

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

RESONANT SYSTEMS INC.,
d/b/a/ REVELHMI,
Patent Owner.

IPR2024-00698
Patent 8,093,767 B2

Before KARL D. EASTHOM, NORMAN H. BEAMER, and
BRIAN D. RANGE, *Administrative Patent Judges*.

RANGE, *Administrative Patent Judge*.

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

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–5 of U.S. Patent No. 8,093,767 B2 (Ex. 1001, “the ’767 patent”). Paper 2 (“Pet.”). Resonant Systems, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). On October 21, 2024, we instituted *inter partes* review of the challenged claims on all asserted grounds. Paper 9 (“Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 13, “PO Resp.”), Petitioner filed a Reply (Paper 19, “Pet. Reply”), and Patent Owner filed a Sur-Reply (Paper 25, “PO Sur-Reply”). An oral hearing was held on July 16, 2025, and a transcript of the hearing is in the record (Paper 28, “Tr.”). We have jurisdiction under 35 U.S.C. § 6. This decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–5 of the ’767 patent are unpatentable.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies itself as the real party in interest. Pet. 79. Patent Owner identifies itself as the real party in interest, as assignee of the ’767 patent. Paper 5, 1.

B. *Related Matters*

The parties identify the following pending matters as related to this proceeding: *Resonant Systems, Inc. d/b/a RevelHMI v. Apple, Inc.*, No. 7-23-cv-00077 (W.D. Tex.) (filed June 1, 2023) (“the District Court case”). Pet. 79–80; Paper 5, 1. Patent Owner also identifies the companion Petition (IPR2024-00697) also filed by Petitioner. *Id.*

C. The '767 patent

The '767 patent, titled “Linear-Resonant Vibration Module,” issued January 10, 2012, with claims 1–5. Ex. 1001, codes (45), (54), 11:6–12:33. The '767 patent claims priority to a provisional application, No. 61/179,109, filed on May 18, 2009. *Id.* at (60). The '767 patent describes that it is “related to vibration-generating devices and, in particular, to vibration modules that can be incorporated into a wide variety of different types of electromechanical devices and systems to produce vibrations of selected amplitudes and frequencies over a wide range amplitude/frequency space.” *Id.* at 1:11–16.

The '767 patent describes that the most common prior-art method of producing vibrations in consumer appliances, toys, and other devices is an intentionally-unbalanced electric motor. *Id.* at 1:22–28. The patent describes four problems with this method: unbalanced forces (which can damage devices), inefficiency in producing forces (which drains batteries faster), elliptical, rather than linear, vibrations, and that “only a very limited portion of the total vibrational-force/frequency space is accessible to unbalanced electric motors.” *Id.* at 2:9–49.

In the '767 patent, “vibrational forces are produced by linear oscillation of a weight or member, in turn produced by rapidly alternating the polarity of one or more driving electromagnets,” and “[f]eedback control is used to maintain the vibrational frequency.” *Id.* at 3:9–15. Figure 6, reproduced below, is a block diagram of a linear-resonant vibration module (“LRVM”) of the '767 patent:

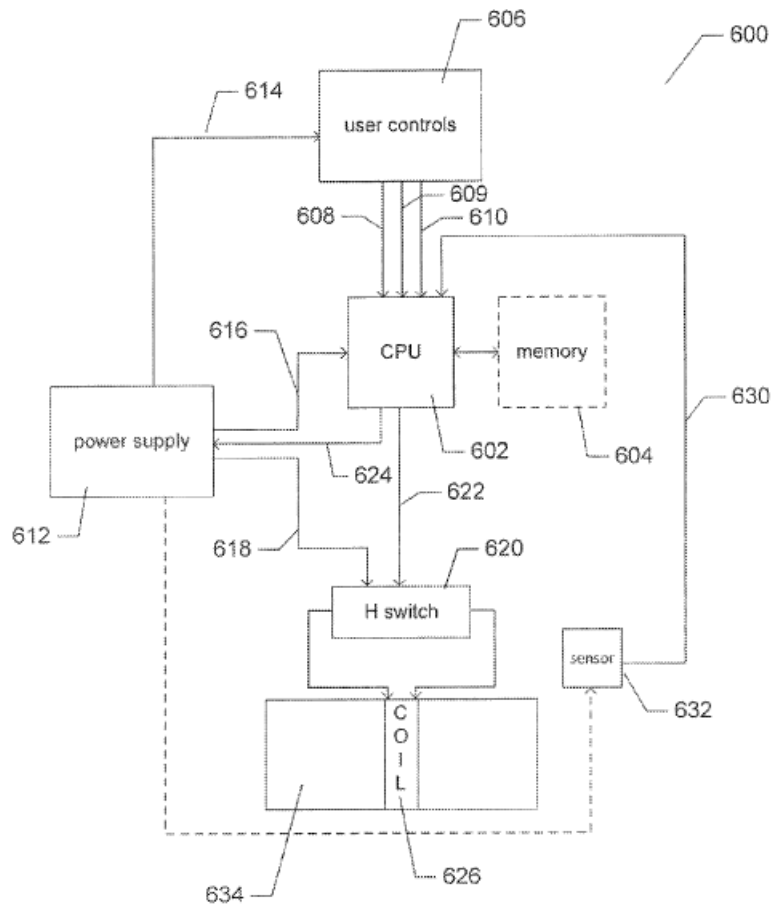


Figure 6 illustrates CPU 602, memory 604, user controls 616, input signals 608–610, power supply 612, H-bridge switch 620, sensors 632, coil 626, and linearly oscillating mass 634.

A side-view of one type of coil and oscillating mass is shown in Figure 10, reproduced below.

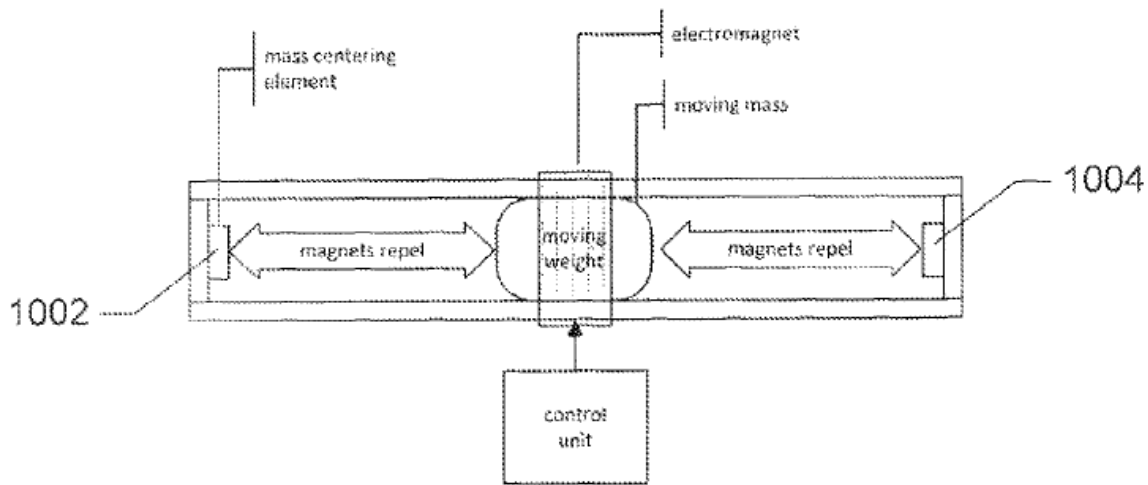


Figure 10 shows a LRVM and illustrates end magnets 1002 and 1004 (which may instead be springs), a moving weight, an electromagnet, and a control unit. *Id.* at 8:45–51.

D. Illustrative Claim

Claim 1 is independent. The other challenged claims (claims 2–5) depend from claim 1. *See* Ex. 1001, 11:5–12:33.

Claim 1 (with identifiers of claim elements, *see, e.g.*, Pet. vi–1, 10–30) is illustrative and is reproduced below.

[1.P] A linear resonant vibration module comprising:

[1.1] a housing;

[1.2] a moveable component;

[1.3] a power supply;

[1.4] a driving component that drives the moveable component in each of two opposite directions; and

[1.5.1] a control component that includes a microprocessor and that controls supply of power from the power supply to the driving component to cause the moveable component to linearly oscillate, the control component including, in addition to the microprocessor,

[1.5.2] a control program, stored in one of a separated electronic memory or within the processor, that is executed by the microprocessor to control operation of the linear resonant vibration module, and

[1.5.3] a switch that receives a directional signal d from the processor and that selects a corresponding direction of the two opposite directions in which the driving component drives the moveable component,

[1.6] the control component receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

Ex. 1001, 11:6–33.

E. Asserted Grounds of Unpatentability

Petitioner, supported by the Declaration of Dr. Blake Hannaford (Ex. 1003), asserts the following grounds of unpatentability (Pet. 1):¹

Ground	Claim(s) Challenged	35 U.S.C. §	References/Basis
1A	1	103(a)	Izumi, ² Cosper ³
1B	1–3	103(a)	Izumi, Cosper, Rossi ⁴

¹ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, took effect on March 16, 2013. The ’767 patent was filed before this date. *See* Ex. 1001, codes (22), (60). Therefore, pre-AIA statutes apply.

² US 2005/0275294 A1, published Dec. 15, 2005, Ex. 1005 (“Izumi”).

³ US 2008/0246532 A1, published Oct. 9, 2008, Ex. 1009 (“Cosper”).

⁴ US 4,879,641, issued Nov. 7, 1989, Ex. 1020 (“Rossi”).

Ground	Claim(s) Challenged	35 U.S.C. §	References/Basis
1C	1	103(a)	Izumi, Cospers, Ibuki ⁵
1D	4, 5	103(a)	Izumi, Cospers, Rossi, Ibuki
2A	1	103(a)	Izumi, Cospers, Ibuki, Aldrich ⁶
2B	1–5	103(a)	Izumi, Cospers, Ibuki, Aldrich, Rossi

III. ANALYSIS

A. Legal Standard

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and “the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

⁵ US 2005/0144784 A1, published July 7, 2005, Ex. 1038 (“Ibuki”).

⁶ “Controller for Driving a Piezoelectric Actuator at Resonance,” NASA Tech Briefs, Apr. 2008, Ex. 1021 (“Aldrich”).

⁷ Objective evidence of nonobviousness is not at issue here.

B. Level of Ordinary Skill in the Art

In order to determine whether an invention would have been obvious at the time the application was made, we consider the level of ordinary skill in the pertinent art at the critical time. *Graham*, 383 U.S. at 17. The resolution of this question is important because it allows us to “maintain[] objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation omitted). Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovention Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) (“A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.”).

Petitioner contends that a person of ordinary skill in the art (POSITA) would have had a degree in mechanical engineering, electrical engineering, physics, or a related technical field, and at least 2–3 years of experience related to the design or development of systems incorporating linear actuators; additional years of experience could substitute for the degree. Pet. 4 (citing Ex. 1003 ¶ 30–31). Patent Owner contends a POSITA would have had (1) a bachelor’s degree in electrical engineering, mechanical engineering, or a comparable field of study, and (2) at least two years of professional experience with electro-mechanical control systems, or other

similarly relevant industry experience. PO Resp. 2–3. Additional relevant industry experience may compensate for lack of formal education or vice versa. *Id.* Patent Owner further contends this is similar to Petitioner’s POSITA contention. *Id.* at 3.

For purposes of this Decision, we adopt Petitioner’s proposal as reasonable and consistent with the ’767 patent specification and the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art). Our reasoning herein would be the same under Patent Owner’s similar proposal.

C. Claim Construction

In *inter partes* reviews, the Board interprets claim language using the district-court-type standard, as described in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence should be considered in the context of the intrinsic evidence. *See id.* at 1317–19.

In considering claim construction, we take into account the August 23, 2024, Claim Construction Memorandum and Order (“Dist. Ct. Constr.”) issued in the District Court case. *See supra* Section II.B.

Claim 1, Preamble. Both parties agree that the preamble of claim 1 is limiting. PO Resp. 6. We agree that claim 1’s preamble is limiting. We also

note that the parties agreed that this preamble is limiting in the District Court case. Dist. Ct. Const. 10.

Claim 1, “driving component” and “control component.” Petitioner argues that two terms recited in all claims, “driving component” and “control component,” should be construed under their plain and ordinary meaning. Pet. 5. But Petitioner also indicates that in the District Court case, Petitioner is arguing the terms should be construed under 35 U.S.C. § 112 ¶ 6 as “means-plus-function” terms. *Id.* Therefore, Petitioner argues Grounds 1A–1C based on plain and ordinary meaning but argues based on a means-plus-function construction for Grounds 2A and 2B. *Id.* at 5–6.

Patent Owner argues that we do not need to address means-plus-function issues here because those issues “relate to issues not relevant to the arguments made in this Response.” PO Resp. 7. Patent Owner also notes that the District Court ordered that “control component” has its plain and ordinary meaning.

Because neither party asserts that construction of “driving component” or “control component” is necessary to resolve the issues before us, we decline to expressly construe these claim terms. *See, e.g., Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). For clarity, because Petitioner argues that plain and ordinary meaning is appropriate and because Patent Owner does not dispute that construction, we adopt the plain and ordinary meaning of these claim terms when comparing the challenged claims to the prior art.

Other claim terms. It is unnecessary for us to expressly construe other claim terms for purposes of this Decision. *See, e.g., Realtime Data, LLC*, 912 F.3d at 1375.

D. Overview of the Asserted Art

1. Izumi (Exhibit 1005)

Izumi “relates to a driving unit and a method for driving a resonance system comprising an elastic body and a moving element supported by the elastic body.” Ex. 1005 ¶ 1. Izumi seeks to drive “a resonance system which can improve energy efficiency.” *Id.* ¶ 7. Izumi’s system “comprises a moving element, an elastic body configured to support the moving element, a permanent magnet fixed on said moving element, an electromagnet disposed to be opposed to said permanent magnet, and a controller.” *Id.* ¶ 8. Izumi’s driving unit is used in an electric shaver, with a linear actuator for reciprocating an inner cutter blade. *Id.* ¶ 39.

Figure 1A, reproduced below, shows a side-view diagram of a driving unit.

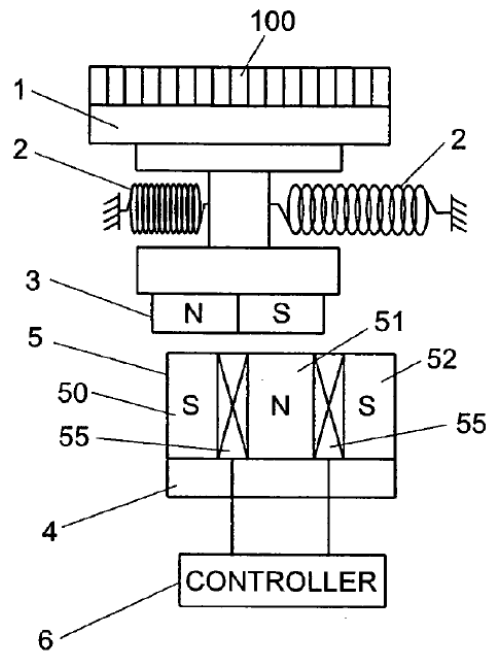


Figure 1 shows moving element 1, coil springs 2, permanent magnet 3, electromagnet 5 on stationary element 4, and controller 6. *Id.* ¶ 39. The “controller of the driving unit gives an alternating voltage of a rectangular wave to an electromagnet every half-cycle, and reciprocates the moving element with a constant amplitude by controlling a voltage application period (T_{on}) and a phase (T_{ph}) of the alternating voltage.” *Id.* ¶ 4. “Vibration force which moves the moving element will increase or decrease in response to the amount of the current flowing through the coil.” *Id.* ¶ 5.

The “controller detects a motion of the moving element every half-cycle, and if the width of the moving element is larger than a target width, the controller decreases the voltage application period, and if the width of the moving element is shorter than the target width, the controller increases the voltage application period.” *Id.* In Izumi, “an electric current in the form of a current waveform desirable for an intended motion of the moving element can flow through the coil, so that an energy loss due to an

unnecessary current can be reduced and the energy efficiency can be improved.” *Id.* ¶ 8.

2. *Cosper (Exhibit 1009)*

Cosper relates to “automatically driving and maintaining oscillation of an assembly system including a mass and a bias member (which may also be referred to as a spring or elastomeric member) at or near a resonant frequency of the assembly system.” Ex. 1009, code (57). Cosper’s system includes “a controller operable to receive a signal from a sensor associated with a position or motion of the subassembly, and generate a drive signal for driving the subassembly in response to the received signal from the sensor.” *Id.* Cosper’s “controller may monitor the motion of the subassembly and adjust or modulate the driving force over time to maintain the subassembly at or near a resonant frequency.” *Id.*

Figure 1, reproduced below, is a schematic of Cosper’s system.

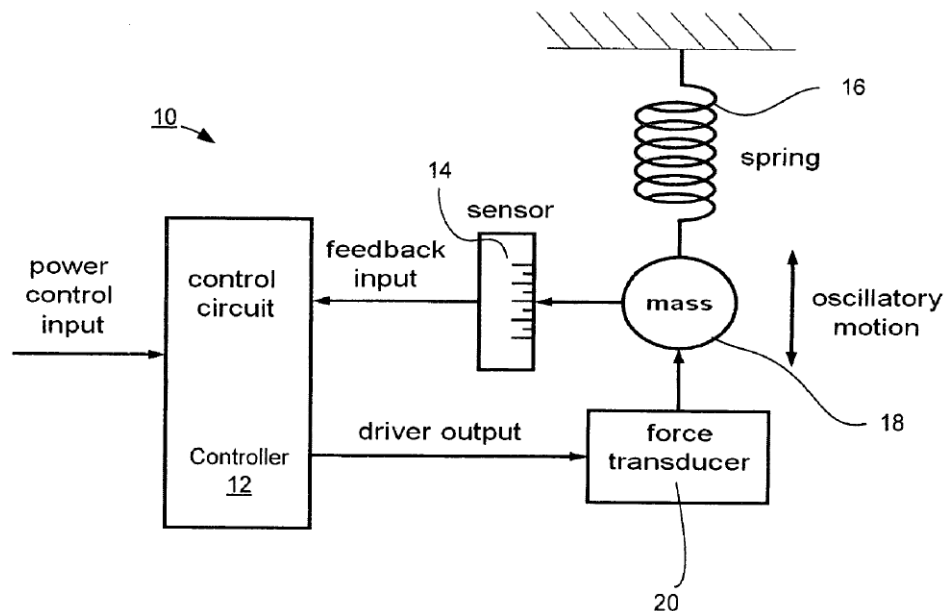


Figure 1 shows control system 10, with

control logic (e.g., hardware, software, firmware, or combinations thereof) included with a controller or control circuit

12), a sensor 14 for determining a parameter from the moveable subassembly (e.g., including a bias 16 and mass 18), a sensor input for inputting the parameter into the control logic of control circuit 12, and a control output from the control logic to drive the moveable subassembly at or near resonance via force transducer 20.

Id. ¶ 49.

3. *Rossi (Exhibit 1020)*

Rossi “relates to circuits for a switching mode driving of a load and in particular to circuit arrangements for controlling the current being delivered to the load.” Ex. 1020, 1:8–11. Rossi describes that prior art apparatuses for controlling electric motors typically use “sensing resistances,” which “represent[] a remarkable cost factor of the apparatus [] because they must often possess well determined precision and temperature co-efficient characteristics and be exempt of any appreciable inductance.” *Id.* at 1:27–36.

Rossi’s circuit “determines the magnitude and direction of the current being delivered to a load of an H-bridge stage by utilizing a single sensing resistor connected between a common virtual ground node of the driving bridge circuit and a real ground node.” *Id.* at 1:38–43.

A diagram of Rossi’s circuit is reproduced below:

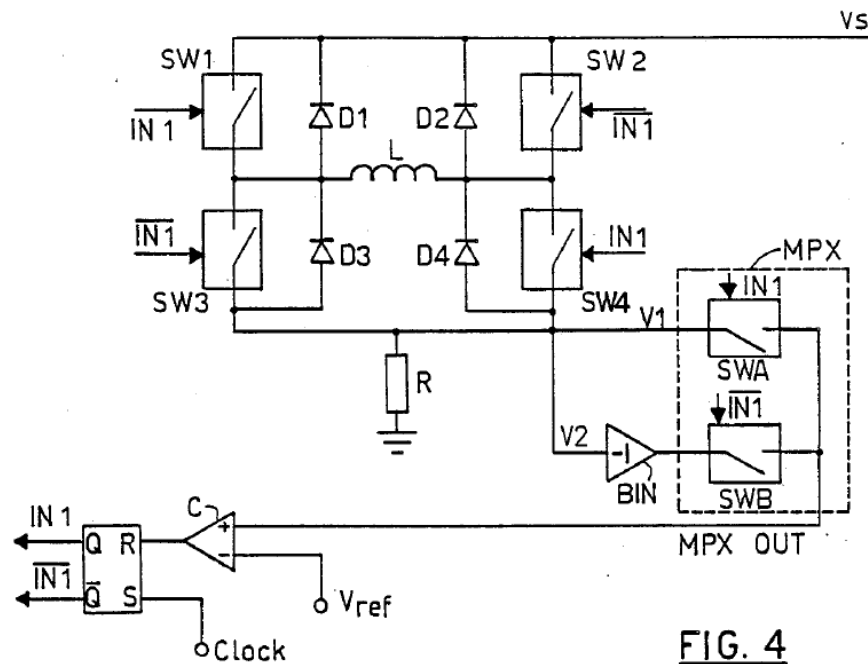


FIG. 4

Rossi’s Figure 4 depicts a circuit that utilizes “a single sensing resistor R connected between a single common virtual ground node (V1) and a real ground node of the circuit.” *Id.* at 2:57–59.

4. Ibuki (Exhibit 1038)

Ibuki discloses an electric razor, “capable of cleaning a blade,” “without scattering water and shaving debris.” Ex. 1038 ¶¶ 1, 6.

The electric razor is operatively changeable between a normal drive mode of allowing the user to shave the hair, and a cleaning drive mode of allowing the user to clean the blade, wherein at least one of a driving frequency, the number of revolutions per unit time, and an amplitude of the blade in the cleaning drive mode is differentiated from a corresponding one in the normal drive mode.

Id. ¶ 7. Ibuki discloses its controller 13 controls a “driving unit 7,” which may be configured for driving amplitude of the reciprocating inner blade 3, and speed of the inner blade, or speed of a rotational embodiment of the rotating inner blade. *Id.* ¶¶ 23, 24.

Ibuki also discloses a “cleaning drive mode,” where an outer blade is removed, the inner blade is driven at a lower speed than in normal mode, and water is allowed to be applied to clean the blades. *Id.* ¶ 38. A mode switch controls shifting to cleaning mode from normal mode. *Id.* ¶ 27. Alternatively, the blade speed in cleaning mode can be set to higher than that of normal mode. *Id.* ¶ 32.

5. *Aldrich (Exhibit 1021)*

Aldrich describes its system as follows:

[a] digital control system based partly on an extremum-seeking control algorithm [which] tracks the changing resonance frequency of a piezoelectric actuator or an electrically similar electromechanical device that is driven by a sinusoidal excitation signal and is required to be maintained at or near resonance in the presence of uncertain, changing external loads and disturbances.

Ex. 1021, 41.⁸

Aldrich describes incrementing or decrementing an excitation frequency, determining if the change “results in an increase in the current/voltage ratio,” and then either making another increment, or reversing and decrementing, until the resonance peaks. *Id.* at 42.

E. Unpatentability Grounds

1. *Unpatentability over Izumi and Cosper (Ground 1A)*

Petitioner asserts that claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Izumi and Cosper, citing the Declaration of Dr. Hannaford for support. Pet. 2, 10–30 (citing Ex. 1003). Patent Owner disputes what Petitioner labels as “Limitation [1.5.3],” but

⁸ We refer to the page numbers in the original.

otherwise does not dispute Petitioner's assertions. PO Resp. 9–14. We address Petitioner's assertions and Patent Owner's argument below.

a. *Combining Izumi and Cospers*

Petitioner argues that Izumi describes a driving unit that drives a linear actuator resonance system such as for a shaver device. Pet. 11–13 (citing, e.g., Ex. 1005 ¶¶ 8–10, 40–44, 57, 59, Figs. 1A, 2; Ex. 1003 ¶¶ 72–82). Petitioner argues that Cospers describes a feedback control system for maintaining resonant oscillation of a linear actuator. *Id.* at 13–15 (citing, e.g., Ex. 1009 ¶¶ 49–50; Ex. 1003 ¶¶ 81–82).

Petitioner argues that a person having ordinary skill in the art would have combined Izumi's module to include multiple sensors in accordance with Cospers's teachings. Pet. 15. Petitioner argues that the sensors would monitor the moving element and generate a control signal in accordance with Izumi. *Id.* at 15–16. Petitioner further argues that Izumi's controller would have been implemented using a microprocessor and memory as Cospers suggests. *Id.* at 16.

Petitioner argues three reasons why a person having ordinary skill in the art would have combined Izumi with Cospers's teachings. *Id.* at 16–19. First, Petitioner argues that a person having ordinary skill in the art would have looked to Cospers as a way to further Izumi's objective of having a sensor that detects the and controls the movement of the moving element. *Id.* at 16–17. Second, Petitioner argues that the combination of Izumi and Cospers would have enhanced reliability of the feedback sensors by capturing “data specific to different operating parameters.” *Id.* at 17–18. Third, combining the references' teachings would “facilitat[e] implementation of software instructions” by using a microprocessor and memory. *Id.* at 18–19.

Patent Owner does not dispute Petitioner’s rationale to combine the references’ teachings. Based on our review and consideration of the record, we determine that a preponderance of the evidence supports that a person of ordinary skill in the art would have combined the teachings of Izumi and Cosper in the manner Petitioner argues (“the Izumi-Cosper combination”).

b. *Claim 1*

Petitioner contends that the combined teachings of Izumi and Cosper teach or suggest each limitation of claim 1. Pet. 21–38. We address each limitation below.

[1.P] A linear resonant vibration module comprising:

Petitioner argues that the Izumi-Cosper combination includes a linear resonant vibration module. Pet. 21–22. We find that Petitioner’s argument is supported by a preponderance of the evidence. Izumi teaches a moving element that oscillates linearly. Ex. 1005 ¶¶ 8, 10–11, 39, 43–44, 46, 57; *see also* Ex. 1003 ¶¶ 127–128.

[1.1] a housing;

Petitioner argues that the Izumi-Cosper combination includes a housing. Pet. 22. We find that Petitioner’s argument is supported by a preponderance of the evidence. Izumi teaches, for example, that the moving element moves within a “case.” Ex. 1005 ¶ 39; Ex. 1003 ¶ 124.

[1.2] a moveable component;

Petitioner argues that the Izumi-Cosper combination includes a moveable component. Pet. 22–23. In particular, Petitioner identifies Izumi’s “moving element” as a moveable component. *Id.* We find that Petitioner’s argument is supported by a preponderance of the evidence. Izumi teaches a

moveable component. *See, e.g.,* Ex. 1005 ¶¶ 8, 12, 39, Figs. 1A–1B; Ex. 1003 ¶ 125.

[1.3] a power supply;

Petitioner argues that the Izumi-Cosper combination includes a power supply. Pet. 23. We find that Petitioner’s argument is supported by a preponderance of the evidence. Izumi teaches that a battery may be used as a power source. Ex. 1005 ¶ 56; *see also id.* ¶ 12; Ex. 1003 ¶ 126.

[1.4] a driving component that drives the moveable component in each of two opposite directions;

Petitioner argues that Izumi teaches electromagnet wire coils that drive the moveable component in two opposite directions. Pet. 23–24. We find that Petitioner’s argument is supported by a preponderance of the evidence. Izumi explains, for example, how providing voltage to the coils results in movement as follows:

When a positive voltage is given to the coils 55 by the controller 6, the magnetic material 51 located at the center is magnetized into a north pole and the magnetic materials 50, 52 located at both ends are magnetized into a south pole, respectively, as shown in FIG. 1A, and the moving element 1 is moved to the left in FIG. 1A by magnetic force acting between the magnetic materials 50, 51 and the permanent magnet 3.

Ex. 1005 ¶ 39; *see also, e.g.,* Ex. 1003 ¶ 127–128.

[1.5.1] a control component that includes a microprocessor and that controls supply of power from the power supply to the driving component to cause the moveable component to linearly oscillate, the control component including, in addition to the microprocessor,

Petitioner argues that the Izumi-Cosper combination includes a control component with a microprocessor programmed to execute an oscillation control program and an H-bridge switch. Pet. 25–26. Petitioner

argues that the control component controls power from the power supply to the driving component to cause the moveable component to linearly oscillate. *Id.* at 25. We find that Petitioner's argument is supported by a preponderance of the evidence. Izumi teaches a local microprocessor and software instructions that control power in the recited manner. Ex. 1003 ¶¶ 109–122, 1129–132; Ex. 1005 ¶¶ 9, 40, 47, 61, 63, Fig. 22A; Ex. 1009 ¶¶ 49, 56, 125.

[1.5.2] a control program, stored in one of a separated electronic memory or within the processor, that is executed by the microprocessor to control operation of the linear resonant vibration module,

Petitioner argues that the Izumi-Cosper combination includes a control program executed by a microprocessor to control operation of the linear resonant vibration module consistent with Izumi's stated objectives. Pet. 26–27. We find that Petitioner's argument is supported by a preponderance of the evidence. The combined system would include a control program that receives the value of an output signal, compares that value, and adjusts operational outputs based on the comparison. Ex. 1003 ¶ 133; Ex. 1005 ¶¶ 8–13, 39–59, 60–66; Ex. 1009, code (54), ¶¶ 9–11, 50, 55–58 125.

[1.5.3] a switch that receives a directional signal d from the processor and that selects a corresponding direction of the two opposite directions in which the driving component drives the moveable component;

Petitioner argues that the combination's H-bridge switch selects a corresponding direction of two opposite directions in which the driving component drives the moveable component. Pet. 27–28. Petitioner argues that the switch receives control signals (S1-S4) from the microprocessor. *Id.*

Petitioner's witness, Dr. Hannaford, annotates Izumi Figure 22A to illustrate Izumi's configuration. Ex. 1003 ¶¶ 134–137. Dr. Hannaford also explains how control signals control switches to drive Izumi's moving element. *Id.*; *see also* Ex. 1005 ¶¶ 49–51, 57–62.

Patent Owner argues that Petitioner does not establish that Izumi teaches that a microprocessor controls the recited switches. PO Resp. 10–11. Patent Owner argues that Izumi does not state that the current waveform decider is a microprocessor, and Patent Owner argues Izumi suggests that the controller may use “PWM control” rather than a signal from a processor. *Id.* at 10–13. Patent Owner argues that PWM control could be performed with an analog circuit. *Id.* at 13–14 (citing Ex. 2017, 3; Ex. 2009 ¶ 9). Thus, Patent owner concludes that Izumi does not teach the recited “switch that receives a directional signal d from the processor” and argues that “[n]either the petition nor Dr. Hannaford point to any motivation a POSITA would have had to ... utilize ‘a directional signal d from the processor.’” *Id.*

In Reply, Petitioner argues that Patent Owner focuses on isolated aspects of Izumi rather than addressing the Izumi-Cosper combination as a whole. Pet. Reply 1. Petitioner argues that, as explained in the Petition, the Izumi/Cosper combination renders obvious use of a microprocessor. *Id.* at 2. For example, Petitioner argues that the Petition explained that Izumi's controller would have been implemented using a microprocessor and memory in accordance with Cosper's suggestions. *Id.* at 3. Petitioner further argues that use of a microprocessor would have been obvious to “reliably and effectively carry out the control scheme.” *Id.* at 4 (quoting Pet. 18–19) (citations omitted).

The preponderance of the evidence supports Petitioner’s position. As the Petition explains, Izumi teaches a controller that, for example, “determines a shape and a phase of the current waveform necessary for the intended motion of the moving element.” Pet. 25 (quoting Ex. 1005 ¶ 9). Izumi and Cosper both suggest that this controller be or include a microprocessor. *See, e.g.*, Ex. 1005 ¶ 63 (Izumi referring to the control device having “CPU [central processing unit] speed”); Ex. 1009 ¶¶ 56 (Cosper explaining that control may achieved by “via software, hardware, firmware, or any suitable combination thereof”); 125 (explaining that, when Cosper refers to “circuitry” it means “any appropriate circuitry, including hardware, software, firmware, or some combination thereof”); *see also* Ex. 1003 ¶¶ 129–130 (Dr. Hannaford credibly explaining that a person having skill in the art would have understood that, given the small form factor of Izumi’s shaver, a person having ordinary skill in the art would have found it obvious that Izumi’s CPU includes a microprocessor); Ex. 1049 ¶¶ 8–19 (Dr. Hannaford credibly emphasizing his previous testimony as to why a processor would have been obvious and elaborating on this point).

Moreover, the Petition alleged that “Cosper, demonstrated the conventional knowledge of... a microprocessor that receives inputs from the sensors and that generates control signals to control the actuators.” Pet. 15. This allegation is supported by the preponderance of the evidence. Ex. 1003 ¶ 109 (Dr. Hannaford credibly testifying as to this point and citing, for example, Ex. 1005 ¶¶ 7–8, 41, 59, Ex. 1009 ¶ 50). The Petition further explained that a person having ordinary skill in the art would have has reason to utilize a microprocessor and memory and how a microprocessor could be used in the combination. *See* Pet. Reply 4 (citations omitted). Also,

numerous references corroborate Dr. Hannaford’s testimony that a “microprocessor” was a known and suitable option for delivering control signals. Pet. Reply 5–6 (citations omitted).

Patent Owner responds to this evidence by arguing that, even if use of a microprocessor within a controller would have been obvious, “it does not follow that the ‘directional signal d’ purportedly produced by that controller is ‘a directional signal d from the processor.’” PO Sur-Reply 2. Patent Owner argues that Apple assumption that signals from the controller are also from the processor is “ill-founded” because the controller includes circuitry in addition to a processor (such as PWM control circuitry). *Id.* at 2–4.

Patent Owner’s argument does not persuasively undermine Petitioner’s showing. The “directional signal d” at issue corresponds to a signal whose purpose is to control the moving actuator of the Izumi-Cosper combination. As explained above, Izumi and Cosper’s combined teachings suggest use of a microprocessor to control the actuator; thus, the references suggest that the microprocessor causes the “directional signal d.”⁹ Also, we agree with Petitioner that nothing in Izumi’s text suggests that the “PWM control method” must be performed by an analog circuit rather than with a processor. Pet. Reply 7–8; *see also, e.g.*, Ex. 1049 ¶ 17. The mere potential of an analog circuit performing the function of controlling the actuator with a directional signal d does not negate Petitioner’s cited evidence establishing

⁹ We note that nothing about the language of claim 1 requires that the switch receive directional signal d *directly* from a processor. Patent Owner did not argue for such a construction. PO Resp. 6–9 (not addressing this issue in the context of claim construction).

that a person having ordinary skill in the art would have understood that a processor could perform the function.

[1.6] the control component receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

Petitioner argues that the microprocessor of the combination's control component receives output from sensors. Pet. 28–30. Petitioner argues that the microprocessor adjusts control signals including H-bridge control signals S1-S4 according to received sensor output signals. *Id.* We find that Petitioner's argument is supported by a preponderance of the evidence. Cosper teaches multiple sensors that detect “position, velocity, acceleration, etc.” Ex. 1009 ¶ 50. Also, Izumi teaches that “the controller determines the current waveform in response to the behavior of the moving element detected by the sensor.” Ex. 1005 ¶ 10; *see also id.* ¶¶ 11, 40–44, 50, 57, 59; Ex. 1003 ¶¶ 139–140; Ex 1009; ¶ 11.

We determine Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combined teachings of Izumi and Cosper.

2. *Unpatentability over Izumi, Cosper, and Rossi (Ground 1B)*

Petitioner asserts claims 1–3 are unpatentable under 35 U.S.C. § 103(a) as obvious over Izumi in view of Cosper and Rossi. Pet. 2, 30–46 (citing Ex. 1003) (Petitioner's Ground 1B).

a. *Combining Izumi, Cosper, and Rossi*

Petitioner argues that Rossi teaches an H-bridge switching circuit. Pet. 31. Petitioner argues that a person having ordinary skill in the art would have had reason to combine Rossi’s H-bridge as an H-bridge of the Izumi-Cosper combination with a reasonable expectation of success. *Id.* at 31–36. For example, Izumi suggests use of an H-bridge. Ex. 1005 ¶ 60, Fig. 22A. Patent Owner does not dispute Petitioner’s arguments regarding reason to combine these references’ teachings. Based on our review and consideration of the record, we determine that a preponderance of the evidence supports that a person of ordinary skill in the art would have combined the teachings of Izumi, Cosper, and Rossi in the manner Petitioner argues (“the Izumi-Cosper-Rossi combination”).

b. *Claim 1*

Petitioner addresses obviousness of claim 1 over Izumi, Cosper, and Rossi similarly to how it addresses obviousness of claim 1 over Izumi and Cosper. Pet. 36–38. Petitioner additionally identifies Rossi’s H-bridge claim 1’s “switch that receives a directional signal d.” *Id.* at 36. Patent Owner does not dispute Petitioner’s arguments (aside from the issues Patent Owner raises with regard to the Izumi-Cosper combination). We determine Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combined teachings of Izumi, Cosper, and Rossi.

c. *Claim 2*

Petitioner contends that Izumi, Cosper, and Rossi teach or suggest each recitation of claim 2 and contends that a person having skill in the art would have had reason to combine the references teachings with a

reasonable expectation of success. Pet. 38–45. We address each recitation of claim 2 below.

[2.1] The linear resonant vibration module of claim 1 wherein the switch comprises: a directional-signal d input;

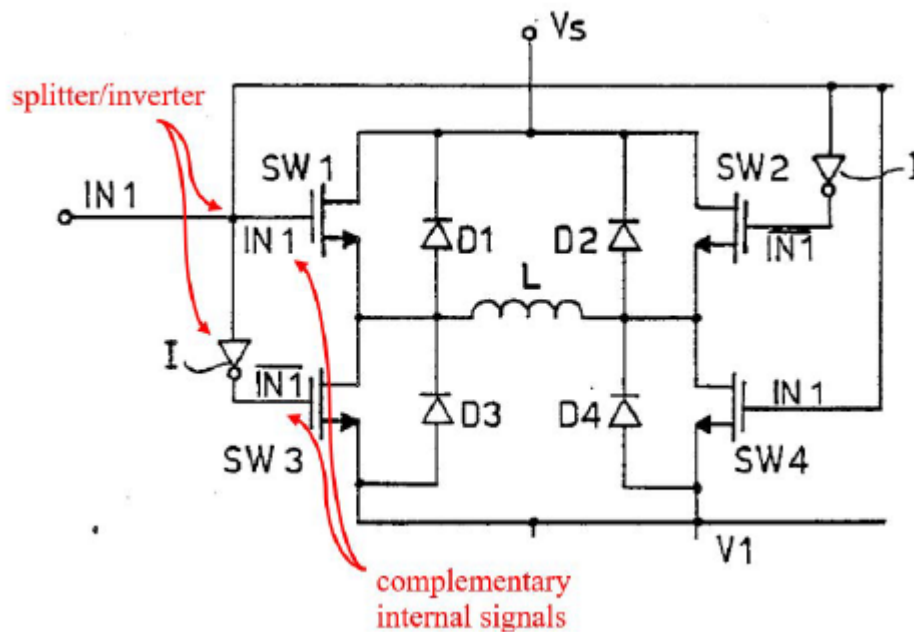
Petitioner argues that the Izumi-Cosper-Rossi combination includes a directional signal d input (“driving signal IN1” node). Pet. 38–49. Patent Owner does not dispute this point. A preponderance of the evidence supports Petitioner’s position. Ex. 1003 ¶ 149; Ex. 1020, Fig. 6.

[2.2] a voltage input;

Petitioner argues that the Izumi-Cosper-Rossi combination’s switch includes a voltage input (voltage supply node “Vs” in accordance with Rossi). Pet. 39–40. Patent Owner does not dispute this point. A preponderance of the evidence supports Petitioner’s position. Ex. 1020, code (57), 1:65-2:12, 3:57–4:52, Figs. 4, 6.

[2.3] a directional-signal splitter/inverter that generates two complementary internal signals, d and $\bar{d}$, corresponding to directional-signal d ; and

Petitioner argues that The Izumi-Cosper-Rossi combination’s switch includes a directional signal splitter/inverter (“I”) that generates two complementary internal signals, d (“driving signal IN1” after the splitter) and $\bar{d}$ (“driving signal $\overline{\text{IN1}}$ after the splitter”) corresponding to directional-signal d . Pet. 40–41. Petitioner annotates Rossi Figure 6 to illustrate its position. *Id.* We reproduce Petitioner’s annotated Rossi Figure 6 below.



Pet. 41. Rossi Figure 6 is “a circuit diagram of an embodiment of the circuit of FIG. 4 utilizing analog switches implemented by means of MOS transistors.” Ex. 1020, 1:62–64. Petitioner identifies the splitter/inverter on the left side of the figure and identifies IN1 and $\overline{\text{IN1}}$ on the left side of the figure as “complementary internal signals.” Pet. 40.

Patent Owner does not dispute that Rossi teaches this particular recitation. Pet. Resp. 14–16 (arguing recitation [2.4] rather than recitation [2.3]). A preponderance of the evidence supports Petitioner’s position that Rossi suggests this recitation. *See, e.g.*, Ex. 1003 ¶ 151; Ex. 1020, 1:65–2:2, Fig. 6.

[2.4] two pairs of solid-state switches, a first switch of each pair controlled by internal signal d and a second switch of the pair controlled by internal signal $\bar{d}$, that apply the input voltage in a first direction to the driving component when the d is in a first voltage state and that apply the input voltage in a second direction to the driving component when the d is in a second voltage state.

Petitioner argues that, as depicted in Rossi Figure 6 reproduced above, the first pair of solid-state switches is SW1 and SW3. Pet. 41–43. Petitioner argues the second pair of solid-state switches is SW2 and SW4. *Id.* SW1 and SW4 are the first switch of each pair, and SW2 and SW3 are the second switch of each pair. *Id.* Petitioner argues that the first switch of each pair is controlled by internal signal d and the second switch of each pair is controlled by internal signal $\bar{d}$. *Id.* at 43–45; *see also* Ex. 1003 ¶¶ 156–157. Petitioner argues that the Rossi Figure 6 apparatus applies voltage in two different directions depending on the voltage state of internal signal d . Pet. 43–44.

Patent Owner argues that argues that the alleged second switch of each pair (SW2 and SW3) are not both “controlled by internal signal $\bar{d}$ ” as claim 2 requires. PO Resp. 14–16. Patent Owner argues that while Figure 6 shows that both SW2 and SW3 receive signal $\overline{IN1}$, “only the signal received by SW3 is the ‘internal signal $\bar{d}$,’ i.e. the signal generated by the splitter/inverter of limitation [2.3].” *Id.*

As we explain here, the preponderance of the evidence supports Petitioner’s position for two reasons. First, Rossi Figure 6 teaches or suggests that both switch SW2 and SW3 receive an identical signal “ $\overline{IN1}$.” Ex. 1020, Fig. 6. The language of claim 2 does not require that the signal to these switches come from an identical inverter. Rather, recitation [2.3] requires that an inverter generate a signal d and $\bar{d}$, and recitation [2.4] requires that the second switch of each pair be controlled by $\bar{d}$. The claim uses the word “comprising” so it is open ended and could, optionally, include another inverter that generates an identical $\bar{d}$. Thus, even if Rossi is

understood as having two inverters generating a $\overline{\overline{d}}$ signal, this would not distinguish it from claim 2 properly construed. *See* Pet. Reply 16–17.

Second, even if claim 2 is construed to require that only one inverter generate one signal $\overline{\overline{d}}$ that then controls both of the second switches of each pair of switches, Rossi reasonably suggests such a configuration. *Id.* at 10–16. For example, Rossi states that Figure 6 is a *circuit diagram* of an embodiment of Figure 4. Ex. 1020, 1:62–64. Because it is a circuit diagram, it is meant to depict the functionality of a circuit and is not limited to a precise layout. A person of ordinary skill in the art would know that specific components and structural details could be selected in various ways, including use of a single inverter, to satisfy the logical circuit layout of Fig. 6. Ex. 1049 ¶ 30 (Petitioner’s expert, Dr. Hannaford, credibly explaining this). Figure 4 illustrates signal $\overline{\text{IN1}}$ as an input to both SW2 and SW3 without limiting what generates signal $\overline{\text{IN1}}$. Ex. 1020, Fig. 4. Rossi also teaches that a single inverter may be implemented. *Id.* at Fig. 1; *see also id.* at 2:56–3:5 (referring to a single “clocked driving signal” and its “inverted signal $\overline{\text{IN1}}$.”); Ex. 1049 ¶¶ 16–33 (Petitioner’s witness, Dr. Hannaford, credibly explaining with reference to Rossi why Rossi suggests use of single inverter configurations). Moreover, using a single inverter would be a predictable implementation of Rossi within an Izumi system. Ex. 1049 ¶ 31. Patent Owner does not present evidence or argument persuasively rebutting this Petitioner’s position in this regard on the merits. *See* PO Sur-Reply 5–9 (addressing the timing of Petitioner’s argument rather than the merits).

Patent Owner argues that the Petition relies only on Rossi Figure 6, and that arguments in Petitioner’s Reply concerning Rossi’s other teachings

are improper. PO Sur-Reply 7–8. We determine that Petitioner’s arguments in the Reply regarding Rossi’s broader teachings are proper. In the Patent Owner Response, Patent Owner takes the position, for the first time, that claim 2 requires that the $\bar{d}$ signal that controls the second switch of each pair must come from an identical inverter. PO Resp. 16. Petitioner is permitted to respond to this new claim construction position by citing additional teachings of the asserted reference Rossi. *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1380 (Fed. Cir. 2023) (explaining that “where a patent owner offers a new claim construction for the first time in its response after the institution decision, a petitioner may introduce new arguments and evidence in reply under the newly proposed claim construction”).

A preponderance of the evidence supports Petitioner’s position for the reasons we explain above. We thus determine Petitioner has established by a preponderance of the evidence that claim 2 would have been obvious over the combined teachings of Izumi, Cosper, and Rossi.

d. *Claim 3*

Petitioner contends that Izumi, Cosper, and Rossi teach or suggest each recitation of claim 3 and contends that a person having skill in the art would have had reason to combine the references teachings with a reasonable expectation of success. Pet. 45–46. We address each recitation of claim 3 below.

[3.1] The linear resonant vibration module of claim 2 wherein the linear resonant vibration module further includes a vibration sensor; and

Petitioner argues that the Izumi-Cosper-Rossi combination’s control program “continuously monitors output from the vibration sensor (accelerometer) to adjust the frequency at which the control program

changes the voltage state of the directional signal d (IN1) delivered to the H-bridge circuit.” Pet. 45–46 (citing, for example, Ex. 1005, code [57], ¶¶ 40–41, 43–47, 57, 60, Fig. 6; Ex. 1003 ¶ 163).

Patent Owner argues that the Petition “cites nothing in Cosper or any other reference that is allegedly an accelerometer.” PO Resp. 17. Patent Owner is incorrect. Cosper teaches an accelerometer at paragraph 50. Ex. 1009 ¶ 50 (“one or more sensors 14 may detect position, velocity, **acceleration**, etc.” (emphasis added)); *see also* Pet. Reply 21; Ex. 1049 ¶ 35 (Petitioner’s witness, Dr. Hannaford, explaining that an accelerometer is a sensor that detects acceleration). The Petition quotes Cosper’s reference to a sensor that detects acceleration. Pet. 14 (citing, for example, Ex. 1009 ¶¶ 49–50).

Patent Owner argues in Sur-Reply that not every sensor that senses acceleration is an accelerometer. PO Sur-Reply 10–12. For example, Patent Owner argues that acceleration could be measured “without using a sensor that itself is experiencing the acceleration” and that this would not be an “accelerometer” under at least one dictionary definition. *Id.* at 12. Patent Owner’s argument does not persuasively undermine Petitioner’s showing for three reasons.

First, Patent Owner’s argument that Cosper lacks an “accelerometer” does not squarely address the issues at hand because claim 3 recites a vibration sensor, not an “accelerometer.” Patent Owner fails to persuasively undermine Petitioner’s position that Cosper’s sensor that measures acceleration, whether qualifying as an “accelerometer” or not, is a vibration sensor within the ambit of claim 3. Pet. 45–46. Indeed, the ’767 patent confirms that vibration sensors are not limited to “accelerometers” but could

also be “other types of sensors that generate signals corresponding to the strength of desired vibrational forces.” Ex. 1001, 6:10–14. Cosper’s sensors that measure acceleration, even if not themselves experience vibration, would generate signals corresponding to acceleration “for the subassembly,” and acceleration signals correspond to strength of vibrational forces.¹⁰ Ex. 1009 ¶ 50.

Second, Cosper at paragraph 50 refers to “[s]ensors 14” as being able to detect acceleration. Cosper further explains that “sensor 14 is connected to a driver associated with force transducer 20, and senses the load or driving force applied to the subassembly.” *Id.* . Thus, Cosper reasonably suggests that the sensors may directly measure acceleration, and this would be an accelerometer even under the narrower definition Patent Owner proposes. In contrast, Patent Owner does not cite any persuasive evidence supporting that Cosper teaches *only* a sensor that does not experience acceleration.

Third, Petitioner provides evidence that a person having ordinary skill in the art would have implemented a vibration sensor in view of Izumi and Cosper. Pet. 19–20 (citing Pet. 17–18; Ex. 1049 ¶ 37). Patent Owner argues that this position is new to the Reply and, thus, comes too late. PO Sur-Reply 12–13. Petitioner, however, is responding to Patent Owner’s implicit claim construction position, raised for the first time in the Reply, that claim 3’s “vibration sensor” excludes a sensor that measures acceleration if it the sensor is not an “accelerometer.” PO Resp. 17–18; *see also* PO Sur-Reply 9–12. Petitioner may introduce new arguments in reply where patent owner

¹⁰ Force equals mass multiplied by acceleration.

relies on a new claim construction in its Patent Owner Response. *Axonics, Inc.*, 75 F.4th at 1380.

Patent Owner also argues that the Petition “fails to explain why a POSITA would have been motivated to add a separate accelerometer for adjusting frequency, in addition to the sensors already being used for the feedback control in the mapping of claim 1.” PO Resp. 17–18. Petitioner, however, explains that Cospers taught the use of multiple sensors one of which could be a sensor for measuring acceleration. Pet. 13–15; Pet. Reply. 19. A preponderance of the evidence supports Petitioner’s argument. Ex. 1009 ¶¶ 10, (referring to “[f]eedback on the position, velocity, and/or acceleration of the mass”), 50 (referring to “one or more feedback inputs from one or more sensors”), 125 (“one or more sensors (e.g., optical sensors, electrical sensors, motion sensors, etc.) may be used to provide information to the control circuitry”).

Thus, for the reasons explained above, a preponderance of the evidence supports that this recitation would have been obvious in view of Cospers in combination with Izumi and Rossi.

[3.2] wherein the control program continuously monitors output from the vibration sensor in order to adjust the frequency at which the control program changes the voltage state of the directional signal d.

Petitioner argues that the combined Izumi-Cospers-Rossi system continuously monitors output from the vibration sensor to adjust frequency by use of a continuous control loop. Pet. 45–46. Patent Owner argues that the Petition fails “to point to anything in the prior art references that teaches ‘continuous’ monitoring or to explain why it would have been obvious to modify the prior art to perform such ‘continuous’ monitoring.” Pet. Reply 22.

The preponderance of the evidence supports that, as the Petition asserts, the Izumi-Cosper-Rossi system would have included continuous monitoring. Paragraph 10 of Rossi, for example, suggests a system with continuous monitoring as follows:

A drive circuit typically functions to compensate for changes in mechanical, electrical or magnetic parameters that may otherwise alter the mechanism's resonant frequency. In general, a mass may be set in motion via an electromagnetic control and drive circuit. Feedback on the position, velocity, and/or acceleration of the mass may be input to the controller. The controller is operable to process the feedback signal and generate drive signals that are processed to maintain mechanical oscillation at the mechanical resonant frequency of the system.

Ex. 1009 ¶ 10; *see also* Pet. 14–15, 26–27, 46 (citing, for example, this paragraph of Rossi). A person having ordinary skill in the art would have understood signals provide feedback continuously in order to “maintain” a particular frequency. Ex. 1003 ¶ 163. Given the context of Cosper as a whole, Cosper would have suggested that continuous adjustments are needed to maintain a frequency because “[t]he frequency of the two systems, one mechanical, and one electronic, will typically drift apart over time.” Ex. 1009 ¶ 7; *see also* Pet. Reply 20–22 (citing Ex. 1009 ¶¶ 50–51, 54, 125; Ex. 1005 ¶¶ 44–47; Ex. 1050, 36:12–37:10).

A preponderance of the evidence also supports that a person having ordinary skill in the art would have implemented continuous monitoring in the Izumi-Cosper-Rossi system based on the teachings of Izumi. Pet. 45–46. Izumi explains that its sensor detects “the behavior of the moving element.” Ex. 1005 ¶ 40; *see also id.* at ¶¶ 41, 43–47, 57, 60, Fig. 6; Ex. 1003 ¶ 163. In response to this behavior, the Izumi device adjusts its waveform. *Id.* at ¶¶ 44–46. Figure 6 of Izumi illustrates these constant adjustments.

Dr. Hannaford credibly explains that monitoring of behavior and making related adjustments suggests continuous monitoring over time much like the monitoring taught by the '767 patent. Ex. 1003 ¶ 163.

Patent Owner cites no evidence that persuasively weighs against Petitioner's showing. Thus, for the reasons explained above, a preponderance of the evidence supports that this recitation would have been obvious in view of Izumi, Cosper, and Rossi.

3. *Unpatentability over Izumi, Cosper, and Ibuki
(Ground 1C)*

Petitioner asserts that claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over Izumi, Cosper, and Ibuki. Pet. 2, 46–52 (citing Ex. 1003). A preponderance of the evidence supports this position. *Id.* (providing citations to the record). Patent Owner does not separately dispute this assertion. PO Resp. *passim*.

We determine Petitioner has established by a preponderance of the evidence that claim 5 would have been obvious over the combined teachings of Izumi, Cosper, and Ibuki.

4. *Unpatentability over and Izumi, Cosper, Rossi, and Ibuki
(Ground 1D)*

Petitioner asserts claims 4 and 5 are unpatentable under 35 U.S.C. § 103(a) as obvious over Izumi, Cosper, Rossi, and Ibuki. Pet. 2, 52–55 (citing Ex. 1003) (Petitioner's Ground 1D). A preponderance of the evidence supports this position. *Id.* (providing citations to the record). Patent Owner does not separately dispute this assertion. PO Resp. *passim*.

We determine Petitioner has established by a preponderance of the evidence that claims 4 and 5 would have been obvious over the combined teachings of Izumi, Cosper, Rossi, and Ibuki.

5. *Unpatentability over and Izumi, Cosper, Ibuki, and Aldrich (Ground 2A)*

Petitioner asserts claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over Izumi, Cosper, Ibuki, and Aldrich. Pet. 2, 55–72 (citing Ex. 1003) (Petitioner’s Ground 2A). A preponderance of the evidence supports this position. *Id.* (providing citations to the record). Patent Owner does not separately dispute this assertion. PO Resp. *passim*.

For the reasons explained above when addressing other grounds, we determine Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combined teachings of Izumi, Cosper, Ibuki, and Aldrich.

6. *Unpatentability over and Izumi, Cosper, Ibuki, Aldrich, and Rossi (Ground 2B)*

Petitioner asserts claims 1–5 are unpatentable under 35 U.S.C. § 103(a) as obvious over Izumi, Cosper, Ibuki, Aldrich, and Rossi. Pet. 2, 72–76 (citing Ex. 1003) (Petitioner’s Ground 2B). A preponderance of the evidence supports this position. *Id.* (providing citations to the record). Patent Owner does not separately dispute this assertion. PO Resp. *passim*.

For the reasons explained above when addressing other grounds, we determine Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combined teachings of Izumi, Cosper, Ibuki, Aldrich, and Rossi.

IV. CONCLUSION¹¹

For the reasons above, we determine that Petitioner has proven, by a preponderance of the evidence, that claims 1–5 of the '767 patent are unpatentable as summarized in the following table.

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1	103(a)	Izumi, Cosper	1	
1–3	103(a)	Izumi, Cosper, Rossi	1–3	
5	103(a)	Izumi, Cosper, Ibuki	1	
1	103(a)	Izumi, Cosper, Rossi, Ibuki	4–5	
1	103(a)	Izumi, Cosper, Ibuki, Aldrich	1	
1–5	103(a)	Izumi, Cosper, Ibuki, Aldrich, Rossi	1–5	
Overall Outcome			1–5	

¹¹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

For the foregoing reasons, it is

ORDERED that Petitioner has demonstrated by a preponderance of the evidence that claims 1–5 of the '767 patent are unpatentable; and

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

IPR2024-00698
Patent 8,093,767 B2

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