

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PETITIONER ATHLETICA CANADA INC. and PETITIONER USA INC.
Petitioner

v.

NIKE, INC.
Patent Owner

Case IPR2023-00438
Patent 8,620,413 B2

NIKE, INC.'S PATENT OWNER RESPONSE UNDER 37 C.F.R. § 42.120

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EXHIBITS

Exhibit No.	Description
Ex. 2001	Declaration of Dr. Bryan Bergeron
Ex. 2008	Supplemental Declaration of Dr. Bryan Bergeron
Ex. 2009	Carl J. Caspersen, Kenneth E. Powell, and Gregory M. Christenson, “Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research,” Public Health Reports, Vol. 100, No. 2:126-131 (March-April 1985)
Ex. 2010	U.S. Department of Health and Human Services, <i>Physical Activity and Health: A Report of the Surgeon General</i> , Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion (1996)
Ex. 2011	Excerpts from William D. McArdle, Frank I. Katch, and Victor L. Katch, <i>Exercise Physiology - Energy, Nutrition, and Human Performance</i> , 5 th ed., Lippincott Williams & Wilkins (2001)
Ex. 2012	2023-09-27 Deposition Transcript of Dr. Kevin Lynch

Nike, Inc. (“Nike”) submits this Patent Owner Response in the IPR of U.S. Patent No. 8,620,413 (Ex. 1001, “the ’413 Patent”), which challenges Claims 1–5, 7, 9, 12–14 and 17–19 (the “Challenged Claims”). Petitioner has not carried its burden of proving that any Challenged Claim is unpatentable.

I. INTRODUCTION

The ’413 Patent relates to an athletic training device and methods, and the Challenged Claims recite, *inter alia*, determining heart rate zones based on heart rate measurements taken while a user exercises at multiple exertion levels that are based on the user’s own level of physical fitness, and during subsequent exercise communicating to the user whether the heart rate falls within one of those zones. *E.g.*, Ex. 1001, 1:20–41, 18:5–23.

Trial was instituted on nine grounds, but only three address the independent claims, including two anticipation grounds—Amano (Ground 1) and Matsumoto (Ground 2)—and one obviousness ground—Lubell in combination with Ceci (Ground 3). Petition, 20. Obviousness Grounds 4–9 address dependent claims only, based on Lubell, Amano, and Matsumoto, in combination with other references (Ceci, Gorman, and Flach). *Id.*

First, the Board was correct to be unpersuaded by Petitioner’s Matsumoto and Lubell grounds. Paper 11, 33-34, 36. For Matsumoto (Grounds 2, 8, 9), the Board expressed skepticism because Petitioner improperly “combine[d] aspects of

different embodiments” in an anticipation ground for the independent claims. *Id.* at 33. And for Lubell (Grounds 3, 4, 5), where the independent claims are only challenged as obvious, the Board found that “Petitioner has not provided adequate reasoning as to why a person of ordinary skill in the art would have combined the teachings of Lubell and Ceci.” *Id.* at 36.

Second, while the Board instituted trial based on Amano (Grounds 1, 6, 7), Petitioner cannot carry its burden of demonstrating unpatentability, including because Amano does not disclose prompting “a user to exercise at a plurality of successive exertion levels, *wherein an exertion level is based on a level of physical fitness of a user*” under its plain and ordinary meaning, which is an exertion level that takes into account an individual user’s particular physical fitness *condition*, as assessed by fitness condition criteria such as cardiorespiratory endurance.¹ For all Grounds, Petitioner applied an unsupported meaning based on physical *characteristics*, but Petitioner’s own expert Dr. Lynch admitted that age, sex, weight, and height *are not* themselves “a level of physical fitness.”² Ex. 2012, 137:6–9, 148:5-149:21.³ Furthermore (and just as with Matsumoto), Petitioner as

¹ All emphases added, unless otherwise specified.

² Thus, all primary references (Amano, Matsumoto, and Lubell) do not disclose this limitation under its plain and ordinary meaning.

³ *E.g.*, (“Q: Is it your opinion that just a person’s weight could be a level of physical fitness of a user? A: Certainly not.”).

improperly combined aspects of at least *three distinct Amano embodiments* for *anticipation* Ground 1.

Third, for the dependent claims, Petitioner failed to demonstrate that a POSITA would have combined the wired devices of Amano, Matsumoto, or Lubell, with the wireless radiofrequency communication teachings and protocols of Gorman or Flach.

For these and additional reasons discussed herein, Petitioner has not met its burden of proving by a preponderance of the evidence that any Challenged Claim is unpatentable.

II. THE '413 PATENT

The '413 Patent relates to monitoring athletic training, including by measuring a user's heart rate while he or she exercises at exertion levels based on the user's individual physical fitness condition. Ex. 1001, 14:49–15:26. For example, the '413 Patent explains that an athlete may wish to pursue athletic “performance gains by maintaining his or her heart rate within a target range or ‘zone,’” aided by a system that can “alert an athlete when his or her measured heart rate rises above or falls below a selected heart rate zone.” *Id.*, 14:59–15:5. However, prior approaches determined zones using “a mathematical formula” or a standardized “heart rate chart,” which provided “heart rate values” that “may be appropriate for a few individuals,”

but “often are inaccurate for many users because they cannot take into account an individual’s particular exercise ability.” *Id.*, 15:7–17.

Accordingly, the ’413 Patent claims improvements over the prior art that can “advantageously calculate heart rate zones for an individual athlete automatically,” such as “by associating how a user is physically feeling when determining the heart rate” while exercising at exertion levels that feel “easy,” “medium,” and “hard,” to a user, relative to his or her own physical fitness condition. *Id.*, 15:18–16:55. The Challenged Claims recite systems and methods that (i) “prompt” a user to exercise at multiple “exertion levels” that are “based on a level of physical fitness of a user,” (ii) “determine” multiple “heart rate zones based on” “heart rate measurements” taken “while the user exercises” at the multiple “exertion levels,” and (iii) prompt a user to “to exercise while maintaining” heart rate within a particular “heart rate zone,” and determine whether the heart rate is within that zone. *Id.*, 18:5–23. The claimed inventions therefore enable users “to determine the appropriate heart rate to exercise more efficiently and to avoid over-training.” *Id.*, 15:24–26. The three independent claims share substantively the same limitations, with limitations [1A] through [1G] reproduced below (*id.*, 18:5–23):

1. An apparatus comprising:

[1A] a processor; and

[1B] a memory storing instructions that, when executed by the processor, cause the apparatus at least to:

- [1C] prompt a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of a level of physical fitness of a user;
- [1D] determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels;
- [1E] generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;
- [1F] process second heart rate measurements received from the sensor subsequent to generating the prompt; and
- [1G] determine whether the second heart rate measurements are within the particular heart rate zone.

III. PRIOR ART REFERENCES

A. Amano

Amano discloses eight embodiments for an “exercise workout support device,” including one that estimates a subject’s “maximum oxygen uptake quantity” (VO_{2max}) (Ex. 1002, 3:1-6, 6:5-11), another that calculates “upper and lower limit” pulse rates from a standardized table that lists VO_{2max} values for an “average person” (*id.*, 2:65-67, 19:15-20:30), and yet another with a display that shows a user’s cumulative exercise over time. *Id.*, 38:44-56.

Amano’s first embodiment (*id.*, 6:4) discloses a device that estimates VO_{2max} using the “Astrand-Ryhming nomogram” (Figure 3), which relies on a mathematical relationship between heart rates and calculations of exercise power, which Amano refers to as “exercise intensity” (in kpm/min or Watts, [W]). *Id.*, 6:12–28, 7:30-8:20.

Amano's entirely separate fourth embodiment (*id.*, 19:8) discloses a device that takes an estimated VO_{2max} as an input, reads a target pulse rate from standardized "pulse rate tables" (Figure 14 shows the male version) that list pulse rates for an "average person" when exercising at "50% of VO_{2max} ," and sets upper and lower pulse rate limits by multiplying the target pulse rate read from the table by the preset coefficients 80% and 120%, respectively. *Id.*, 19:29–20:30. The device uses an audible "pitch maker" to indicate the pace at which the subject should run to keep his or her heart rate between the upper and lower limits, and changes the sound to direct the subject to speed up or slow down, if the pulse rate falls outside of the 80-120% range. *Id.*, 20:31–21:23.

Amano's entirely separate eighth embodiment (*id.*, 38:22) discloses an LED display with three elements that depict a user's progress toward a workout goal over time (Figures 51-53): a "bar graph" or "pie chart" showing the "current value" of exercise completed "as a percentage" of "target value"; a "face" that smiles or frowns to indicate progress; and an "intensity meter" that compares the current calculated power (*i.e.* "exercise intensity," in kpm/min) to a target. *Id.*, 38:39-39:32.

For the first embodiment, Petitioner admits that Amano discloses an approach where "it is necessary to *measure exercise intensity* at at least three or more stages," such that the device produces "*beeps that indicate to the subject the pace* they should run." Petition, 9-10 (citing Ex. 1002, 6:63-66, 13:46-50). Amano tells

subjects how fast to run because the Astrand-Ryhming nomogram method requires comparing a subject's heart rates to calculated "exercise intensity," which in this context means power. *Id.*, 6:56–58. Amano defines this "exercise intensity" as a subject's weight multiplied by distance, divided by time, which is a measure of power (in kilo-pound-meters/minute, or in Watts (W))—*i.e.*, not intensity in the sense of speed, or difficulty level, or how a subject feels while trying to exercise at a certain exertion level. *Id.*, 12:15-21, Figure 3. Amano's method requires measuring the "heart beat rate" and calculating power (*i.e.*, "exercise intensity") for "***at least three***" different power levels, which are referred to as "intensity-beat rate pairs." *Id.*, 6:59–67, 12:39–41. "If there are less then [sic] 3 pairs, then it is not possible" to use the Astrand-Ryhming nomogram method. *Id.*, 12:26-30.

Importantly, the aspect of Amano that produces beeps to notify the subject of the "pitch" (*i.e.* speed) at which to run is entirely distinct from the calculation of "exercise intensity" power just described above. Amano explains "that the exercise intensity is not obtained during exercise intensity increase notifying processing, but rather is obtained by measurements and calculations in [different] steps . . . discussed above." *Id.*, 13:56-60. This is important because in describing the "exercise intensity increase notifying" aspect—*i.e.*, where the device beeps to indicate the running speed—Amano loosely uses the word "intensity" again, but in a second context that is different from calculating power. In this "notifying" aspect,

Amano does not prompt a user to begin running at a specific speed or exertion level. Instead, a subject simply “begins to run,” the device detects the running “pitch” (defined as “the number of steps per unit time,” *i.e.*, speed), and Amano generates beeps that are “synchronized” to the subject’s pace. *Id.*, 10:63-11:4, 7:24-25.

Then, as Petitioner admits, the “device notifies an exerciser to increase their exercise intensity after a certain amount of time *at a particular intensity*.” Petition, 10. But again, here Amano is referring to speed, not calculating power. Amano explains that the device “determines the *pitch* at which there is a *10% increase over the pitch* detected” previously, and generates beeps “at an interval which represents a *10% increase over the previous pitch*.” Ex. 1002, 13:44-45, 14:54-56. The subject then “tries to maintain running at this pitch . . . until the second exercise intensity increase,” when the subject is directed to run at “a further 10% increase in pitch.” *Id.*, 14:56-15:5. Because power is calculated in different steps, Amano explains that “it is not necessary that the test subject increase *exercise intensity* by 10% only.” *Id.*, 13:61-62. Instead, a subject “may maintain exercise intensity at a constant level,” or may “vary exercise intensity according to his own preferences.” *Id.*, 13:63-67. Those options are available in different steps of the process, because in the aspect where Amano directs a subject to increase *speed*, it only discloses prompting the subject to increase his or her running “pitch” in standardized 10% intervals.

Turning to the fourth embodiment, Petitioner failed to mention that it relied on this distinct embodiment for Amano's disclosures of a "device which can show the upper and lower limit values for the pulse rate." Petition at 8, 10-11 (for Amano's "first objective," only citing from columns 19-25 of Amano). The device in this embodiment selects a target pulse rate from standardized tables listing "the pulse rate when an average person . . . exercises at an intensity which corresponds to 50% of VO_{2max} ." Ex. 1002, 19:40–46. Petitioner admits that the target pulse rate is selected from the table based on an entered VO_{2max} value, not "heart rate measurements." Petition, 10. Then, the device multiplies the target pulse by 120% and 80% to set upper and lower pulse rate limits, respectively. Ex. 1002, 20:14–28.

For the eighth embodiment, Petitioner acknowledged that it relied on "another embodiment" for disclosure of an LED display. Petition, 25-27 (citing columns 38-39 and Figure 51). This display depicts power in an "exercise intensity meter" (*id.*, 25), which is calculated in kpm/min. Ex. 1002, 38:61-39:6, Figs. 51-53. This display does not depict heart rates, or heart rate zones.

B. Matsumoto

Matsumoto discloses two embodiments of an exercise management machine (which can be used with a training bicycle, or while jogging). The first machine (shown in Fig. 3) selects standardized exercise programs and target pulse rates for

the user from a table (like that excerpted below), based on characteristics including sex, age, and weight (Ex. 1003, 1:48–55, 4:4–55):

Age	Exercise Prog. No.	Target Pulse	Exercise Time	Exercise Standard	
				Men	Women
–29	1	120	5	M1	W1
	2	130	5	M2	W2
	3	140	5	M3	W3
	4	145	5	M4	W4
	5	150	5	M5	W5
	6	155	5	M6	W6
	7	155	6	M7	W7
	8	155	7	M8	W8
	9	155	8	M9	W9
	10	155	9	M10	W10

For this first embodiment, an “objective of this invention” is to select “an exercise program that is *suited to*,” but is not based on “the individual user’s physical fitness.” Ex. 1003, 4:33–35. As Petitioner admits, the exercise program is selected by “compar[ing] to *typical* fitness tables to *estimate* the physical fitness of the user.” Petition, 31. Matsumoto does not select the “exercise program” based on an individual’s actual physical fitness condition, of which the device is unaware. The first embodiment also selects “warming up” and cool down target pulses (PN) from a second standardized table, without regard to the user’s fitness level (*id.*, 5:25–34):

TABLE 2							
N	0	1	2	3	4	5	6
PN	80	100	120	130	140	150	160

For example, for the value 3, the user is prompted “to attain the target pulse” of 130. *Id.*, 5:33–42. The user exercises “until the one minute timer expires,” at which point the target pulse is set to “N+1,” *i.e.*, 140 in this example, and the user continues until reaching the pulse for the “full fledged” workout selected from Table 1. *Id.*, 5:45–68. After the full workout, the user is prompted to cool down, using the Table 2 pulse rates in reverse order. *Id.*, 6:12–20.

Matsumoto’s second embodiment is a distinct exercise management machine (shown in Fig. 10), where a user can compare his or her heart rate while exercising to a “target pulse.” *Id.*, 7:36–55 (“FIG. 10 illustrates another embodiment of this invention”). This “target pulse” is determined using a formula that takes the user’s “pulse at rest” as an input. *Id.*, 8:24–60. This machine includes an LED display “which can emit green, red or yellow light, to inform the user whether he is above, below or within the target pulse zone (e.g. target pulse ± 5).” *Id.*, 7:49–51, 9:27–30.

C. Lubell

Lubell discloses a fitness monitoring device that measures heart rates, and calculates $VO_{2\max}$ (“maximal oxygen uptake”) “by automatically pacing the subject through a straightforward training protocol.” Ex. 1004, at Abstract, 2:45–51. Petitioner admits that the Lubell protocol “is the same for every user, ***regardless of their fitness level.***” Petition, 39. Importantly, Lubell contrasts its protocol with prior approaches, emphasizing that protocols allowing subjects to “pace themselves at

various speeds,” or exercise “at whatever speed he or she desired,” had “drawbacks” including that they were “not universally applicable.” *Id.*, 2:1-44.

Lubell uses “pacing tones” to prompt the subject to exercise “at a predetermined pacing rate,” starting with a “slow rate” and progressing through “faster cadences.” *Id.*, 3:30–42. Lubell then “measures the heart rate of the subject” while “he, she, or it is exercising.” *Id.* (using “it” because the protocol also applies to animals). Lubell’s preferred protocol prompts the subject to run at 4, 6, 8, 10, 12, and 14 miles per hour, in “three minute intervals.” *Id.*, 8:61–67. The subject must maintain those speeds until reaching “a maximal heart rate,” or until the subject “feels exhausted” and stops the test. *Id.*, 4:1–3, 8:47–49. Lubell also discloses a “pacer mode,” which uses “pacing tones” to notify the user when the heart rate corresponds to an exercise stress level outside of the preset “fitness training range” of “60-80%” of VO_{2max} . *Id.*, 1:23–29, 4:33–38, 9:58–68.

Petitioner acknowledges that the distinctions between Lubell and protocols where subjects can “pace themselves” led the Examiner to allow the Challenged Claims. Petition, 7–8. In two office actions, the Examiner originally found that Lubell anticipated the independent claims. *See* Ex. 1011, at 2–3, 4–5; Ex. 1013, at 3–4, 6. The applicant then amended the claims to require “prompt[ing] a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of physical fitness of a user.” Ex. 1014, at 7–8. Lubell, on the other

hand, discloses “a *prescribed* exercise test” protocol “that is not based on a level of physical fitness of a user.” *Id* (emphasis original). The Examiner agreed and allowed the claims. Ex. 1015, at 2–3. The Examiner stated that the “reasons for allowance” included that the claimed “exertion levels are based on a level of physical fitness of the user and *are specifically chosen by the user [sic] there is no external device which is choosing the exercise level.*” *Id.* (emphasis added). Thus, Petitioner only asserts Lubell in combination with Ceci as Ground 3. Petition, 39-47.

D. Ceci

Ceci is an article titled “Self-monitored exercise at three different RPE intensities in treadmill vs field running.” Ex. 1005. Ceci discloses a study of “self-regulation of exercise,” where subjects exercised at levels in the “Ratings of Perceived Exertion (RPE) scale.” *Id.*, 732. The RPE scale is “subjective,” in that a subject exercises at “the degree of exertion they perceive as related to a certain physical intensity.” *Id.* Ceci directed subjects to run at speeds subjectively experienced as “light exertion,” “somewhat hard” exertion, and “hard” exertion. *Id.*, 734. The subjects’ heart rates were measured, and mean values were reported across all subjects. *Id.*, 733, Fig. 2. Ceci does not discuss or measure VO_{2max} .

E. Gorman

Gorman discloses a monitor that encodes a biomedical data signal, such as “a heartbeat rate,” for the purpose of “wirelessly transmitting the encoded digital signal”

via radiofrequency to a “display.” Ex. 1007, Abstract, 4:14–50. In addition to a “data part” (such as heart rate), the encoded signal also includes an “identification part,” which “enables the receiving unit to accept only those signals sent from the associated chest unit.” *Id.*, 8:41–45. In this manner, two monitors operating on the same radiofrequency can distinguish signals from different users. *Id.*, 4:67–5:2.

F. Flach

Flach discloses a system and timing techniques for the wireless transmission and reception of health care data via “RF” (*i.e.*, radio frequency). Ex. 1008, Abstract. Flach discusses a TDMA (time division multiple access) wireless protocol, which permits the transmission of “data packets” in different “timeslots.” Ex. 1008, at [0016] – [0018].

IV. LEGAL STANDARDS

Petitioner has “the burden of proving a proposition of unpatentability by a preponderance of the evidence.” 35 U.S.C. § 316(e); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016).

A. Claim Construction

In IPR, claim terms are construed “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). The ordinary and customary meaning is determined in view of the patent’s specification and prosecution history, and extrinsic evidence that helps show how a POSITA

would understand the claim terms. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315-19 (Fed. Cir. 2005). The applicant’s “arguments made during the prosecution history are relevant in determining the meaning of the terms at issue.” *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1438 (Fed. Cir. 1988).

B. Anticipation

For anticipation, Petitioner must prove that “the four corners of a single, prior art document describe every element of the claimed invention” in the same specific “arrange[ment] as in the claim.” *See Net MoneyIN, Inc., v. Verisign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008). Disclosures from multiple, distinct embodiments cannot be combined for anticipation. *Id.* Instead, “differences between the prior art reference and a claimed invention, however slight, invoke the question of obviousness, not anticipation.” *Net MoneyIN*, 545 F.3d at 1371.

C. Obviousness

For obviousness, Petitioner must prove that “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made” to a skilled artisan. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). An obviousness determination is based on four inquiries: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective indicia of nonobviousness. *Id.*, 406 (citing *Graham v.*

John Deere Co. Kan. City, 383 U.S. 1, 17–18 (1996)). Petitioner must articulate specific reasoning, and cannot rely on conclusory statements or attorney argument. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362–63 (Fed. Cir. 2016); *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1342 (Fed. Cir. 2020) (affirming nonobviousness where petitioner’s challenge was “based on attorney argument rather than evidence in the record”). Petitioner also must prove that a POSITA would have been motivated to modify or combine teachings from different references. *KSR*, 550 U.S. at 418; *see also In re Stepan Co.*, 868 F.3d 1342, 1345–46 (Fed. Cir. 2017). Petitioner also must demonstrate a reasonable expectation of success in making a prior art combination. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016).

V. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this Response, Nike applies Petitioner’s proposed level of ordinary skill in the art. *See* Petition, 18.

VI. PETITIONER’S EXPERT TESTIMONY SHOULD NOT BE CONSIDERED FOR ANTICIPATION, OR AFFORDED ANY WEIGHT FOR OBVIOUSNESS

First, Petitioner *did not rely* upon Dr. Lynch to support the Amano or Matsumoto anticipation Grounds 1-2 (*i.e.*, the Petition includes no citations to Dr. Lynch’s declaration for anticipation), and the Board therefore should not consider Dr. Lynch’s opinions for anticipation. In any case, Dr. Lynch agreed that his

declaration does not contain any anticipation opinions. Ex. 2012, 36:11–20 (“I don’t believe that my declaration ever says an entire claim is disclosed by a single prior reference.”) And Dr. Lynch admitted that the sections of his declaration discussing Amano and Matsumoto do not include a single citation to the ’413 Patent for a comparison of those references to any claim. *Id.*, 156:19–157:19. Accordingly, even if Petitioner had relied upon them, Dr. Lynch’s opinions should not be considered because he did not conduct an anticipation analysis.

Second, for all the obviousness grounds (Grounds 3–9), the Board should afford Dr. Lynch’s opinions no weight because he admittedly did not compare the *claimed invention* of the ’413 Patent to any prior art. It is well settled that an obviousness inquiry requires assessing the differences between *the claims* and the prior art. *KSR*, 550 U.S. at 406. Yet Dr. Lynch admits that his declaration does not include any discussion of any complete claim, any assessment of the plain and ordinary meaning of any claim terms, or any element-by-element analysis of the differences between a complete claim and the prior art, because “*that was not what I was asked to do.*” *E.g.*, Ex. 2012, 37:9–13 (“my job was . . . not necessarily to look at an entire claim”); 77:18–22 (“Q: So you just don’t remember . . . whether you included any opinions about the plain and ordinary meaning of any claim terms? A: Correct.”); 63:8–17 (“So my answer, again, is that there’s nowhere in my declaration that, for a particular claim, I step through element by element and provide

references to the prior art.”); 191:15–17 (“I am not directly addressing or dealing with the entirety of any single claim in the 413 [patent]”). Instead, Dr. Lynch admitted that his declaration only includes assessments of the prior art in relation to certain “bits of the text” from some claims. *Id.*, 201:12–202:13. And even for those “bits,” Dr. Lynch could not identify or articulate any impact that the intrinsic record had on his understanding. *Id.*, 97:19–21 (“There are the opinions that I put in this declaration, which were not impacted”); Ex. 1009, ¶40 (“I did not see anything in the prosecution history of the ’413 patent that affected my opinions in this declaration.”). And Dr. Lynch admitted that the physical characteristics Petitioner relies on in the asserted references as disclosing limitation [C] are not “a level of physical fitness of a user.” Ex. 2012, 137:6–9, 148:5–149:21. Dr. Lynch’s opinions cannot be relevant or reliable to an obviousness analysis when they admittedly do not support Petitioner’s arguments.

Further, it is clear that Dr. Lynch did not fully analyze the references for which he nonetheless offered opinions on “obvious combinations.” Ex. 1009, ¶¶89–108. For instance, he did not consider whether Amano, Matsumoto, and Lubell disclose multiple devices and embodiments—instead, he testified that “reading [them] as a POSITA,” he simply “tried to follow the teaching[s] of the columns” without regard to embodiments. Ex. 2012, 184:6–185:12. Even for figures plainly depicting different devices (*e.g.* Matsumoto Figures 3 and 10), Dr. Lynch looked at them “as

both illustrating the same invention.” *Id.*, 185:14–20. Similarly, even though Dr. Lynch agreed that Gorman and Flach “both disclose wireless communication” (*id.*, 216:12–13), Dr. Lynch did not seem to know whether Amano, Matsumoto, and Lubell disclosed wired or wireless devices, and he testified that “I don’t remember thinking that that was important.” *Id.*, 213:5–17. As an example of the lack of basis for Dr. Lynch’s obviousness opinions, he first testified that “I did consider” this issue when forming his opinions for Lubell, confidently stating “Lubell disclosed both wired and wireless communications.” *Id.*, 244:11–246:21. But when pressed, and pointed to the actual disclosures of Lubell, Dr. Lynch backtracked and admitted that “I’m not aware of a wireless communication disclosed in here.” *Id.*, 248:2-7.

Dr. Lynch’s opinions are plainly divorced from the full context of the claims, intrinsic record, and prior art. Accordingly, Dr. Lynch could not have properly evaluated the differences between the claims and the prior art, or properly assessed a POSITA’s motivation to combine references. Dr. Lynch’s opinions are not reliable or relevant to obviousness, and should be afforded no weight.

VII. CLAIM CONSTRUCTION

Petitioner failed to apply the plain and ordinary meaning of “wherein an exertion level is based on a level of physical fitness of a user,” in each independent claim. The plain and ordinary meaning, as understood by a POSITA in view of the intrinsic record and confirmed by extrinsic evidence, is an exertion level that takes

into account an individual user’s particular physical fitness *condition*, as assessed by fitness condition criteria such as cardiorespiratory endurance. Ex. 2008, ¶¶20-31. Petitioner instead applied an unsupported meaning that incorrectly deems physical *characteristics*, such as “stride length and weight,” and “sex, age, and weight,” to be “aspects of a user’s physical fitness,” while also ignoring that the claims require a “*level*” of physical fitness, not aspects (however defined). Petition, at 22, 31. In fact, Petitioner’s own expert agrees that sex, age, weight, and stride length are not “a level of physical fitness of a user.” Ex. 2012, 137:6–9, 148:5-149:21.

All Grounds are premised on a conflation of the claimed “*level of physical fitness* of a user,” with physical *characteristics* that both do not indicate a person’s physical fitness, and are not levels in the first place. Indeed, the ’413 Patent does not include a single reference to height, weight, sex, or stride length,⁴ and the patent’s sole reference to an “athlete’s age” is found in a list that *separately* recites “the athlete’s *fitness condition*” as a distinct item. Ex. 1001, 15:7-10. And for good reason—the applicant amended the claims to require exertion levels based on a user’s individualized physical fitness condition, which the patent explains can be assessed by how difficult it feels (*i.e.*, “easy” or “hard”), or how difficult it is to

⁴ Dr. Lynch could not identify any usage of these characteristics in the intrinsic record (Ex. 2012, 119:4–24), nor could he identify any source for his usage other than a POSITA’s alleged general “understanding.” *Id.*, 115:22-116:9.

breathe, while exercising at a given exertion level. *Id.*, 15:44-16:55. To put it another way, a user’s particular physical fitness condition is commonly described by levels such as poor, average, and excellent. Ex. 2008, ¶23; Ex. 2011, 163.

In contrast, physical characteristics alone do not indicate a person’s physical fitness condition, because people of the same height, weight, or sex, can have widely varying difficulty exercising at the same exertion level. Ex. 2008, ¶¶20-25. Nor, as Dr. Lynch admits, are height, weight, and sex *levels* of physical fitness. The plain and ordinary meaning is confirmed by the prosecution history, where the applicant explained that “*predetermined*” exertion levels like Lubell’s, which do not take into account a user’s actual level of physical fitness, are therefore “not based on a level of physical fitness of a user.” Ex. 1014, at 8 (emphasis original).

A. The Intrinsic Record Provides The Plain And Ordinary Meaning

The specification explains that an athlete may wish to exercise at different heart rate levels “elevated” above “normal,” in order to “obtain different performance gains.” *Id.*, 14:51-67. For example, it is well-known to POSITAs that at heart rate levels slightly elevated above normal, the body produces energy by “aerobic chemical reactions,” during which an athlete “may burn fat most efficiently.” *Id.* On the other hand, at “higher heart rates,” “an athlete will produce energy through anaerobic chemical reactions,” where “his or her maximum possible rate of oxygen consumption” may be improved. *Id.* The specification explains that in prior

approaches, an athlete would have to calculate the parameters of these heart rate levels using “a mathematical formula” that takes as inputs “the athlete’s sitting heart rate, the athlete’s age, *and a general estimate of the athlete’s fitness condition.*” *Id.*, 15:1-17. But approaches relying on such estimates had significant drawbacks, including that they provided heart rate levels that were only “appropriate for a few individuals,” and “often [were] *inaccurate* for many users because they cannot *take into account an individual’s particular exercise ability.*” *Id.*

As a solution to these problems, the specification describes embodiments that “allow a user to calculate an individualized heart rate by associating the heart rate with *how a user is physically feeling.*” *Id.*, 15:18-26. This aspect—how a user is *physically feeling* while exercising—is another way of describing that user’s *particular fitness condition*, which enables a more accurate determination of heart rate levels compared to formulas using an “estimate.” Ex. 2008, ¶¶28-29.

This concept is further described in an embodiment in which a user is prompted to exercise at three exertion levels of increasing difficulty, including “easy” (*id.* at 15:44-53), “medium” (*id.* at 16:8-17), and “hard or difficult” (*id.* at 16:36-47). A person “of ordinary skill in the art” would understand that at the “easy” level, the user should feel like he or she is “performing a warm-up routine, so that the user feels at ease,” “with his or her *breathing only slightly greater* than when the user began exercising.” *Id.*, 15:54-61. At the “medium” level, exercising should feel

“more challenging than a warm-up, but not uncomfortable,” such that the “user’s *breathing should be heavy*” while at the same time the user should have “no difficulty obtaining air.” *Id.*, 16:17-23. And finally, at the “hard or difficult” level, exercising “should be achievable, but not comfortable,” such that the “user’s *breathing should be heavy*, and the user should not be getting sufficient air to continue this level of exercise for a long period of time.” *Id.*, 16:47-55.

In this manner, an athlete’s “fitness condition” is assessed by criteria such as cardiorespiratory endurance, as evidenced by a user’s difficulty in breathing while exercising. And importantly, how a user is *physically feeling* while exercising at increasing levels of exertion will be different for each individual user. Thus, the claimed invention is able to “advantageously calculate heart rate zones for an *individual* athlete automatically,” and “determine the appropriate heart rate” for exercising “more efficiently and to avoid over-training” (*id.* at 15:18-26).

On the other hand, a POSITA understands that physical characteristics, such as height, weight, sex, and stride length while running, do not themselves indicate an athlete’s particular “fitness condition,” or level. Ex. 2008, ¶¶20-29. That the specification does not even reference such characteristics is telling, and illustrates the fact that physical characteristics do not indicate whether a person will find a given exertion level “easy,” “medium,” or “hard.” *Id.* The same is true for age, which is why the specification lists age as an item *separate from* “fitness condition.”

Id. But a person’s breathing levels and subjective feelings of difficulty are indicative of cardiorespiratory endurance, and therefore “fitness condition.” *Id.* Accordingly, a POSITA would understand that the plain and ordinary meaning of “wherein an exertion level is based on a level of physical fitness of a user” is an exertion level that takes into account an individual user’s particular physical fitness **condition**, as assessed by fitness condition criteria such as cardiorespiratory endurance. *Phillips*, 415 F.3d at 1316 (“The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.”).

The prosecution history confirms this meaning. The applicant amended the claims to require this term (Ex. 1014, 3), and stated that it was supported by, *e.g.*, the section of the specification discussing “easy,” “medium,” and “hard” levels of exertion. *Id.*, 7-8. The applicant contrasted these claimed “exertion levels” with Lubell, which “automatically executes a predefined exercise test protocol that is **not based** on a level of physical fitness of a user.” *Id.*, 8. The applicant explained that Lubell uses “pacing tones” to “incrementally increase a running speed” after beginning with a “4 miles per hour *starting* speed,” which “may, for some users, be considered difficult to achieve, or may, in other instances, be beyond the capabilities of some users.” *Id.* Importantly, the applicant explained that Lubell’s exertion levels are “**not adaptive** to the physical fitness of a user.” *Id.* In other words, different

users may feel that the same exertion level (*e.g.*, 4 miles per hour) is more or less difficult to achieve, based on their own physical fitness condition, but Lubell does not adapt its levels based on the individual user's fitness.

In allowing the claims, the examiner agreed with the applicant, finding that the ***claimed*** exertion levels “are based on a level of physical fitness of the user and are specifically chosen by the user” “(i.e., low, medium and high),” and “there is no external device which is choosing the exercise level.” Ex. 1015, 2-3. The applicant's prosecution statements, which are relevant to claim construction, confirm that the claimed exertion levels take into account an individual user's particular physical fitness ***condition*** level. *E.g.*, *E.I. du Pont*, 849 F.2d at 1438.

B. Extrinsic Evidence Confirms The Plain And Ordinary Meaning

The plain and ordinary meaning is confirmed by extrinsic evidence, including a standard textbook in exercise physiology, and reports from United States health authorities. This evidence shows that “a level of physical fitness” refers to ***fitness condition***, which can be assessed by criteria including cardiorespiratory endurance.

First, a report issued by the U.S. Centers for Disease Control in 1985 (Ex. 2009 (“Caspersen”), “Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research”) discussed the need for a “framework” of “standardized terminology,” to “promote greater understanding of the relation between physical activity, exercise, physical fitness, and health.” *Id.*,

126. Caspersen defines “physical fitness” as a “set of attributes that people have or achieve that relates to the ability to perform physical activity.” *Id.*, 128-29. Caspersen further explains that “physical fitness” includes five measurable health-related components: “(a) cardiorespiratory endurance, (b) muscular endurance, (c) muscular strength, (d) body composition, and (e) flexibility.” *Id.* (with body composition defined as “the relative amounts of muscle, fat, bone, and other vital parts of the body”). Each of these can be measured, including measuring cardiorespiratory endurance by VO_{2max} . *Id.* Caspersen also explains that levels of “physical fitness vary among members of the population from low to high.” *Id.*, 130. Caspersen does not describe characteristics such as height, weight, sex, or age as components of a level of “physical fitness.”

Second, a 1996 report from the Surgeon General of the United States (Ex. 2010 (“Surgeon General Report”)), titled “Physical Activity and Health,” uses Caspersen’s definition of “physical fitness,” and refers to the same five measurable health-related components. *Id.*, 20-21. The Surgeon General Report also distinguishes physical characteristics from the cardiorespiratory endurance component of physical fitness (also referred to as “endurance,” “cardiorespiratory capacity,” and “aerobic power”). *Id.*, 33. Specifically, the report explains that cardiorespiratory fitness “is largely **determined** by habitual physical activity,” and may also be “**influence[d]**” by a person’s “age, sex, heredity, and medical status.”

Id. However, a person's actual level of physical fitness can be measured by, *e.g.*, "maximal oxygen uptake or aerobic power (VO₂ max)." *Id.* In other words, while multiple factors can influence a person's physical fitness, those factors do not themselves indicate a *level* of "physical fitness."

Third, the 2001 fifth edition of a long-running textbook in the field of exercise physiology (*Exercise Physiology*, by McArdle *et al.*, first published in 1981) provides substantively the same definition of "physical fitness" as the above reports. Ex. 2011 ("McArdle"). Specifically, McArdle defines "physical fitness" as "[a]tttributes related to how well one performs physical activity," and describes "health-related physical fitness" as including an "aerobic and/or cardiovascular fitness" component. *Id.*, 871. McArdle explains that assessing physical fitness "focuses on functionality capacities" (*id.*), and does not describe characteristics such as height, weight, sex, or age as components of a level of "physical fitness." McArdle also teaches that a measure of a person's "cardiovascular fitness" is VO_{2max}, and that one way to classify fitness levels among groups ranging from "sedentary persons" and "cardiac patients," to "world-class runners" and "cross-country skiers," is a scale that includes the levels "poor," "fair," "average," "good," and "excellent." *Id.*, 163.

This extrinsic evidence confirms the plain and ordinary meaning provided by the specification, consistent with a POSITA's understanding. Ex. 2008, ¶¶22-26.

C. Petitioner’s Expert Agrees That Physical Characteristics Are Not “A Level Of Physical Fitness”

First, during his deposition Dr. Lynch readily agreed that physical characteristics such as age, sex, weight, and height *are not* themselves “a level of physical fitness.” Ex. 2012, 137:6–9, 148:5-149:21. This definitively confirms that Petitioner applied an unsupported meaning of the term. In addition, Dr. Lynch opined that a person’s “physical fitness” is distinct from that person’s physical *characteristics*.⁵ Specifically, Dr. Lynch explained that Lubell collects “certain *physiological information* about a user before starting a test,” including “weight, height and sex.” Ex. 1009, ¶61. Dr. Lynch then opined that one could allegedly “*modify*” Lubell to “collect more information about a user, *such as their actual or perceived fitness capacity*.” *Id.* That Dr. Lynch understands this distinction is made clear by his opinion that “a subject with *high* physical fitness may have a lower heart rate at a particular cadence level than a subject with *lower* physical fitness.” *Id.*, ¶58. In other words, Dr. Lynch uses the *levels* high and low, just like McArdle uses the levels poor, fair, average, good, and excellent. Ex. 2011, 163. Furthermore, Lubell collects a person’s physical characteristics (weight, height, and sex) *before* starting its test to calculate VO_{2max}. It would be nonsensical to equate the physical

⁵ To be clear, Dr. Lynch did not offer any opinions on the meaning of any claim terms (Ex. 2012, 77:18-22), and his opinions should not be considered or afforded any weight for the reasons discussed above.

characteristics that Lubell collects, with the physical fitness parameter that Lubell measures, and Dr. Lynch does not do so—he agrees that they are distinct.

VIII. GROUNDS 1, 6, 7: THE AMANO GROUNDS DO NOT ANTICIPATE OR RENDER OBVIOUS ANY CHALLENGED CLAIM

Amano does not anticipate, because it does not disclose limitation [C] of the independent claims under its plain and ordinary meaning, or limitations [D] and [E] as they are arranged in the claims, because Petitioner improperly combined disclosures from distinct embodiments in an anticipation ground. The Amano combinations do not render obvious any dependent claims, including because Petitioner failed to prove a motivation to combine Amano’s wired systems with the wireless communication teachings of Gorman or Flach.

A. Ground 1: Amano Does Not Anticipate Any Claims

Beginning with limitation [C], for multiple reasons Petitioner cannot demonstrate that Amano discloses “prompt[ing] a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of physical fitness of a user,” under its plain and ordinary meaning.

First, Petitioner cannot show that Amano discloses a protocol with “a plurality of successive exertion levels,” where those exertion levels take into account an individual user’s particular physical fitness *condition*, as assessed by fitness condition criteria such as cardiorespiratory endurance. Ex. 2001, ¶¶110-114; Ex. 2008, ¶¶65-69. Instead, and as admitted by Petitioner, Amano discloses a protocol

where *every subject* is prompted to increase their running pitch (*i.e.*, speed)⁶ “by 10% every 120 seconds,” without regard to the *individual user’s* particular physical fitness condition. Petition, 22 (citing Ex. 1002, 13:53-55). In part, this deficiency results from Petitioner’s failure to acknowledge that Amano uses “exercise intensity” in two distinct contexts. While column 13 of Amano explains that its first embodiment includes “notifying” the subject to “increase the *exercise intensity* during running” (*id.*, 13:30-34), the very next paragraphs explain that it does so by “detect[ing] the *pitch* of the running,” “determin[ing] the *pitch* at which there is a *10% increase over the pitch* detected in the preceding step,” and “generat[ing] a beep alarm in accordance with this *pitch* for 10 seconds,” so that the “subject is able to referentially know the timing when increasing exercise intensity.” *Id.*, 13:40-50.

This description continues in columns 14-15, explaining that “an alarm sound is generated at an interval which represents *a 10% increase over the previous pitch*,” whereby “the test subject increases the *pitch by 10%*, and tries to maintain running at this *pitch* for 120 seconds” until the next increase, “corresponding to a further 10% increase in *pitch*.” *Id.*, 14:54-15:5. At no point does this embodiment disclose that a user’s physical fitness condition has any impact on the protocol—to the contrary, the protocol uses 10% pitch increases for all users.

⁶ Amano defines “pitch” as “the number of steps per unit time,” which is analogous to speed (*i.e.*, distance/time). Ex. 1002, 7:24-25.

Petitioner misleadingly argues that “[t]his *intensity*, as measured and subsequently increased, is based on a user’s stride length and weight, aspects of a user’s physical fitness.” Petition, 22. This is wrong for several reasons. As an initial matter, stride length and weight may be physical *characteristics*, but they do not indicate a user’s physical fitness *condition* (Ex. 2008, ¶¶20-31, 67), nor are they “a level,” as Dr. Lynch admits. As Dr. Bergeron explains, stride length and weight do not indicate an individual’s capacity for exercising at a given exertion level, because people with the same stride length or the same weight may have vastly different cardiorespiratory endurance levels, and thus different physical fitness conditions. *Id.*

But in any case, Petitioner is also wrong because Amano *does not use* stride length or weight to set the running “pitch” increases described in columns 13-15, nor does Amano *measure* this “exercise intensity.” Petitioner cites Amano at 12:15-20 for this argument (Petition, 22), but column 12 describes a *different* aspect, in which Amano calculates the power exerted by the user as “*exercise intensity [W]*.”⁷ Power is calculated by multiplying the subject’s “stride” *by* “*pitch*” to arrive at “the distance run by the test subject per unit time,” multiplying that product “by the user’s body weight,” and converting the result into “kpm/min.” *Id.* But in column 13,

⁷ Amano expresses “exercise intensity” power in the unit kpm/min, where 1 kpm/min = 0.1653 W, *i.e.*, Watts, the standard SI unit for power (Joules/second). Ex. 1002, 8:17-20; Ex. 2008, 25-27.

Amano explicitly states that the power (*i.e.*, “exercise intensity”) calculation described “in steps . . . discussed above” (*i.e.*, column 12), “***is not obtained*** during exercise intensity increase notifying,” which is the aspect that directs ***every subject*** to increase the running pitch “by 10% each time.” *Id.*, 13:54-60. In other words, Petitioner failed to understand that “exercise intensity” is used in columns 13-15 to refer to the running “pitch,” not a calculation of power.⁸ Ex. 2008, ¶¶40-42, 67-68.

Furthermore, the Board’s preliminary finding that “the ***initial*** ‘intensity’ of exercise that ultimately increases by 10% every 120 seconds is based on measurements of a user’s stride length and weight,” is also incorrect, because it relied on Petitioner’s references to the wrong context of “exercise intensity.” Paper 11, at 26 (citing Petition at 22, and Ex. 1002 at 12:15-20). While the Petition itself does not discuss how Amano sets the “initial” running pitch, Amano explains that a specific pitch is not set by the device. Instead, the subject “begins to run,” and the device “detects the pitch of running” and “generates an alarm sound” that is “synchronized” to the subject’s speed. Ex. 1002, 10:63-11:4 (section describing the “Operation of the embodiment”). The “[e]xercise intensity increase notifying means” section confirms that “[a]fter starting to run, the test subject carries out running at a

⁸ That these two uses of “exercise intensity” are distinct is also apparent from their different ***units***: “exercise intensity” is defined as “kilo-pound-meters per minute” or Watts, while “***pitch***” is “the number of steps per unit time,” and is used ***as an input*** into the formula for calculating power. *Id.*, 8:19-20.

constant pitch for 120 seconds.” *Id.*, 14:43-44. In other words, Amano neither sets a specific initial running pitch, nor uses “measurements of a user’s stride length and weight” to set an initial pitch. Indeed, after a user starts running, Amano “prompts a user to increase their intensity by 10%” (where “intensity” = “pitch”), with the 10% pitch increases applied to all users. Ex. 2008, ¶68.

Second, Petitioner’s argument “that a user can choose subjective exertion levels *during this determination phase*,” when Amano prompts the user to increase pitch in 10% increments, is also incorrect. Petition, 22. For this argument Petitioner again cites the same paragraph of column 13 discussed above, which refers to *earlier steps* where power is calculated (*i.e.*, the other context of “exercise intensity”). Ex. 1002, 13:56-67. But Amano only needs to record “three or more exercise intensity-beat rate pairs” (*id.*, 12:39-40), with no requirement that the three exercise intensity values be spaced in 10% increments. Ex. 2008, ¶69. In this context, Amano is explaining that because “*exercise intensity is not obtained* during” these “notifying” steps, “it is not necessary that the test subject increase *exercise intensity* by 10% only,” in reference to the user’s exercising *power*. Ex. 1002, 13:57-62. But for “pitch” (speed) prompts made during the “increase notifying” steps described in columns 13-15, there is no disclosure of Amano “prompting” a subject to increase his or her running pitch in any manner *other than “by 10% each time.”* *Id.*, 13:55. Every subject is prompted with the same “alarm sound [] generated at an interval

which represents a 10% increase over the previous pitch” (*id.*, 14:54-56), and Amano does not “prompt” a user to choose his or her own speed.

This is dictated by Amano’s “Astrand-Ryhming” protocol, which requires measuring “three or more exercise intensity-beat rate pairs” to estimate VO_{2max} . *Id.*, 12:39-40, 13:21-24. Thus, while a subject “*may* maintain *exercise intensity* at a constant level” for some amount of time, or “*may* reduce *exercise intensity* to some extent” (*id.*, 13:64-66) with respect to calculated *power* levels, that is not how Amano’s “pitch” notifying process works. The protocol requires prompting the user to exercise at multiple speeds, so that multiple “exercise intensity-beat rate pairs” can be calculated. Of course, no device can force a user to increase their running speed by 10%, but that is the only prompt made by Amano. Ex. 2008, ¶69.

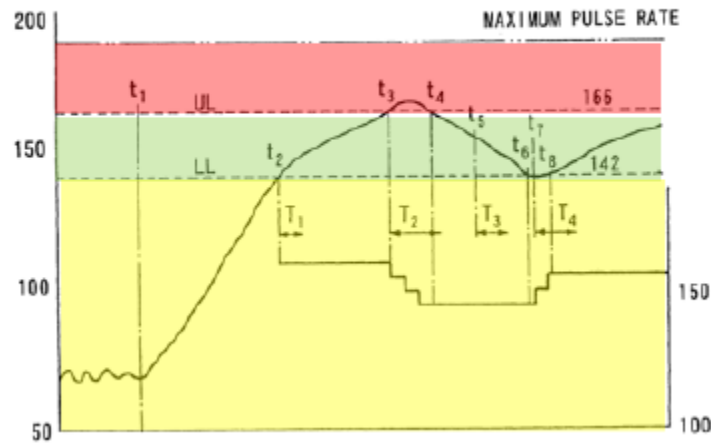
Turning to limitation [D], Petitioner cannot demonstrate that Amano anticipates “determin[ing] a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels” as arranged in the claims, because Petitioner relies on the *fourth* embodiment, which is distinct from the *first* embodiment relied upon for limitation [C] (and others).⁹ In any case, the fourth embodiment also does not

⁹ For example, Petitioner relies on the first embodiment of Amano for limitations [A] (Petition, 20 (citing column 7)) and [C] (Petition, 21-22 (citing columns 12-13)), and relies on both the first and fourth embodiments of Amano for limitation [B]. Petition, 21 (citing columns 7-8, and column 19).

disclose determining heart rate zones based on “heart rate *measurements*,” plural, taken “while the *user exercises*,” because Amano inputs a single estimate of VO_{2max} , and sets upper and lower heart rate limits based on “an *average person*,” not on the user’s heart rate measurements taken “at the plurality of successive exertion levels.”

First, Petitioner improperly combined embodiments for anticipation. Petitioner relies on matter from columns 19-20 and Figure 27 to argue that Amano “take a pulse rate that corresponds to 50% VO_{2max} ,” and “calculates heart rates 20% above and below this rate and uses them as an upper and lower limit.” Petition, 23-24 (citing Ex. 1002, 19:40-43, 20:19-28, Fig. 27). However, all of this matter appears in “Embodiment 4” (*id.*, 19:8), and for this reason alone, Petitioner cannot demonstrate that Amano discloses limitation [D] as it is arranged in the claims. *Net MoneyIN*, 545 F.3d at 1371. But even considering the substance, Amano does not disclose limitation [D]. The Board initially found convincing that Figure 27 discloses the claimed “heart rate zones” (Paper 11, at 28-29):

FIG. 27



But even if the ranges below, between, and above the upper (“UL”) and lower (“LL”) heart rate limits are considered “zones,” Amano does not determine those upper and lower limits based on “heart rate measurements,” *plural*, taken “while the *user exercises*.” Ex. 2008, ¶71. Instead, for this fourth embodiment the “user estimates his own VO_{2max} in advance using the methods” described in other embodiments, or by another method, and “inputs this value” on the display. Ex. 1002, 19:49-50, 20:10-13. Then, Amano plugs that estimated VO_{2max} value into a “pulse rate table” (with the male version shown in Fig. 14), which lists “the pulse rate” for an “*average person*” when exercising at 50% of various VO_{2max} values. *Id.*, 19:40-46.

FIG. 14

VO_{2max}	36	37	38	39	40	41	42
PULSE RATE	105	110	115	120	125	130	135

For example, if a male subject enters an estimated VO_{2max} of 40, Amano reads a pulse rate of 125 from the table. Next, Amano calculates the upper (“UL”) and lower (“LL”) heart rate limits by multiplying that pulse rate (125) by 1.2 and 0.8, resulting in a UL of 150 and an LL of 100. *Id.*, 20:14-30. In other words, even if the subject enters an estimated VO_{2max} calculated using heart rates measured via a method described in a different Amano embodiment, and even if those heart rates factor into the “pulse rate” read from the table, Amano *does not use* the individual subject’s “heart rate measurements,” plural, that were taken “while the *user exercises*,” to set the UL and LL. Instead, the UL and LL *will be the same* for every subject that enters a given VO_{2max} value. Indeed, the device of Amano’s distinct fourth embodiment does not disclose any means for entering previously-recorded heart rates, so it cannot determine zones based on “heart rate *measurements*,” plural, taken “while the *user exercises*.” Ex. 2008, ¶43.

For limitation [E], Petitioner cannot demonstrate that Amano anticipates “generat[ing] a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones,” as it is arranged in the claims, because Petitioner relies on both the *fourth* and *eighth* embodiments, which are also distinct from the *first* embodiment relied upon for limitation [C] (and others). Petitioner relies on matter from columns 21, 25, and 26 to argue that Amano “outputs a pitch to indicate if a user’s heart rate is below, in, or above the desired range.”

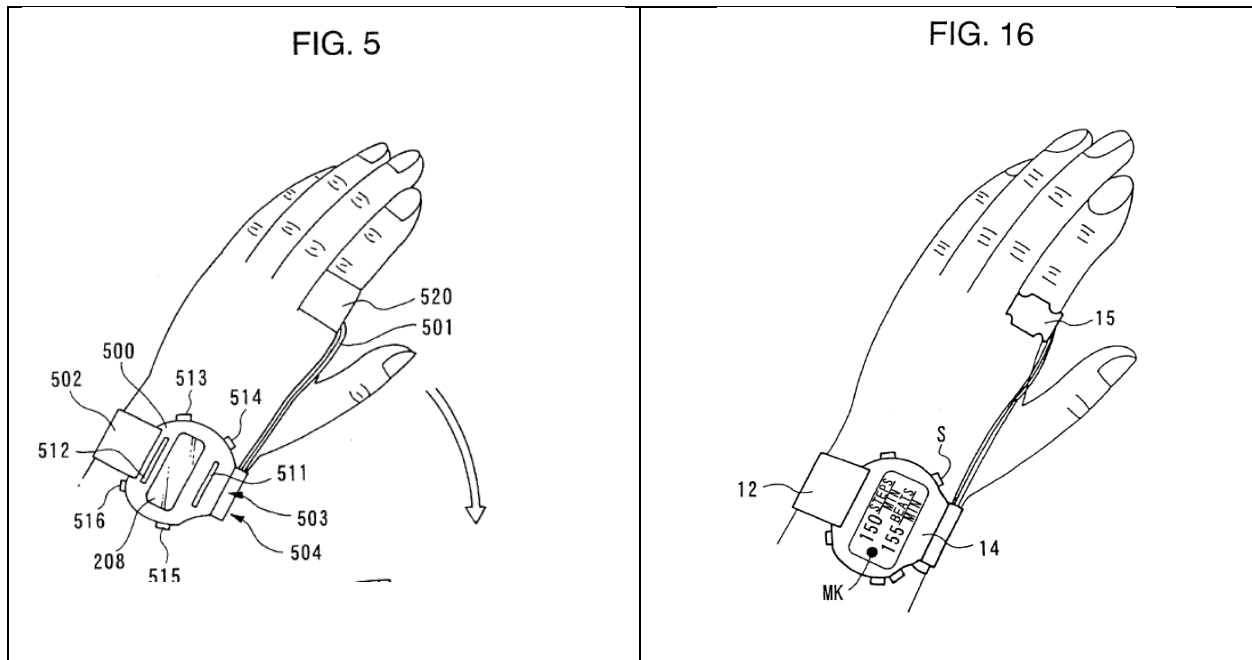
Petition, 24 (citing Ex. 1002, 21:48-55, 25:17-26:29). All of this matter appears in “Embodiment 4” (*id.*, 19:8). Petitioner also relies on matter from columns 38-39 and Figure 51, to argue that Amano discloses an LED display that “prompts a user to exercise while maintaining their heart rate in a measured zone.” Petition, 25 (citing Ex. 1002, 38:40-41, 39:14-17, Fig. 51). However, all of this matter appears in “Embodiment 8” (*id.*, 38:22). Thus, Petitioner cannot demonstrate that Amano discloses limitation [E] as arranged in the claims. *Net MoneyIN*, 545 F.3d at 1371.

Finally, Petitioner also cannot demonstrate that Amano anticipates dependent claims 5 or 7, including because Amano does not anticipate claim 1, from which claims 5 and 7 depend. Petitioner also failed because it only relies upon Amano’s first embodiment for anticipation of claims 5 and 7 (Petition, 27-28, citing columns 7 and 12), but as discussed above, for claim 1 (from which claims 5 and 7 depend), Petitioner also relied upon the fourth and eighth embodiments. Accordingly, Petitioner cannot demonstrate that Amano discloses all the limitations of claims 5 and 7 (which include the limitations of claim 1), as they are arranged in the claims.

B. Grounds 6, 7: The Amano Combinations Do Not Render Obvious Any Dependent Claims

First, Petitioner cannot demonstrate that the Amano combinations render obvious challenged dependent claims 2, 3, 4, 13, and 18 (Ground 6), or claims 9, 14, and 19 (Ground 7), because Amano does not disclose the independent claims.

Second, Petitioner failed to carry its burden, because the Petition does not provide any rationale whatsoever for combining the embodiments of Amano that Petitioner actually relies upon—***both*** of which are ***wired*** devices—with the wireless communication teachings of Gorman or Flach. Petition, 54-55; Ex. 2008, ¶¶74-82. Indeed, for the independent claims, Petitioner only relied on Amano’s fourth and first embodiments (*id.*; Ex. 1002, 19:7-15, 6:4-11), both of which utilize wired connections between components (Fig. 5 (*id.*, 4:8-10), and Fig. 16 (*id.*, 4:39-41)):

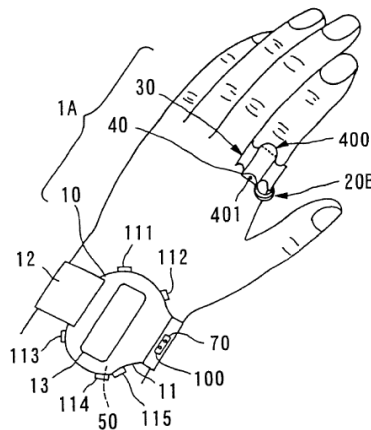


On the other hand, Petitioner cannot dispute that the “encoded messages” in the challenged dependent claims relate to the *wireless* transmission and reception of data, because that is the reason Petitioner asserts combinations with Gorman and Flach in the first place. Petition, 47 (Gorman relates to “wirelessly transmitting the encoded digital signal”), Ex. 1009, ¶95 (same); Ex. 1008 (Flach is titled “Cellular

Architecture and Data Transfer Methods...”); Ex. 1009, ¶100 (“Flach involves wireless communication systems”); Ex. 2012, 216:7–13 (Dr. Lynch admitting that Gorman and Flach “both disclose wireless communication”). The ’413 Patent specification also explains that the use of “encoded messages” relates to wireless transmission.¹⁰ Ex. 2008, ¶¶13-16.

Yet the Petition’s *only* citation to Amano for obviousness Grounds 6 and 7 is to column 37 (Petition, 54-55 (citing Ex. 1002, 37:8-11)), which describes the distinct *seventh* embodiment that features a “sensor unit” that communicates with a *separate* “device main body” “by means of *optical signals*” (*id.*, 36:50-55; Figure 44 (with no wire connecting the pulse sensor and watch device)):

FIG. 44



¹⁰ The ’413 Patent discloses “*remote* electronic sensors,” and contrasts “sensor interfaces” “capable of transmitting and receiving . . . signals *encoded onto radio waves*,” with “[a]lternatively, one or more sensor interfaces may be *physically connected* to a remote sensor by a conductive *wire* or an optical fiber.” Ex. 1001, 6:36, 5:27-32. Encoded signals are described for wireless transmission only.

This is why Petitioner argues that the seventh embodiment uses “*encoded data* with identification” (Petition, 54), so that it can “recognize which device sent the optical signal” wirelessly. Ex. 1002, 37:6-20. But Petitioner *did not rely upon* this seventh embodiment in any respect for anticipation (or explain how it could operate in conjunction with the first and fourth embodiments), let alone demonstrate that it discloses every limitation of the independent claims. See Petition, 20-28. Thus, Petitioner did not (and cannot) show that Amano combinations disclose the dependent claims.

Even setting aside that deficiency, Petitioner also did not provide any rationale supporting why a POSITA would have combined Amano’s *wired* embodiments (the only embodiments Petitioner used for the independent claims), with the *wireless* teachings of Gorman or Flach. *Id.* at 54-55. As Dr. Bergeron explains, the goals of Gorman’s teachings were to prevent multiple “heart monitors” “transmitting on the same frequency from receiving and displaying signals from the wrong person,” and to detect and correct signal errors that may occur due to noise. Ex. 1007, 4:58–5:11. And for Flach, the goal was to use the TDMA wireless communications protocol with timeslots to distinguish heartbeat data being wirelessly transmitted from multiple different patients on the same radiofrequency. Ex. 1008, [0017]-[0018]. Amano’s wired devices would not have experienced any of these problems, because a wire obviates the need to distinguish signals sent over radiofrequencies by different

people using a monitor, or to correct signals sent over radiofrequencies.¹¹ Ex. 2008, ¶¶74-82. Nor would a POSITA have had a reasonable expectation of success, because implementing Gorman and Flach’s wireless radiofrequency transmission techniques would have required complete redesigns and new components for the wired Amano devices. *Id.*, ¶¶77-78, 81-82.

For his part, Dr. Lynch admitted that his declaration does not even discuss whether Amano discloses multiple embodiments (Ex. 2012, 162:2–12), and that he could not recall considering whether the references disclosed wired or wireless devices when he conducted his analysis. *Id.*, 207:3-15. Dr. Lynch also could not articulate why a POSITA would have considered combining with Gorman and Flach’s teachings even for Amano’s wireless seventh embodiment, which “already appears to disclose encoding information with unique identifiers.” *Id.*, 243:19-244:3. Accordingly, Petitioner cannot carry its obviousness burden.

IX. GROUNDS 2, 8, 9: THE MATSUMOTO GROUNDS DO NOT ANTICIPATE OR RENDER OBVIOUS ANY CHALLENGED CLAIM

As the Board correctly found, Matsumoto does not disclose limitations [D] or [E] as they are arranged in the independent claims, because Petitioner improperly combined aspects of different embodiments for anticipation, and Matsumoto does

¹¹ Even if Amano’s seventh embodiment were considered, Petitioner also failed to demonstrate a motivation or reasonable expectation of success in combining its “optical” transmission approach using an “LED” (Ex. 1002, 37:8-25), with the radiofrequency transmission components and protocols of Gorman and Flach.

not disclose “determin[ing] a *plurality* of heart rate zones.” Paper 11, at 33. The Petition has the same deficiency for limitation [G], and Petitioner also failed to prove Matsumoto discloses limitations [F] and [G]. Petitioner also cannot demonstrate that Matsumoto discloses limitation [C] under its plain and ordinary meaning. The Matsumoto combinations do not render obvious any dependent claims, including because Petitioner failed to prove a motivation to combine the wired systems of Matsumoto with the wireless teachings of Gorman or Flach.

A. Ground 2: Matsumoto Does Not Anticipate Any Claims

Beginning with limitations [D] and [E], Petitioner improperly used multiple embodiments for anticipation. Matsumoto discloses two distinct electronic exercise management machines, with the first embodiment depicted in Figures 3-5 (Ex. 1003, 2:16-17, 36-37 (“An embodiment of the invention . . . FIG. 3 shows a front view of the exercise management machine”)), and the second embodiment depicted in Figures 10-11 (*id.*, 7:36-37 (“FIG. 10 illustrates another embodiment of this inventions, with an outline of the exercise management [machine] body”)).

For limitation [D], the Petition improperly combines disclosures from the *first* embodiment—*e.g.*, the “different heart rate targets in an example exercise program” depicted in Table 2 (Petition, 33 (citing Ex. 1003, 5:29-33))—with disclosures from the *second* embodiment—*e.g.*, “the target pulse zone (e.g. target pulse ± 5),” “future programs” for exercise, and the LED display with green, yellow, and red lights

(Petition, 32-33 (citing Ex. 1003, 7:50-51, 8:55-9:5, 9:36-40)). Petitioner admits that the second embodiment only discloses a single “target pulse zone (e.g. target pulse ± 5),” which is why Petitioner relies on the first embodiment for alleged zones based on multiple “different heart rate targets” in Table 2. *Id.* As the Board found, Table 2 only discloses single target heart rates, not “zones,” and in fact there is no discussion of any zones for the machine of Matsumoto’s first embodiment. Ex. 2001, ¶¶129-130; Ex. 2008, ¶89. Petitioner cannot demonstrate anticipation for these reasons alone.¹²

However, even setting aside Petitioner’s improper reliance on different embodiments, Matsumoto does not disclose even a single “zone” “***based on*** first heart rate measurements” that were taken “***while the user exercises.***” Petitioner misleadingly implies that the ***second*** embodiment’s machine can use heart rate data obtained by the ***first*** embodiment’s machine. *E.g.*, Petition, 32 (discussing pulse rates memorized while a user exercises in the first embodiment, and implying that the second embodiment is “***using***” “first heart rate measurements ***gathered*** during the first” exercise). There is no support for this argument. The embodiments are separate machines with entirely distinct interfaces and controllers (*compare* Ex.

¹² Petitioner also improperly combined embodiments for limitation [E], where for “generat[ing] a prompt,” Petitioner relied on the ***first*** embodiment—*e.g.*, the prompt to “[c]ontinue for xx min” (Petition, 33-35 (citing Ex. 1003, 5:61))—and the ***second*** embodiment—*e.g.*, the “flashing LEDs” and Figure 13 (citing *id.* at 9:23-40).

1003, Figures 3 and 5, *with* Figures 10 and 11), and Petitioner provides no explanation for how they could work together. Ex. 2008, ¶¶45-47, 90. Dr. Lynch admitted that he did not address how the embodiments could “work together or even individually.” Ex. 2012, 187:16–23. Thus, while the second embodiment calculates a single “target pulse” and zone of ± 5 , it does so using the subject’s “sex, age, weight, pulse at rest and brake value.” Ex. 1003, 8:24-48. In other words, only the user’s “pulse at rest” factors into this target pulse zone, not “first heart rate measurements” taken “while the user exercises.” Accordingly, even the second embodiment’s single “zone” cannot meet limitation [D]. Ex. 2008, ¶¶88-90.

For limitation [G], Petitioner again improperly combined distinct embodiments for “determin[ing] whether the second heart rate measurements are within the particular heart rate zone.” Petition, 36. Specifically, aspects of the first embodiment—*e.g.*, the “user’s pulse” is “compared with the target pulse” (citing Ex. 1003, 5:64-6:7)—were combined with aspects of the second embodiment—*e.g.*, LEDs indicating whether the user’s pulse “is within the target pulse [] zone” (citing *id.* at 9:36-40).

Additionally, Petitioner did not identify any “second heart rate measurements” for limitations [F] or [G]. The first embodiment tracks the user’s heart rate while exercising. Ex. 1003, 6:39-7:24. But Petitioner already argued that those heart rates satisfy the “*first* heart rate measurements” required in limitation [D]. Petition, 32

(citing Ex. 1003, 5:62-6:6). Petitioner cites the same disclosure for limitation [F] (Petition, 35 (citing Ex. 1003, 5:62-63)), and for limitation [G]. Petition, 36 (citing Ex. 1003, 5:64-6:7). The same disclosure cannot satisfy both the claimed “first” and “second” heart rate measurements. Ex. 2008, ¶91.

Turning to limitation [C], Petitioner cannot demonstrate that Matsumoto discloses “wherein an exertion level is based on a level of physical fitness of a user,” under its plain and ordinary meaning. Matsumoto’s protocol does not take into account an individual user’s particular physical fitness *condition*, as assessed by fitness condition criteria such as cardiorespiratory endurance. Ex. 2001, ¶¶125-127; Ex. 2008, ¶¶84-86. Instead, Matsumoto’s first embodiment uses an “exercise standard” table, and selects a program from that table based solely on physical *characteristics*, including “the user’s age, sex, [and] weight.” Ex. 1003, 3:4-64. Matsumoto’s levels explicitly provide “values for specific *standard* amounts of exercise” (*id.*), not levels based on a user’s level of physical fitness.

Petitioner’s unsupported argument to the contrary relies on a misinterpretation of one sentence in Matsumoto, which states that an “*objective* of this invention” is providing “an exercise program that is *suit*ed to the individual user’s physical fitness.” *Id.*, 4:33-35. However, even if a suitable workout were its “objective,” Matsumoto’s protocol cannot take into account an individual user’s particular physical fitness *condition*, because its “exercise standard” table assigns a program

to a person without having any knowledge of that person's actual fitness. Indeed, Matsumoto will assign every user who enters the same age, sex, and weight *the exact same* exercise program. For example, two 27-year-old men weighing 175 pounds would be assigned the same program, even if one never exercised, and the other was an Olympic athlete. Ex. 2008, ¶¶84-85. Moreover, Dr. Lynch agrees that the age, sex, and weight characteristics used by Matsumoto are not “a level of physical fitness of a user” in the first place. Ex. 2012, 213:5-17, 218:18-219:9.

Furthermore, a user progresses through the levels in the table until reaching (and repeating) the highest, again without regard to the user's particular physical fitness condition: “there are exercise programs No. 1 to 16. As No. 16 is the highest level, the person continues at this level once he reaches it.” *Id.*, 4:15-18. Each level has a preset target pulse and exercise time, and therefore Matsumoto cannot tailor these levels to an individual user's particular physical fitness condition. The same is true for the first embodiment's “warming up” protocol, where the “machine increases the intensity level” using the pre-set target pulses in Table 2, and “repeats this escalation successively until the cyclist reaches the ‘full fledged training target pulse.’” *Id.*, 5:51-60. Again, these levels are one-size-fits-all, and cannot be based on an individual user's fitness condition. Ex. 2008, ¶86. Petitioner even admits that the programs selected by Matsumoto are “*not subjective*,” yet does not explain how non-subjective workouts could possibly take into account an individual user's

physical fitness condition. Petition, 32. Petitioner’s attorney argument that the “levels *must be based on* the physical fitness of the user” is unsupported. *Id.*, 31.

Finally, Petitioner also cannot demonstrate that Matsumoto anticipates dependent claims 5 or 7, including because Matsumoto does not anticipate claim 1, from which claims 5 and 7 depend. Petitioner also failed because it only relies upon Matsumoto’s first embodiment for anticipation of claims 5 and 7 (Petition, 36-37, citing columns 2, 4, and 6), but also relied on the second embodiment for claim 1. Accordingly, Petitioner cannot demonstrate that Matsumoto discloses all the limitations of claims 5 and 7 as they are arranged in the claims.

B. Grounds 8, 9: The Matsumoto Combinations Do Not Render Obvious Any Dependent Claims

First, Petitioner cannot demonstrate that the Matsumoto combinations render obvious challenged dependent claims 2, 3, 4, 13, and 18 (Ground 8), or claims 9, 14, and 19 (Ground 9), because Matsumoto does not disclose the independent claims.

Second, Petitioner failed to carry its burden of demonstrating obviousness for largely the same reasons as the Amano grounds (Section VIII)—namely, Petitioner does not provide any rationale whatsoever for combining Matsumoto’s wired devices with the wireless teachings of Gorman or Flach. Petition, 56. Indeed, both Matsumoto embodiments utilize wired connections. *E.g.*, Ex. 1003, 2:18-35 (Fig. 1: “wire that connects the pulse sensor (15) and the exercise management machine (17)”; 2:36-42 (Figure 3: “(14) and (16) are electric wire”); Fig. 10 (depicting same

wires (14) and (16)). Ex. 2008, ¶¶45-47. And Dr. Lynch admitted that Gorman and Flach “both disclose wireless communication.” Ex. 2012, 216:7-13. But Petitioner did not provide Matsumoto-specific rationales (*see* Petition at 56, reciting generic motivations, and cross-referencing the distinct Lubell reference). And Dr. Lynch was not even aware of Matsumoto’s wired nature when he conducted his analysis.¹³

The offered rationales are entirely insufficient to prove obviousness. Petitioner only asserts that the combination “would be a beneficial way to improve how Matsumoto’s machine communicates with a sensor” (without explaining any insufficiency in Matsumoto’s use of wires to communicate with sensors), and Dr. Lynch opines that Matsumoto and Gorman are both “used to track heart rate during exercise,” and that Matsumoto and Flach both “involves measuring physiological data about a person.”¹⁴ Petition, 56; Ex. 1009, ¶¶107-108. These supposed rationales are generic, conclusory, and insufficient, because they merely assert that the references are in similar fields. *See, e.g., Securus Techs., Inc. v. Global Tel*Link*

¹³ When asked whether Matsumoto discloses wired or wireless devices, Dr. Lynch testified “I can’t answer that,” and “I don’t remember thinking that that was important.” Ex. 2012, 213:5-17. Dr. Lynch did not provide any opinions regarding why or how a POSITA would have modified Matsumoto’s wired devices to use the wireless teachings of Gorman or Flach, let alone a reasonable expectation of success. Ex. 1009, ¶¶107-108.

¹⁴ Dr. Lynch also opined that “Matsumoto gives little detail about how its heart rate sensor communicates with the main device” (*id.*), apparently in ignorance of its wired connections.

Corp., 701 F. Appx. 971, 976 (Fed. Cir. 2017) (nonprecedential) (“conclusory” rationales that references are “drawn from the same general field of art,” are insufficient to prove obviousness). As Dr. Bergeron explains, Gorman and Flach teach solutions for wireless transmission issues, but Matsumoto’s wired devices would not have experienced any of the problems those wireless teachings were directed to solving (such as distinguishing multiple devices transmitting on the same radiofrequency, or correcting transmission errors caused by noise). Ex. 2008, ¶¶93-100. Nor would a POSITA have had a reasonable expectation of success, because implementing Gorman and Flach’s wireless radiofrequency transmission techniques would have required complete redesigns and new components for the wired Matsumoto devices. *Id.*, ¶¶96, 99. Petitioner cannot carry its obviousness burden.

X. GROUNDS 3, 4, 5: THE LUBELL GROUNDS DO NOT RENDER OBVIOUS ANY CHALLENGED CLAIM

The Board correctly found that Petitioner failed to provide “adequate reasoning” why a POSITA “would have combined the teachings of Lubell and Ceci,” which is fatal to all three obviousness-based Lubell grounds. Paper 11, at 36. Additionally, the Board correctly found that Ceci does not disclose “a plurality of heart rate zones *based on first heart rate* measurements” in limitation [D] of the independent claims (*id.*), which Petitioner admits is not disclosed in Lubell. Petition, 44 (“Lubell calculates heart rate zones *but does so in terms of . . . VO_{2max}*”). This deficiency is also fatal to all three Lubell grounds.

A. Ground 3: No Motivation To Combine Lubell And Ceci

Starting with the lack of motivation to combine, Lubell only discloses an exercise test *for determining* VO_{2max} that “‘is *the same for every user*, regardless of their fitness level,’ and, thus, is *not* a test based on a level of fitness of a user as required by the challenged claims.” Paper 11, at 35 (quoting Petition at 39). Petitioner relies on Ceci’s “self-regulated exercise chosen by a user” to fill this gap for limitation [C]. *Id.*, 41-44. But to prove obviousness, it is insufficient to allege that a POSITA “*could* combine these references,” and instead Petitioner must demonstrate “that they *would* have been motivated to do so.” *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014) (emphasis original). Petitioner failed to do so. Ex. 2001, ¶¶141-147; Ex. 2008, ¶¶106-113.

Neither Petitioner nor Dr. Lynch explained how Lubell’s system could be modified to use a self-regulated protocol for determining VO_{2max} , let alone why a POSITA would have been motivated to attempt it. Instead, Petitioner argues that Lubell itself suggests using “other tests in other circumstances”—but that argument rests on a misinterpretation of the reference. Petition, at 42; Ex. 1009, ¶90 (both citing Ex. 1004, 5:6-16). The cited paragraph explains that Lubell’s “exemplary embodiment” describes a protocol “using *running* as the preferred training exercise,” and that it “could be *suitably* adapted for use when cycling” or “swimming,” in which cases a “*suitable* submaximal exercise test protocol could

be used.” *Id.* Here, Lubell is plainly referring to a cycling or swimming version of its running protocol for determining VO_{2max} , not unspecified protocols that cannot even determine VO_{2max} , as Petitioner suggests. Ex. 2008, ¶112. Lubell **does not mention** a “self-regulated” protocol, or any type of protocol other than one using the Van der Walt relationship. *Id.*, ¶¶111-112. Obviously, for **other modes of exercise**, a “suitable” protocol would replace prompting the subject to run at certain speeds for certain time intervals. *E.g.*, Ex. 1004, 8:61–9:12. But nowhere does Lubell suggest that such a protocol could be self-regulated (like Ceci’s).¹⁵

Indeed, the purpose of Lubell’s protocol is to determine VO_{2max} (Ex. 1004, 2:50), and the Ceci protocol cannot determine VO_{2max} , as Petitioner’s own expert Dr. Lynch admits. Ex. 2012, 272:15-17 (“Q: Does Ceci disclose a protocol for determining VO_{2max} ? A. No.”). And while Dr. Lynch suggests that Lubell could be modified to determine parameters other than VO_{2max} , the only other parameter he could name was “heart rates” (*id.*, 275:2-12), which he admitted Lubell **already measures**. Ex. 1009, ¶48 (Lubell “track[s] heart rate throughout”); Ex. 2008, ¶113. Petitioner’s interpretation is unsupported, and contrary to Lubell’s express purpose.

Moreover, Lubell **expressly teaches away** from self-regulated protocols like

¹⁵ In fact, the passage that Petitioner misinterprets also explains that Lubell’s protocol “could be adapted for monitoring the training of **non-human** subjects, such as race horses or dogs,” and it would be non-sensical to suggest that animals could choose a “self-regulated exercise” protocol. *Id.*, 5:14–16; Ex. 2008, ¶51.

Ceci's, by disparaging "previously-proposed fitness monitoring systems" where users can "pace themselves at various speeds," or exercise "at whatever speed he or she desires." Ex. 1004, 2:1-10, 2:35-51; Ex. 2001, ¶¶143-145; Ex. 2008, ¶¶111-112. Lubell distinguished those approaches as "not universally applicable," in contrast to the claimed invention's approach of subjecting all users to the same "straightforward training protocol," to "avoid the drawbacks" of prior devices. *Id.* Dr. Lynch's opinion that a "POSITA would have been aware of the existence of the RPE scale" only serves to underscore Petitioner's failure—Lubell acknowledged self-regulated protocols *and rejected them*. Ex. 1009, ¶92. Particularly since Ceci teaches nothing about VO_{2max} , a POSITA would have had no reason to look to it.

Furthermore, Petitioner did not demonstrate a reasonable expectation of success in combining Lubell with Ceci for determining VO_{2max} , or any other "fitness parameter." Lubell uses the Van der Walt relationship to estimate VO_{2max} , which requires the subject to run at increasing speeds in specific time intervals to obtain the "elapsed time T" for reaching "maximal heart rate" (or the point of exhaustion), which is input into "known formulas" to calculate VO_{2max} . Ex. 1004, 8:43-9:38; Ex. 1009, ¶48; Ex. 2008, ¶¶48-52. Dr. Lynch admitted that substituting Ceci's RPE protocol into Lubell would require using "a different method other than the Van der Walt relationship" to determine VO_{2max} , but he could not identify what any such method would be, let alone the equations necessary to render it operable. Ex. 2012,

277:5-278:2. A POSITA would not have had a reasonable expectation of success in combining with Ceci, as it would have rendered Lubell inoperable for its intended purpose of determining VO_{2max} . Ex. 2008, ¶110.

None of Petitioner's other arguments prove a motivation to combine or a reasonable expectation of success. Petitioner's arguments that the combination "is a simple substitution of one test for another," is "applying a known technique (RPE test protocol) to a known device (Lubell health fitness monitor)," and "would be desirable and feasible" (Petition, 43-44) are entirely conclusory, and unsupported by expert testimony. And for his part, while Dr. Lynch opined without explanation that the "architecture already exists in the device of Lubell to support" the Ceci protocol (Ex. 1009, ¶93), during his deposition he admitted that the combination would require modifying Lubell in ways that he could not identify.¹⁶ See *Xerox Corp.*, IPR2022-00624, Paper 9 at 15 (precedential) (conclusory expert testimony is entitled to little or no weight); Ex. 2001, ¶¶146-147; Ex. 2008, ¶¶110-112.

For limitation [D], in addition to the lack of motivation to combine as already discussed,¹⁷ neither Lubell nor Ceci discloses "determin[ing] a plurality of *heart*

¹⁶ When asked how the Lubell/Ceci combination would have to be modified to be able to measure VO_{2max} , Dr. Lynch testified "I can't say." Ex. 2012, 277:5–278:2.

¹⁷ Other than Dr. Lynch's conclusory opinions discussed below, Petitioner offered the same inadequate motivation to combine as for limitation [C]. Petition, 45 ("For the same reasons described above, a POSITA would be motivated to combine . . .").

rate zones based on first heart rate measurements” taken “while the user exercises.” First, Petitioner admits that Lubell does not determine “**heart rate** zones,” but instead refers to one **VO_{2max}** “zone of 60 to 80 percent.” Petition, 44.¹⁸ Lubell does not disclose a “zone” bounded by heart rates.¹⁹ Ex. 2008, ¶¶103-105.

Second, and as recognized by the Board, Ceci also does not disclose “heart rate zones.” Paper 11, at 36. Ceci directed subjects to exercise at different *exertion* levels (not in “heart rate zones”) where the “heart rate was tracked.” Ex. 1005, 3. But Ceci only reported the “mean values” of heart rates for a group of subjects in a wide age range, *e.g.*, 105.3 bpm on a treadmill, compared to 140.7 bpm on an outdoor track, for subjects between 33 and 65 years exercising at RPE level 11. *Id.* at 2, Figure 2 (Session 1). Ceci does not refer to any zones, despite Petitioner’s suggestion otherwise. Petition, 45. Instead, Petitioner relies on Dr. Lynch’s opinion that a POSITA could “*use the heart rates* measured at different RPE levels . . . *as the basis for* the heart rate zones in Lubell.” Ex. 1009, ¶92. But Dr. Lynch does not

¹⁸ Because Lubell does not disclose limitation [D], it also cannot disclose limitations [E] and [G], which require the same “heart rate zones.” Petitioner admits that Lubell only discloses a “zone” that “corresponds to a %VO_{2max} between 60 and 80,” not any “*heart rate* zone.” Petition, 45-46.

¹⁹ The VO_{2max} range is also not “based on first heart rate measurements,” plural, taken “while the user exercises.” Petitioner admits that Lubell determines the VO_{2max} range using “*resting heart rate* and maximum heart rate.” Petition, 45. But Lubell records the “resting heart rate” *before* the subject starts running. Ex. 1004, 9:5-12, 8:23-49. Accordingly, only one heart rate used for the VO_{2max} range was obtained “*while the user exercised*.”

explain how Ceci's mean heart rates for a group of subjects could be used as the basis for setting an individual user's $VO_{2\max}$ zone in Lubell. Moreover, Lubell's formula for the $VO_{2\max}$ range uses a subject's resting and maximum heart rates as *inputs*. Ex. 1004, 10:8-24. But Ceci did not measure maximum heart rates or calculate $VO_{2\max}$, so Dr. Lynch's opinion that Ceci's mean heart rates could be used "as the basis for" Lubell's "60 to 80 percent" $VO_{2\max}$ range is non-sensical. Ex. 2008, ¶¶103-105. Nor does Dr. Lynch explain why a POSITA would have been motivated to modify Lubell's $VO_{2\max}$ -based range into an entirely different heart rate-based range, requiring different measurements and formulas, where Lubell's approach already provided a subject with an indication of an exercise "training range." *Id.*

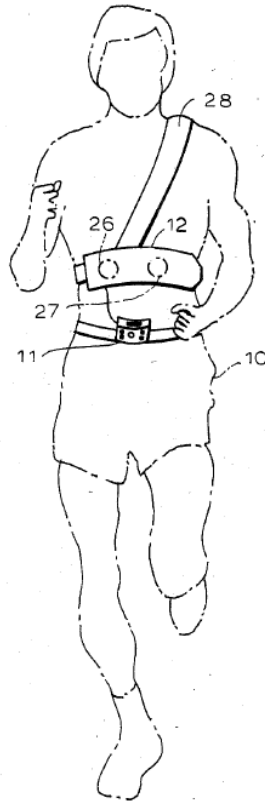
B. Grounds 4, 5: The Lubell Combinations Do Not Render Obvious Any Dependent Claims

First, Petitioner cannot demonstrate that Lubell renders obvious dependent claims 2, 3, 4, 13, and 18 in combination with Gorman (Ground 4), or claims 9, 14, and 19 in combination with Flach (Ground 5), because the combination of Lubell and Ceci does not render obvious any of the independent claims.

Second, Petitioner failed to carry its burden of demonstrating obviousness for largely the same reasons as the Amano grounds (Section VIII)—namely, the Petition does not prove a sufficient rationale for combining Lubell's wired device with the wireless teachings of Gorman or Flach, or a reasonable expectation of success. Petition, 47-54. Indeed, Lubell only discloses a wired health fitness monitor. *E.g.*,

Ex. 1004, 5:32-56 (with respect to Figs. 1-3, “A recessed socket 23 is provided on a back panel of the device 11 to receive a jack from the heart beat sensor 12.”); (Fig. 1, showing a wire connecting components “device 11” and “heart beat sensor 12”):

FIG. 1



Petitioner did not identify any purported shortcomings in Lubell’s wired approach, let alone explain what would have led a POSITA to combine Lubell’s wired device with wireless transmission teachings. Petition, 47-54; Ex. 1009, ¶¶ 94-104. Dr. Lynch did not even consider whether Lubell’s device was wired or wireless when

forming his opinions.²⁰ And Petitioner completely ignored the differences, instead alleging generic rationales such as “Gorman discloses a known technique related to communication in fitness devices that would be useful to improve the similar device in Lubell,” and a “desire for smooth communication between sensor and device would motivate a designer” to combine with Flach. Petition, 48, 53.

And while they should be afforded no weight, Dr. Lynch’s opinions that Lubell “must send a signal from a sensor to a receiver,” and that “Gorman details a successful way to do this,” are insufficient, because he either ignored (or did not realize) that Lubell already discloses an operable system that uses a wire to send the signal. Ex. 1009, ¶96; Ex. 2008, ¶¶115-118. Using a wire also obviates any need for Gorman’s teaching of “validat[ing] the data that is sent between transmitters and receivers,” because Lubell knows the data is sent by the hard-wired sensor. *Id.* And for the Flach combination, Dr. Lynch acknowledges that Lubell already “describes a straightforward transfer from the sensor through some signal processing to the processor” via a wire. Ex. 1009, ¶101. Dr. Lynch opined that a “POSITA looking to provide efficient communication for the Lubell sensor and processor would be

²⁰ It is apparent that Dr. Lynch did not know whether Lubell discloses a wired or wireless device when drafting his declaration. At first, Dr. Lynch confidently testified that Lubell discloses both, but when pointed to descriptions of its wired device, he admitted “I’m not aware of a wireless communication disclosed in here.” Ex. 2012, 246:8-9, 248:2-7. Since he did not know these details, Dr. Lynch’s opinions on this combination are not reliable or relevant. Ex. 1009, ¶¶ 94-104.

motivated to implement the timeslots method described in Flach” (*id.*, ¶102), but that is a generic and entirely insufficient motivation. Ex. 2008, ¶¶119-121.

Nor would a POSITA have had a reasonable expectation of success, as Petitioner did not consider that Lubell’s wired monitor did not have the problems Gorman and Flach are directed to solving (such as distinguishing multiple devices transmitting on the same frequency, or correcting transmission errors caused by noise), or that implementing wireless radiofrequency transmission would require a redesign. *Id.*, ¶¶116-118, 120-121. For instance, Petitioner argued that a “POSITA need only adjust the coding of Lubell’s communication to implement the encoded messages with identification data in Gorman.” Petition, 49. Except, Lubell does not use coding. Ex. 2008, ¶116. Similarly, Petitioner argued that for Flach “[s]uch a change only requires a substitution of the known time division communication technique” “into the machine of Lubell.” Petition, 53. Except Flach’s TDMA protocol is designed for wireless transmission over radio waves, using data packets with timeslots, none of which is compatible with Lubell. Ex. 2008, ¶120.

Petitioner improperly relied on hindsight and treated the claim limitations “like separate pieces of a simple jigsaw puzzle” to be combined, without articulating any rationale for combining Lubell’s wired monitor with entirely disparate wireless teachings. *InTouch Techs.*, 751 F.3d at 1348-49; *Securus Techs., Inc.*, 701 F. Appx. at 976. Petitioner cannot satisfy its obviousness burden.

XI. CONCLUSION

Petitioner has not proven by a preponderance of the evidence that any Challenged Claim is unpatentable.

Dated: October 10, 2023

Respectfully Submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned certifies that this response complies with the type-volume limitations of 37 C.F.R. § 42.24(a)(1)(i). This response (including figure labels and annotations) contains 13,916 words as calculated by the “Word Count” feature of Microsoft Office 365 Word application, the word processing program used to create it, and manual counting of the annotations in the figures.

The undersigned further certifies that this response complies with the typeface requirements of 37 C.F.R. § 42.6(a)(2)(ii) and typestyle requirements of 37 C.F.R. § 42.6(a)(2)(iii). This response has been prepared in a proportionally spaced typeface using Microsoft Office 365 Word application in Times New Roman 14-point font.

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned Certifies that on October 10, 2023, a true and entire copy of this **RESPONSE OF PATENT OWNER NIKE, INC TO IPR2023-00438**, and all supporting exhibits, were served via e-mail to Petitioner by serving the correspondence address of record, indicated below.

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