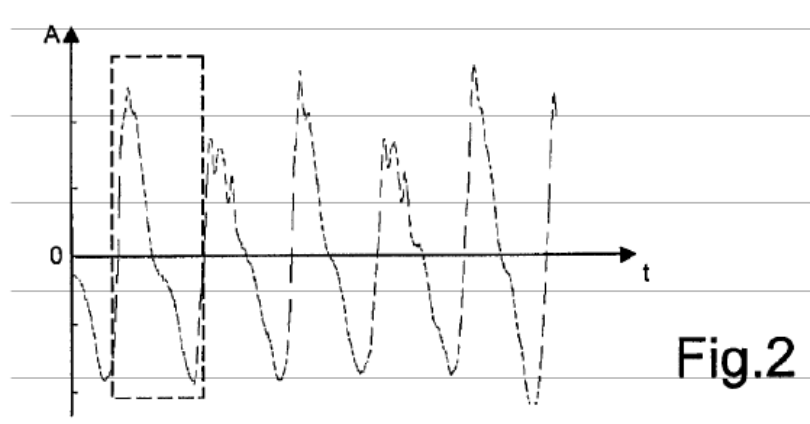


Figure 2 shows a graph corresponding to the pattern of an acceleration signal during a step. *Id.* at 2:39–40.

Step counting may be accomplished by an algorithm that analyzes the acceleration signal to look for a positive phase of the step followed by a negative phase within a pre-set time interval from the occurrence of the positive phase. Ex. 1005, 3:63–66. During the positive phase, a positive-acceleration peak occurs (i.e., directed upwards) due to contact and

consequent impact of the foot with the ground; during the negative phase, a negative-acceleration peak occurs (i.e., directed downwards) due to rebound, having an absolute value smaller than that of the positive-acceleration peak. *Id.* at 3:23–29. The processing unit compares the value of the acceleration signal with positive and negative reference thresholds (S^+ and S^- , respectfully) to identify, respectively, the positive phase (positive acceleration peak) and the negative phase (negative acceleration peak) of the step. *Id.* at 3:36–41. Acceleration datum (CalAcc) values are calculated for each acceleration sample (Acc) based on the acceleration sample value and a mean value (Accm) of the acceleration samples. *Id.* at 6:5, Fig. 3. The positive phase is detected when the acceleration datum exceeds the positive reference threshold and then drops below the positive reference threshold. *Id.* at 4:35–40. The negative phase is detected when the acceleration datum drops below the negative reference threshold within a certain time interval, in which case the processing unit increments the count of detected steps and the algorithm looks for a new potential positive phase of a step. *Id.* at 4:66–5:3, 5:40–41. If no negative phase is detected within the time interval, the algorithm looks for a new potential positive phase of a step without incrementing the step count. *Id.* at 4:62–65, Fig. 3. Alternatively, the step detection can be based solely on the positive phase of the step. *Id.* at 7:65–8:1.

The accelerometer can be a linear accelerometer (Ex. 1005, 2:61), and can also be a three-axis accelerometer (*id.* at 8:11–15). In the latter case, the processing unit identifies the axis having the highest mean acceleration value (due to gravity) as the main vertical axis to be used for step detection. *Id.* at 8:15–24.

2. Fabio

Fabio discloses a pedometer that includes an inertial sensor and a control unit. Ex. 1006, 2:34–40, Figs. 1–2. The pedometer is carried by the user, and the inertial sensor measures accelerations along its detection axis. *Id.* at 2:49–59. Steps are detected by analyzing the acceleration data for a positive peak exceeding a first threshold A_{ZP} , followed by a negative peak exceeding a second threshold A_{ZN} within a certain time window TW after the positive peak. *Id.* at 4:12–21. Figure 5 is reproduced below:

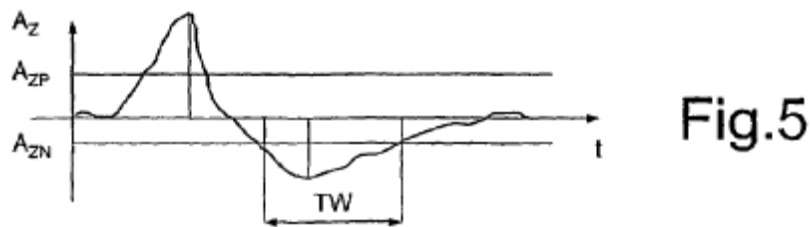


Figure 5 shows a graph of the acceleration signal measured during a step of the user. *Id.* at 4:13–15, 6:23–26.

A detected step is validated as a step when it falls within a variable time window TV, which is illustrated in Figure 6, reproduced below.

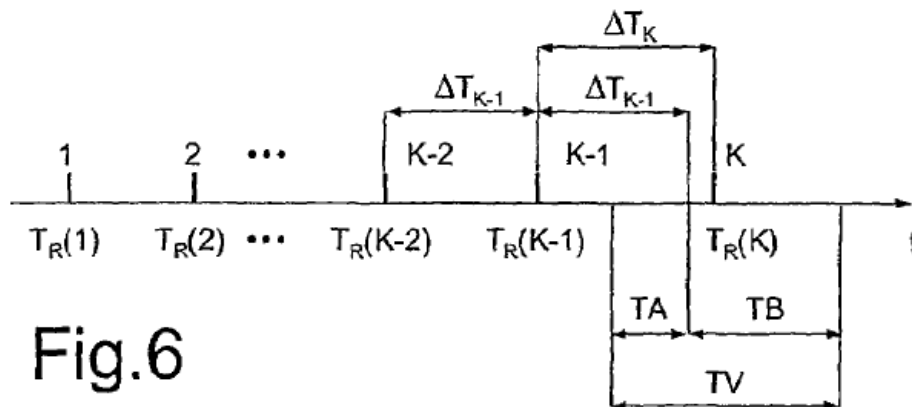


Figure 6 of Fabio is a graph illustrating quantities used to validate user steps detected from acceleration data. Ex. 1006, 2:24–25. Figure 6 illustrates a

sequence of user steps detected at times $T_R(1)$, $T_R(2)$, . . . , $T_R(K-2)$, $T_R(K-1)$, and $T_R(K)$ according to the method disclosed in Figure 5. The time between steps detected at times $T_R(K-1)$ and $T_R(K-2)$ is ΔT_{K-1} ; the time between steps detected at times $T_R(K)$ and $T_R(K-1)$ is ΔT_K . *Id.* at 4:28–35. For the step detected at time $T_R(K)$ to be validated as a step, it must fall within variable time window TV; i.e., $T_R(K)$ must be greater than $T_R(K-1) + \frac{1}{2} (\Delta T_{K-1})$ and less than $T_R(K-1) + 2 (\Delta T_{K-1})$. *Id.* at 4:35–52.

In operation, the control unit initially implements a first counting procedure in which acceleration data is sampled at a pre-determined frequency. Ex. 1006, 3:13–21, Figs. 3–4. The user is considered to be at rest, and the control unit executes the first counting procedure to analyze acceleration data for an indication that the user is engaged in activity with a regular gait. *Id.* at 3:22–27. If a regular gait is detected, the number of detected steps during the first counting procedure is added to the number of total steps and the control unit executes a second counting procedure according to which each detected valid step is added to the number of total steps; if no regular gait is detected within a certain amount of time, the pedometer is set in a low power consumption state and the control unit executes a surveying procedure until the pedometer is moved. *Id.* at 3:27–56, Figs. 4, 7, 8. If, when executing the second counting procedure, an interruption in locomotion is detected, the control unit reverts to the first counting procedure. *Id.* at 3:44–49. If pedometer movement is detected during execution of the surveying procedure, the control unit reverts to the first counting procedure. *Id.* at 3:53–57, Fig. 3.

E. Claims 1–4, 6–8, 11–16, and 19

As noted above, “Petitioner is bound by the ultimate determination made in the Apple IPR regarding claims 1–4, 6–8, 11–16, and 19.” Inst. Dec. 10 (citing 35 U.S.C. §§ 315(e)(1), 325(d); 37 C.F.R. § 42.73(d)(1)). A Final Written Decision has issued in the Apple IPR, in which claims 1–4, 6–8, 11–16, and 19 were determined to be unpatentable. Apple IPR, Paper 21 at 49; *see also id.* at Paper 23 (Decision Denying Patent Owner’s Request on Rehearing of Final Written Decision). For the same reasons set forth in the Apple IPR, we determine Petitioner has demonstrated by a preponderance of evidence that claims 1–4, 6–8, 11–16, and 19 of the ’508 patent are unpatentable. *See* Apple IPR, Paper 21 at 19–48.

F. Claim 20

The Petitioner maps claim 20 to Fabio. Pet. 72–73. Referencing its arguments made regarding claims 3 and 19, Petitioner contends that “Fabio teaches a cadence logic that sets the appropriate cadence window for each step based on the previous step,” and “the validation interval TV (i.e., the cadence window) for each new step is continuously updated based on the timing and duration of the immediately preceding step.” *Id.* at 72 (citing Ex. 1003, 94–95). “Because the validation interval for each step is updated based on the timing and duration of the immediately preceding step, a POSITA would have understood that the validation interval (i.e., the cadence window) is adjusted based on a measured cadence associated with the periodic human motion.” *Id.* (citing Ex. 1003, 95).

Patent Owner disputes Petitioner’s contentions. PO Resp. 6–18. Patent Owner first presents several arguments, directed to claim 6 and

claim 15 from which claim 20 depends, that are substantially similar to arguments made in the Apple IPR. *Id.* at 6–16. First, Patent Owner argues that “Fabio’s [validation interval] TV is *retrospective* at least in that it is used to validate only the immediately preceding step (shown in Fig. 6 as K-1), as opposed to the current step detected (shown in Fig. 6 as K).” *Id.* at 8 (citing Ex. 1006, 4:28–49); *see also id.* at 14 (referencing arguments in sections “VI.A.1–2”), 17 (referencing arguments in section “VI.A.1”). This is the same “retrospective” argument Patent Owner made in the Apple IPR. *See* Apple IPR, Paper 11 at 11–13 (Patent Owner Response). This argument is not persuasive for the same reasons set forth in the Apple IPR. *See id.*, Paper 21 at 30–33 (Final Written Decision); Paper 23 at 2–4 (Decision Denying Patent Owner’s Request on Rehearing of Final Written Decision).

In the Apple IPR Final Decision, we addressed—at length—Patent Owner’s “retrospective” argument asserting that Fabio validates the preceding step (K-1) rather than the current step (K) by explaining that, when considering Fabio’s disclosure as a whole, Fabio discloses that the *current* step is the step being validated and counted. *See* Apple IPR, Paper 21 at 30–33. We stated, for example,

We understand Patent Owner’s [retrospective] interpretation to be based on Fabio’s reference to the “last step recognized”—interpreting the “last step recognized” as the last or preceding step. In fact, the relevant disclosure in Fabio refers to the “last step recognized,” the “current step,” and the “immediately preceding step”:

More precisely, the last step recognized is validated if the instant of recognition of the current step $T_R(K)$ falls within a validation interval TV, defined with respect to the instant of recognition of the immediately preceding step $T_R(K-1)$, in the following way:

$$TV=[T_R(K-1)+\Delta T_{K-1}-TA, T_R(K-1)+\Delta T_{K-1}+TB]$$

where TA and TB are complementary portions of the validation interval TV.

[Ex. 1006,] 4:35–43. Patent Owner contends that “last step recognized” refers to the immediately preceding step (K–1). We disagree. First, the language quoted above indicates that the current step has been recognized (“instant of recognition of the current step”), and the current step (K) necessarily occurred more recently than the immediately preceding step (K–1). *See id.* at Fig. 6 (illustrating a timeline of steps 1, 2, . . . , K–2, K–1, K). Second, only recognized steps are subjected to the validation test. *Id.* at 4:24–27 (“If . . . the step-recognition test is passed (output YES from block 225), the control unit 5 executes a first validation test, corresponding to the regularity of the individual step (block 230).”), 6:27–34 (discussing the second counting procedure and stating “The second validation test is altogether similar to the first validation test carried out in block 230 of FIG. [4].”), Figs. 4, 7.

Accordingly, we find that “last step recognized” refers to the current step (K) because both (K) and (K–1) are recognized steps, and between them, (K) was the last step that was recognized. This understanding is further supported by several of Fabio’s claims, which discuss validation of the “current detected step.” . . . We note that all of this claim language appeared in the Fabio application as originally filed on October 2, 2006. *See* Fabio patent file history, Specification 16 (filed October 2, 2006) (Ex. 3001).

In addition to being consistent with Fabio’s disclosure, Petitioner’s contentions that the current detected step (K) is the step being validated are supported by reference to the testimony of its declarant. *See* Pet. 45–47 (citing, in relevant part, Ex. 1003, 58–59). We credit this testimony as it is un rebutted, factually supported, and more consistent with Fabio’s disclosure as we have described above. Consequently, we view Petitioner’s evidence as more persuasive (and probative) than Patent Owner’s reading of Fabio.

Id. at 31–33.

Next, Patent Owner argues that the Petition is inconsistent with how it treats Fabio's validation interval TV by first defining "cadence window" as being a measurement of time since the last step was *counted* and then discussing Fabio's TV as being measured from when the last step was *recognized*. PO Resp. 9; *see also id.* at 14–15 (referencing arguments made in sections "VI.A.1–3"). This argument is the same as an argument Patent Owner made in the Apple IPR. *See* Apple IPR, Paper 11 at 13 (Patent Owner Response). This argument is not persuasive for the same reasons set forth in the Apple IPR. In the Apple IPR Final Decision, we explained,

Fabio discloses that once analysis of an acceleration sample indicates that a step has been recognized, the control unit executes the first validation test. Ex. 1006, 4:24–27. Additionally, both Figure 4 (illustrating a flowchart of the first counting procedure) and Figure 7 (illustrating a flowchart of the second counting procedure) indicate that an acceleration datum is subjected to the validation test immediately after a step has been recognized.

Id., Paper 21 at 34.

Next, Patent Owner argues that a valid step will not be counted if the next step is a "false positive" detection. PO Resp. 10. In other words, Patent Owner argues that an actual step will not be validated (and counted) if the next step occurs outside the interval time TV (that is, if the next step (K+1) is not a valid step). Patent Owner also argues that Fabio's validation interval TV excludes some time "since detection of the last step" because the validation interval TV does not begin immediately after the last step is detected. *Id.*; *see also id.* at 8 (indicating this "excluded time" with a red arrow on an annotated version of Fabio Figure 6). This argument is the same as an argument Patent Owner made in the Apple IPR. *See* Apple IPR,

Paper 11 at 13–14 (Patent Owner Response). This argument is not persuasive for the same reasons set forth in the Apple IPR. In the Apple IPR Final Decision, we explained,

Patent Owner’s arguments rely on the same “retrospective” interpretation discussed above, and are unpersuasive for the same reasons that we previously explained. Furthermore, we previously explained that the beginning and end points of Fabio’s validation interval TV are determined based on the time that the previous step was recognized ($T_R(K-1)$). *See* section II.D.2 above. There, we noted that Fabio defines validation interval TV as beginning at time $T_R(K-1) + \frac{1}{2} (\Delta T_{K-1})$ and ending at time $T_R(K-1) + 2 (\Delta T_{K-1})$. *See* Ex. 1006, 4:35–52, Fig. 6. As we also previously explained, because the validation test begins immediately after a step is recognized, there is no appreciable time difference between Fabio’s detection and counting of steps. Thus, we find that Fabio’s validation interval TV is a window of time “since” a last step was counted. As correctly noted by Petitioner (*see* Pet. Reply 12–14), the ’508 patent similarly discloses a time “gap” between the counting of a previous step and the beginning of the cadence window. *See* Ex. 1001, 4:41–55, Fig. 2 (describing and illustrating a time gap of “about 0.35 seconds from the second step 232” to the beginning 245 of second cadence window 255).

Id., Paper 21 at 34–35; *see also id.* Paper 23 at 4–6 (Decision Denying Patent Owner’s Request on Rehearing of Final Written Decision).

Next, Patent Owner argues that switching from Fabio’s first counting procedure to the second counting procedure does not teach or suggest switching from a non-active mode to an active mode, asserting that the first counting procedure is not a non-active mode because it counts steps. PO Resp. 11–12. This argument is the same as an argument Patent Owner made in the Apple IPR. *See* Apple IPR, Paper 11 at 15–16 (Patent Owner

Response). This argument is not persuasive for the same reasons set forth in the Apple IPR. In the Apple IPR Final Decision, we explained,

Patent Owner is correct to the extent that, in Fabio's first counting procedure, the number of valid *control* steps N_{VC} is counted. However, these control steps are not added to the number of valid steps N_{VT} unless the first regularity test is satisfied. If the first regularity test is not satisfied, the number of control steps is not added to the number of valid steps N_{VT} . If too many detected steps are determined not to be valid in the first counting procedure, the number of valid control steps is reset to zero. *Id.* at 4:56–64. Accordingly, we find that Fabio's count of valid control steps N_{VC} is a buffered step count, not an actual step count. We further find that when Fabio switches from the first counting procedure that maintains buffered step count N_{VC} to the second counting procedure that maintains actual step count N_{VT} , it switches from a non-active mode to an active mode.

. . . [T]he '508 patent operates in a similar manner as Fabio. *See* Ex. 1001, 10:67–11:3 (“When the number of steps in the buffered step count reaches N , the buffered steps are added to an actual or final step count, and a stepping mode is entered into (block 584).”). The “entry mode” described in the '508 patent maintains a buffered step count when a user first begins an activity, but the steps are not actually counted until the “stepping mode” is entered. *Id.* at 8:22–28, 10:67–11:3. The '508 patent describes the “stepping mode” and “entry mode” as different modes, and further describes the “active mode” as the mode entered “once *continuous steps* within the cadence window *have been identified*” and the “non-active mode” as “all other states.” *Id.* at 7:57–64 (emphases added). Thus, the '508 patent's “entry mode” is a “non-active mode” during which tentative steps are buffered but not counted, and its “stepping mode” is an “active mode” that is switched to after continuous steps have been identified in the non-active “entry mode.” Similarly, as discussed above, Fabio's first counting procedure is a non-active mode during which tentative steps are buffered in counter N_{VC} , and Fabio's second counting procedure is an active mode that is switched to from the first

counting procedure to actively counts steps in counter N_{VT} once a sufficient number of tentative steps have been counted.

Id., Paper 21 at 36–37.

Relying on Fabio Figure 3, Patent Owner next argues that Fabio’s “*first* counting procedure is included as a part of every process flow, while the *second* counting procedure is simply included as a secondary process in certain instances.” PO Resp. 12. Patent Owner notes that the same step recognition process occurs in both the first and second counting procedures. *Id.* at 13–14. This argument is the same as an argument Patent Owner made in the Apple IPR. *See* Apple IPR, Paper 11 at 16–18 (Patent Owner Response). This argument is not persuasive for the same reasons set forth in the Apple IPR. In the Apple IPR Final Decision, we explained,

Fabio explains that once it is determined that the user is moving with a regular gait, “the first counting procedure *is terminated*” and “the second counting procedure is executed.” Ex. 1006, 5:36–39 (emphasis added). Fabio further explains that if, during the second counting procedure, it is determined that the user is no longer moving with a regular gait, “the second counting procedure *is terminated*” and “the first counting procedure resumes.” *Id.* at 3:46–49, 7:1–6 (emphasis added). Thus, Fabio operates under either the first counting procedure *or* the second counting procedure, but does not operate under both the first and second counting procedures simultaneously as suggested by Patent Owner.

Id., Paper 21 at 38.

Patent Owner also presents arguments directed to claim 20. PO Resp. 16–18. Patent Owner argues that the Petition “rel[ies] on conclusory testimony of a declarant as to what would have been common knowledge at the time.” *Id.* at 16 (citing Pet. 72). Patent Owner argues that “Fabio does not disclose adjusting a cadence window based on a measured cadence” and

that “Petitioner does not explain how Fabio’s use of a *single* prior step can approximate ‘a measured cadence’ as required by the claim language.” *Id.* at 17–18. Patent Owner argues that “cadence,” as used in claim 20, requires the consideration of multiple steps or step periods that collectively define the cadence. PO Sur-Reply 3–6. Patent Owner similarly argues that “in the system of Fabio, for the previous step to be validated, its duration must be *substantially homogenous* with the duration of the current step.” PO Resp. 18 (citing Ex. 1006, 4:28–31). According to Patent Owner, “Fabio does not disclose any ‘adjust[ing] based on a measured cadence’ because steps in the system of Fabio are only validated if the previous step is *substantially homogenous* with the current step.” *Id.* (alteration in original); *see also* PO Sur-Reply 6–7.

These arguments are not persuasive for the same reasons set forth in the Apple IPR. As we noted in the Apple IPR Final Decision,

Fabio discloses that the amplitude (duration) of validation interval TV is based on the amplitude of the immediately preceding step and is determined anew each time a step is recognized. Ex. 1006, 4:28–55. . . . Fabio defines validation interval TV as a function of the duration of the preceding step: beginning at time $T_R(K-1) + \frac{1}{2} (\Delta T_{K-1})$ and ending at time $T_R(K-1) + 2 (\Delta T_{K-1})$. *See id.* at 4:35–52, Fig. 6. *Thus, as the cadence of a user’s steps changes, the validation interval TV will also change in corresponding fashion.* Fabio discloses that its control unit is configured to execute these procedures. *Id.* at 3:11–12. Accordingly, we find that Fabio describes . . . updating the cadence window as a user’s actual cadence changes.

Apple IPR, Paper 21 at 43 (emphasis added). In other words, Fabio measures cadence by repeatedly measuring the period ΔT_{K-1} between the last two previously validated steps K–1 and K–2, and adjusts the validation

interval anew for each new step K based on this measurement. Fabio, therefore, discloses adjusting multiple cadence windows, one for each new step K, which are the windows within which “a number of periodic human motions are detected” as required by claim 20 by virtue of its dependence from claim 15. *See* Ex. 1001, 16:33–36 (requiring counting logic to count “a number of periodic human motions . . . detected within appropriate cadence windows.”); *id.* at 16:54–56 (requiring cadence logic to “adjust[] the cadence windows based on a measured cadence associated with the periodic human motion”). Accordingly, for the same reasons as provided in the Apple IPR and summarized above, we find that Fabio describes adjusting the cadence windows based on a measured cadence associated with the periodic human motion, as required by claim 20.

Patent Owner’s arguments that “measured cadence,” by definition, must be based on a calculation of multiple previous steps or periods are first presented in the Sur-Reply. *See* PO Sur-Reply 2–6. These arguments are not responsive to any argument in Petitioner’s Reply, nor do they relate to any declaration or cross-examination testimony. *Id.* Thus, these arguments are an improper attempt to present new arguments not included in Patent Owner’s Response.⁵ *See* CTPG 73–75 (“Sur-replies should only respond to arguments made in reply briefs, comment on reply declaration testimony, or point to cross-examination testimony. . . . Generally, a . . . sur-reply may only respond to arguments raised in the preceding brief.”). Patent Owner’s arguments are improper, and we do not consider them.

⁵ Although Patent Owner cites to pages 15–18 (*see* PO Sur-Reply 3), we see no argument that “measured cadence” requires the consideration of multiple prior steps in the Patent Owner Response.

Alternatively, even considering such arguments, we find them unpersuasive. Patent Owner's arguments are not supported by expert testimony or other evidence of record, and, thus, appear to be mere attorney argument. *See Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017) ("Attorney argument is not evidence.").

Additionally, we note that Patent Owner cites "examples" that may provide instances in which cadence is calculated based on multiple prior stepping periods from multiple steps. *See* PO Sur-Reply 3–5. However, "while it is true that claims are to be interpreted *in light* of the specification and with a view to ascertaining the invention, it does not follow that limitations from the specification may be read into the claims." *Sjolund v. Musland*, 847 F.2d 1573, 1581 (Fed. Cir. 1988). The plain language of claim 20 does not indicate that the periods of multiple prior steps must be averaged to determine the "measured cadence" or that the "measured cadence" must otherwise be calculated from multiple periods obtained from multiple previous steps, as Patent Owner suggests. Patent Owner's arguments are directed at limitations not appearing in the claims, which cannot be relied upon for patentability. *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982). Indeed, the '508 patent discloses embodiments in which cadence logic repeatedly "detects a motion cycle" and updates a cadence window based on the period of that motion cycle. *See, e.g.*, Ex. 1001, 3:48–50 ("Once a motion cycle is detected, a period of the motion cycle is determined, and a cadence of the motion cycle is determined."), 3:56–60 ("[O]nce a stepping period (or other motion cycle period) is determined, that period may be used to set the cadence window," and "the period is updated after each step.").

Moreover, Fabio teaches the width of validation interval TV can be based on the periods between multiple preceding steps rather than on the period between the two immediately preceding steps. In particular, Fabio discloses “[t]he validation interval TV could . . . have a different amplitude,” i.e., width, and that “[i]n practice, it is verified that the last step recognized is compatible with the frequency of the *last steps* made previously.” Ex. 1006, 4:52–55 (emphasis added). Thus, contrary to Patent Owner’s arguments, Fabio teaches or suggests considering multiple prior steps in determining and updating the width of the cadence window or validation interval TV.

Finally, during the oral hearing, Patent Owner’s counsel acknowledged that the ’508 patent discloses that the cadence windows can be adjusted based on a single previous step. Tr. 24–25 (citing Ex. 1001, 4:24), 34. The relevant portion of the ’508 patent explains that “[i]n one embodiment, the cadence window is a dynamic cadence window that continuously updates as a user’s cadence changes. For example, using a dynamic cadence window, *a new cadence window length may be set after each step.*” Ex. 1001, 4:23–27 (emphasis added). Although Patent Owner’s counsel argued that this embodiment is excluded from claim 20 (*see* Tr. 25), we see no language in claim 20 limiting the cadence window adjustments to be based on multiple prior steps. Rather, as claim 20 recites “adjust[ing] the cadence windows,” claim 20 refers to a dynamic cadence window that, as acknowledged by Patent Owner, the ’508 patent explains can be adjusted based on a single prior step.

For the foregoing reasons, we are persuaded by Petitioner’s showing, which we adopt, that claim 20 would have been obvious in view of Pasolini and Fabio.

G. Patent Owner's Constitutional Argument

Patent Owner notes that an argument made in an appeal pending at the U.S. Court of Appeals for the Federal Circuit asserts that “the Board’s appointments of administrative patent judges violate the Appointments Clause of Article II” of the U.S. Constitution. PO Resp. 18–19. “Patent Owner . . . adopts this constitutional challenge . . . to ensure the issue is preserved pending the appeal.” *Id.* at 19.

Our rules preclude incorporation by reference of argument from other documents. 37 C.F.R. § 42.6(a)(3). Patent Owner merely refers to a pending appeal in the Federal Circuit, *Polaris Innovations Ltd. v. Kingston Technology Co.*, No. 18-01768. PO Resp. 18–19. In the absence of any presentation in the Patent Owner Response of argument and the basis therefore as to the alleged constitutional defect in this proceeding, the argument is not framed for our consideration.

Furthermore, any Appointments Clause concerns have been addressed by the Federal Circuit in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019).

III. CONCLUSION⁶

In summary,

Claims	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 11, 12	103(a)	Pasolini	1, 2, 11, 12	
6–8, 15, 16, 19	103(a)	Fabio	6–8, 15, 16, 19	
3, 4, 13, 14, 20	103(a)	Pasolini, Fabio	3, 4, 13, 14, 20	
Overall Outcome			1–4, 6–8, 11–16, 19, 20	

IV. ORDER

Accordingly, it is

ORDERED that claims 1–4, 6–8, 11–16, 19, and 20 of the '508 patent are determined to be unpatentable; and

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

⁶ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), (b)(2).

IPR2018-01589
Patent 7,653,508 B1

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