

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TACTION TECHNOLOGY, INC.,
Patent Owner.

IPR2022-00059
Patent 10,659,885 B2

Before JUSTIN T. ARBES, SCOTT B. HOWARD, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

HOWARD, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

INTRODUCTION

A. Background and Summary

Apple Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claim 20 of U.S. Patent No. 10,659,885 B2 (Ex. 1001, “the ’885 patent”). Paper 1 (“Pet.”). Taction Technology, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). Petitioner requested permission to file a Preliminary Reply “limited to Patent Owner’s arguments in its POPRs for discretionary denial under NHK/Fintiv.” Ex. 3001. We denied that request. *Id.*

We have authority, acting on the designation of the Director, to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). *Inter partes* review may not be instituted unless “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). “When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.” 37 C.F.R. § 42.108(a) (2021).

For the reasons set forth below, upon considering the briefing and the evidence of record, we determine that the information presented in the Petition does not establish a reasonable likelihood that Petitioner will prevail with respect to the challenged claim. Accordingly, we do not institute *inter partes* review.

B. Real Parties in Interest

The parties identify themselves as the only real parties in interest. Pet. 63; Paper 5, 2 (Patent Owner’s Mandatory Notices).

C. Related Matters

The parties identify the following district court proceeding in which the '885 patent has been asserted: *Taction Technology, Inc. v. Apple Inc.*, No. 3:21-cv-00812 (S.D. Cal.). Pet. 63; Paper 5, 2. The parties also identify *Apple Inc. v. Taction Technology, Inc.*, IPR2022-00057, in which Petitioner filed a second petition challenging claims 1–19 of the '885 patent. Pet. 63; Paper 5, 2. Patent Owner also identifies two other petitions filed by Petitioner. Paper 5, 2.

D. The '885 Patent

The '885 patent is entitled “Systems and Methods for Generating Damped Electromagnetically Actuated Planar Motion for Audio-Frequency Vibrations” and is directed to “tactile transducers that produce bass frequency vibrations for perception by touch.” Ex. 1001, code (54), 1:20–21.

According to the '885 patent, “[b]elow about 200 Hz, the lower the frequency of sound, the more it is perceived not only by vibration of the ear drum but also by touch receptors in the skin.” Ex. 1001, 1:25–27. “This sensation is familiar to anyone who has ‘felt the beat’ of strong dance music in the chest, or through the seat of a chair, or has simply rested a hand on a piano.” *Id.* at 1:27–30.

Prior art tactile transducers primarily used axial shakers. Ex. 1001, 1:34–35. However, a drawback of those devices is “the production of unwanted acoustic noise.” *Id.* at 1:43–44. “[T]he same force that stimulates the skin under the ear cup cushions unfortunately also plunges air into the listener’s ear canal, overwhelming the output of the audio driver and generating the excess unwanted acoustic noise.” *Id.* at 1:52–56. Another

drawback was an uneven frequency response, which was often made worse by the lack of damping. *Id.* at 1:57–2:10.

“Another approach in the prior art, also problematic, is the use of un-damped eccentric rotating motors (‘ERMs’) and un-damped linear resonant actuators (‘LRAs’).” Ex. 1001, 2:11–13. However, small undamped ERMs were not compatible with high-fidelity audio. *Id.* at 2:13–46.

“To avoid such unwanted audio, one approach is to construct a low-profile, vibrating module which moves a mass in-plane This approach minimizes the surface area that is oriented to cause the problematic axially directed acoustic radiation.” Ex. 1001, 2:47–51. However, the components are expensive and complex and there is no provision for damping the transducers. *Id.* at 2:60–65.

Another approach to the problem was using “a relatively thin, flat arrangement of a coil and two magnets that produces planar motion.” Ex. 1001, 3:1–3. That approach has been used for haptic feedback in computer input devices. *Id.* at 3:9–18. However, that approach also has a drawback: “A drawback of this guiding approach is the vulnerability of flexures to buckling when loaded by longitudinal compression.” *Id.* at 3:19–21.

The ’885 patent purports to overcome those problems with a “damped electromagnetically actuated planar motion for audio-frequency vibrations.” Ex. 1001, 7:4–6.

Figure 4B is reproduced below.

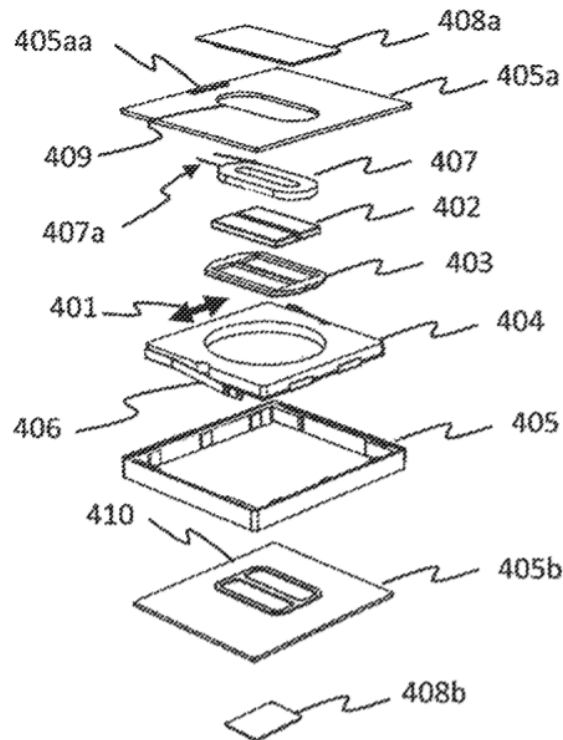


FIG. 4B

Figure 4B shows an “exploded view” of an “an exemplary damped planar electromagnetic module.” *Id.* at 5:37–41.

As shown in FIG. 4B, a pair of oppositely polarized magnets 402 can be held by a retainer 403 in a pocket or depression formed in mass 404, which may be suspended on flexures 406 within a frame or housing 405. Flexures 406 provide for movement of inertial mass 404 and magnets 402 along axis 401, which may be orthogonal to the thinnest dimension of the vibration module. Lateral forces can be imparted to magnets 402 by virtue of a Lorentz force generated by passing current through an coil 407, which is depicted in FIG. 4B as an elongated coil of conductive wire. Upper flux guide 408, which may be a piece of iron, or other suitable ferromagnetic material, adhered to or otherwise placed in close proximity to coil 407, can guide the magnetic flux and act as a

heat sink and means of retaining coil 407 in place within housing 405.

Id. at 8:16–30. Additionally, “movement of the mass 404 and magnets 402 may be damped by thin layer of viscous ferrofluid 410 retained in a gap between the magnets 402 and bottom plate 405b of housing 405.” *Id.* at 8:38–41.

E. Illustrative Claim

Claim 20 is independent and reproduced below with labels used in the Petition.

20. [Preamble] An apparatus for generating damped electromagnetically actuated planar motion, the apparatus comprising at least one vibration module, said vibration module comprising:

[20a] a housing;

[20b] a coil capable of carrying electrical current;

[20c] a plurality of magnets arranged in operative proximity to the plurality of coils;

[20d] a moving portion comprising an inertial mass and the plurality of magnets;

[20e] a suspension comprising a plurality of flexures that guides the moving portion in a planar motion with respect to the housing and the coil;

[20f] wherein movement of the moving portion is damped by a ferrofluid in physical contact with at least the moving portion; and

[20g] wherein the ferrofluid reduces the Q-Factor of the response of the apparatus over at least a portion of the frequency range of 40-200 Hz in response to signals applied to the coil.

Ex. 1001, 16:23–42.

F. Prior Art and Asserted Grounds

Petitioner asserts that claim 20 is unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
20	103 ²	Miyazaki, ³ Park494, ⁴ Kajiwara ⁵
20	103	Miyazaki, Park494, Park728 ⁶

Petitioner also relies on the testimony of Dr. Hannaford (Ex. 1003 (Declaration of Dr. Blake Hannaford)). Patent Owner relies on the testimony of Dr. Okamura (Ex. 2001 (Declaration of Allison Okamura, Ph.D.)).

ANALYSIS

A. Legal Standards

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under 35 U.S.C. § 103 that requires consideration of four factors: (1) the “level of

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the ’885 patent was filed after March 16, 2013 and does not claim the benefit of a pre-AIA patent application, we apply the AIA versions of the statutory bases for unpatentability. *See* Ex. 1001, codes (22), (60), (63).

² Petitioner identifies 35 U.S.C. § 103(a) as the basis for unpatentability. Pet. 5–6. However, that subsection does not exist in the AIA version of the statutory basis for unpatentability. *See* U.S.C. § 103. We consider this a typographical error and apply the appropriate AIA version of the statute.

³ WO 2011/013570 A1, published Feb. 3, 2011 (Ex. 1004). All citations are to the English translation that is included in Exhibit 1004.

⁴ US 8,766,494 B2, issued July 1, 2014 (Ex. 1005).

⁵ US 2009/0267423 A1, published October 29, 2009 (Ex. 1006).

⁶ US 8,461,728 B2, issued June 11, 2013 (Ex. 1007).

ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) if in evidence, “secondary considerations” of non-obviousness such as “commercial success, long-felt but unsolved needs, failure of others, etc.” *Id.* at 17–18. “While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the U.S. Court of Appeals for the Federal Circuit has repeatedly emphasized that “it is error to reach a conclusion of obviousness until all those factors are considered,” *WBIP v. Kohler*, 829 F.3d 1317, 1328 (Fed. Cir. 2016).⁷

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The “person having ordinary skill in the art” is a hypothetical construct, from whose vantage point obviousness is assessed. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998).

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and

⁷ Because neither party addresses objective evidence of non-obviousness, we focus solely on the first three *Graham* factors.

(6) educational level of active workers in the field.” *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). “Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Id.*

Petitioner argues that a person having ordinary skill in the art (“PHOSITA”) would have

(i) a Bachelor’s degree (or higher degree) in an academic area emphasizing electrical engineering or mechanical engineering or a similar technical field; (ii) a working knowledge of computing devices and their associated hardware (including input/output devices) and software; and (iii) two to four years of experience designing and developing haptic interfaces and the associated technologies, including various damping techniques.

Pet. 4 (citing Ex. 1003 ¶¶ 64–67). Petitioner further argues that “[a]dditional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience.” *Id.* at 5 (citing Ex. 1003 ¶ 65).

Patent Owner argues that a PHOSITA would have

(1) a Bachelor’s degree in electrical engineering, mechanical engineering, physics, or a related course of study with at least two years of work experience in industry in the area of electromagnetic actuators or motors, or a related area of work or (2) a Master’s degree in electrical engineering, mechanical engineering, physics, or a related course of study, with at least one year of experience in industry in the area of electromagnetic actuators or motors. More education can substitute for practical experience and vice versa.

Prelim. Resp. 16–17 (citing Ex. 2001 ¶¶ 65–68). Patent Owner further argues that Petitioner’s proposed level of skill is “unreasonably high and not

congruent with the technology of the '885 patent.” *Id.* at 17 (citing Ex. 2001 ¶¶ 69–72); *see also id.* (discussing Petitioner’s proposed level of skill).

We are not particularly persuaded by either party’s evidence. Both Drs. Hannaford and Okamura offer conclusory opinions without identifying the specific evidence they relied upon in forming their opinion or showing their analysis of the facts. *See* Ex. 1003 ¶¶ 64–67; Ex. 2001 ¶¶ 65–72. Such testimony is entitled to little or no weight. 37 C.F.R. § 42.65(a).

That said, based on the current record, we are persuaded by Patent Owner’s argument that Petitioner’s formulation is not commensurate with the technology of the '885 patent. Specifically, the claims of the '885 patent are directed to “[a]n apparatus for imparting motion to the skin of a user.” Ex. 1001, 14:48–16:22. We see nothing in the claims that would require “a working knowledge of computing devices and their associated hardware (including input/output devices) and software.” *See* Pet. 4. Instead, all that is required is a working knowledge of tactile transducers. Ex. 1001, 1:20–21 (“The present invention relates to tactile transducers that produce bass frequency vibrations for perception by touch.”), 3:46–47 (“Therefore, there exists a need for novel audio-frequency tactile transducers and devices.”), 14:48–16:22 (claims 1–19). This observation is also consistent with the prior art cited by Petitioner and its arguments. *See* Exs. 1004–1007. Accordingly, we adopt Patent Owner’s construction, except that we eliminate the term “at least” to eliminate vagueness as to the amount of practical experience. The qualifier “at least” expands the range indefinitely without an upper bound, and thus, precludes a meaningful indication of the level of ordinary skill in the art.

C. Claim Construction

We apply the same claim construction standard used in the federal courts, in other words, the claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). Under the *Phillips* standard, the “words of a claim ‘are generally given their ordinary and customary meaning,’” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312–13.

Neither party proposes any explicit claim construction. Pet. 6; Prelim. Resp. 18–19. Because no express construction is needed for our decision, we do not construe any of the claim limitations. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe 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))).

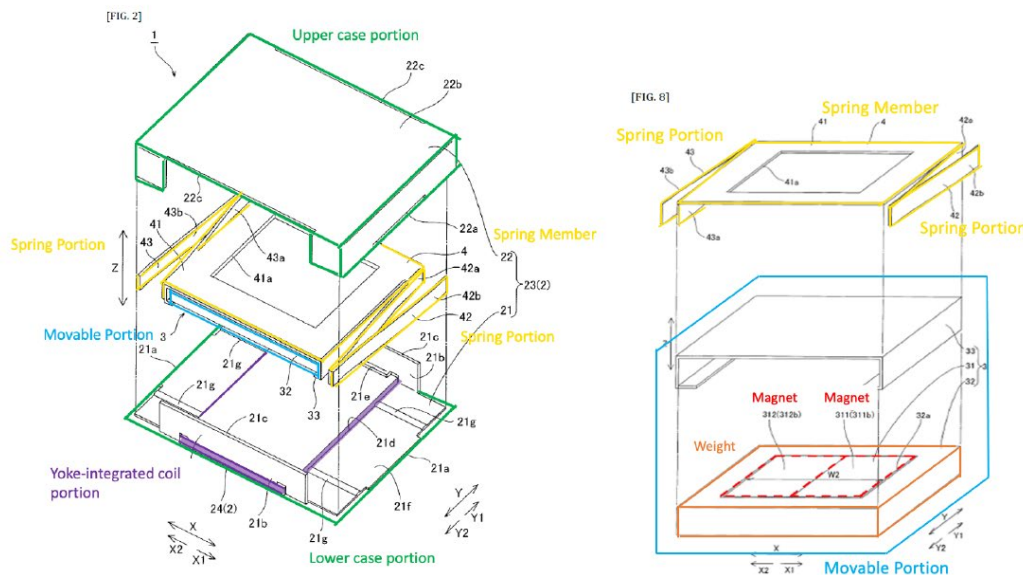
D. Ground 1: Miyazaki, Park494, and Kajiwara

1. Miyazaki

Miyazaki is entitled “Vibration Motor” and is directed “to a vibrating motor provided with a movable portion that includes a permanent magnet and with a fixed portion that includes a coil.” Ex. 1004, code (54) (first quote), ¶ 1 (second quote).

Miyazaki describes a “vibrating motor 1 [that] is made of a fixed portion 2, a movable portion 3 that vibrates relative to the fixed portion 2, and a spring member 4 that supports the movable portion 3 so as to enable vibration.” Ex. 1004 ¶ 13. “[T]he fixed portion 2 includes a metal box-

shaped case 23, made of a baseplate (lower case portion) 21 and an upper case portion 22, and a yoke-integrated coil portion 24 fixed to the baseplate 21.” *Id.* ¶ 14. “[T]he movable portion 3 is made of the permanent magnet 31, which has a tabular shape; a weight 32 made of a material having a large specific gravity . . . and a magnet cover 33 of a nonmagnetic material . . . covering the permanent magnet 31 and the weight 32.” *Id.* ¶ 23. “[T]he spring member 4 is made of a plate portion 41 and a pair of spring portions 42 and 43.” *Id.* ¶ 27. These features are shown in Miyazaki Figures 2 and 8, which are reproduced below with annotations provided by Petitioner.



Pet. 14. Miyazaki Figure 2 is “[a]n exploded perspective view illustrating the vibrating motor” and Figure 8 is “[a]n exploded perspective view illustrating a movable portion and a spring member of the vibrating motor.” Ex. 1004 ¶ 10. Petitioner added colors to the figures above as follows: “housing (green), yoke-integrated portion that includes coils (purple), moving portion (blue), plurality of magnets (red), inertial mass (orange), [and] spring member comprising spring portions (yellow).” Pet. 14. In addition to the colors, Petitioner also added the labels mentioned above. *Id.*

2. *Park494*

Park494 is entitled “Linear Vibrator” and is directed to “a linear vibrator.” Ex. 1005, code (54) (first quote), 1:15 (second quote). Park494 recites using a magnetic fluid coating as a damper:

[A] magnetic fluid (180) may be coated on a bottom surface and an upper surface of the weight (161) respectively facing the pad (112) of the case (111) and the cover (116). . . . [T]he magnetic fluid (180) serves as a damper for rapidly stopping the vibrating unit (160) when the vibrating unit (160) is to be stopped.

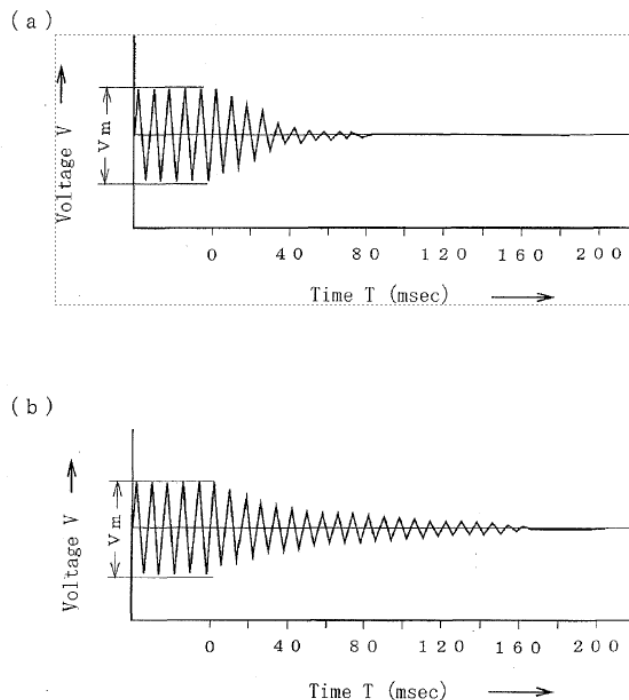
Id. at 4:20–28.

3. *Kajiwara*

Kajiwara is entitled “Electromagnetic Exciter” and is directed “to an electromagnetic exciter that can be incorporated in thin mobile devices such as mobile phones.” Ex. 1006, code (54) (first quote), ¶ 2 (second quote).

Kajiwara Figures 19(a) and (b) are reproduced below.

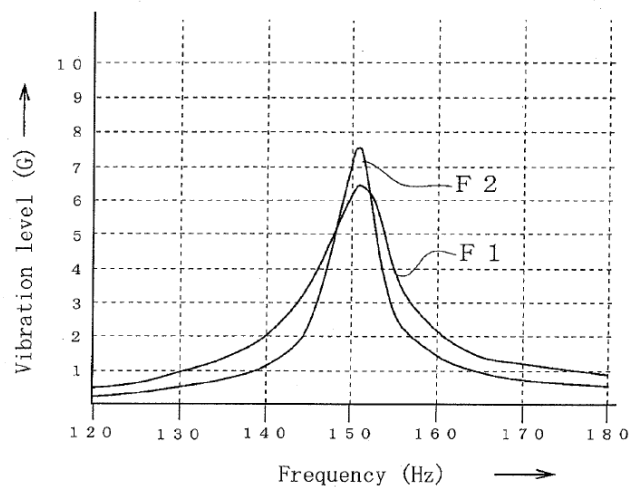
[Fig. 19]



Kajiwara Figure 19(a) “is a graph showing the damped oscillation characteristics of an electromagnetic exciter provided with the deformable members” and Figure 19(b) “is a graph showing the damped oscillation characteristics of an electromagnetic exciter provided with no deformable members.” *Id.* ¶¶ 60 (first quote), 61 (second quote).

Kajiwara Figure 20 is reproduced below.

[Fig. 20]



Kajiwara Figure 20 “shows the driving frequency characteristics of the electromagnetic exciter.” *Id.* ¶ 110. “The curve F1 shows the characteristics when the deformable members 7 are provided. The curve F2 shows the characteristics when the deformable members 7 are not provided.” *Id.* “When the deformable members 7 are not provided, the resonance amplitude is higher and the degree of sharpness Q is higher than those of the structure provided with the deformable members 7.” *Id.*

4. Analysis of Claim 20

Claim 20 recites “[20g] wherein the ferrofluid reduces the Q-Factor of the response of the apparatus *over at least a portion of the frequency range of 40-200 Hz* in response to electrical signals applied to the coil.” Ex. 1001,

16:39–42 (emphasis added). We focus our analysis on the italicized portion of the claim limitation.⁸

(1) Petitioner’s Arguments

Petitioner argues that Miyazaki teaches that “movable portion 3 undergoes reciprocating motion by alternating linear movement.” Pet. 40 (quoting Ex. 1004 ¶ 33). According to Petitioner, “a PHOSITA would have understood that Miyazaki teaches driving a moving portion at a predetermined frequency in response to a drive current (i.e., signal) that is applied to the coils.” *Id.* at 41 (citing Ex. 1003 ¶¶ 112, 157).⁹

Petitioner further argues that Park494 teaches the use of “ferrofluid” (i.e., magnetic fluid 180) in contact with a moving portion to dampen movement of the moving portion. Pet. 35–36, 41. Petitioner also argues that because a PHOSITA would have understood that a damping mechanism which causes the moving part to stop more quickly reduces a Q-factor,¹⁰ Park494 teaches that “the ferrofluid reduces the Q-Factor of the response of the apparatus in response to signals applied to the coil.” *Id.* at 41–42 (citing Ex. 1003 ¶¶ 113, 158–160).

⁸ Because the analysis of “the frequency range of 40–200 Hz” is dispositive, the parties’ arguments on other portions of the limitation and other limitations are moot.

⁹ Petitioner italicizes the names of prior art references. The italics have been omitted from quotes in this Decision.

¹⁰ The “Q-factor refers to a dimensionless parameter that measures the persistence of damped oscillations in a resonator.” Pet. 41 (citing Ex. 1003 ¶¶ 48, 55, 113, 158–159). “A high Q-factor has less energy loss than a low Q-factor, which causes the oscillations to stop more slowly (e.g., continues oscillating for a longer period).” *Id.* (citing Ex. 1003 ¶¶ 48, 55, 160).

Petitioner further argues that Kajiwara teaches that its linear vibration motor operates within the frequency range of 120–180 Hz and has a resonance peak of about 150 Hz. Pet. 42 (citing Ex. 1006 ¶¶ 81, 121, Fig. 20). Petitioner also argues Kajiwara teaches using a damping material (i.e., resin-based deformable members) which causes the vibration to stop in less time than the undamped version. *Id.* at 42–46 (citing Ex. 1006 ¶¶ 105–110, Figs. 19 and 20; Ex. 1003 ¶¶ 46–48, 115–118, 161). According to Petitioner, “[b]ecause the device operates in the range of 120–180Hz and the resonance peak occurs around 150 Hz, this reduction occurs within the frequency range of 40–200Hz.” *Id.* at 46 (citing Ex. 1003 ¶¶ 119, 161).

Petitioner further argues that “Kajiwara notes that the degree of sharpness Q is higher in the structure that does not have a damping material than those of the structure provided with the damping material.” Pet. 46 (citing Ex. 1006 ¶ 110). Petitioner also argues that because a PHOSITA would have understood that Kajiwara’s Q is the Q -factor, “Kajiwara teaches that when the electromagnetic exciter is damped the Q -factor is also decreased.” *Id.* (citing Ex. 1003 ¶ 162). According to Petitioner, a PHOSITA would have understood that “the reduction in the amplitude of a resonance peak and the broadening and flattening of a resonance peak is the reduction of the Q -factor” and, as a result, “Kajiwara expressly discloses an example of a damping material that ‘reduces the Q -Factor of the response of the apparatus over at least a portion of the frequency range of 40–200 Hz in response to signals applied to the coil.’” *Id.* at 46–47 (citing Ex. 1003 ¶¶ 46–48, 55, 162).

Petitioner further argues that “[a] PHOSITA would have been motivated to implement the Miyazaki-Park494 vibrating motor such that it operated at least in a frequency range of 120–180 Hz, by selecting a resonant

frequency around 150 Hz, as taught by Kajiwara.” Pet. 47 (citing Ex. 1003 ¶¶ 121–125, 163–165). In other words, Petitioner relies on Miyazaki for the underlying apparatus with a moving portion, Park494 for the recited “ferrofluid” in contact with a moving portion, and Kajiwara for the recited 40–200 Hz frequency range, and the combination of the three references for the full limitation [1g]. *Id.* at 34–36, 40–51. More specifically, Petitioner argues that because “Kajiwara discloses a frequency range for a vibrating motor for use in mobile devices,” and Miyazaki and Park494 disclose such devices but do not specify an operating frequency range, “a PHOSITA would have been motivated to use the frequency range taught by Kajiwara in the Miyazaki-Park494 vibrating motor.” *Id.* at 48 (citing Ex. 1003 ¶¶ 122, 164). Further, according to Petitioner, Kajiwara’s range of 120–180 Hz is within the known “optimal frequency range” of 100–300 Hz for “haptic actuators used in mobile devices.” *Id.* at 48–49 (citing Ex. 1003 ¶¶ 58–62, 123, 164). According to Petitioner, the overlap in ranges between the Miyazaki-Park494-Kajiwara combination of 120–180 Hz and the claimed range of 40–200 Hz creates a presumption of obviousness. *Id.* at 48 (citing *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018)).

(2) Patent Owner’s Argument

Patent Owner argues that it has overcome the presumption of obviousness associated with overlapping ranges. Prelim. Resp. 27–30. Specifically, Patent Owner argues that the ’885 patent teaches the criticality of the 40–200 Hz range. *Id.* at 29–30 (citing Ex. 1001, 9:25–44). Patent Owner argues that the Specification of the ’885 patent “notes the special concerns around the 40 Hz lower bound for reproducing the tactile response of an audio track” as well as the 200 Hz upper limit for perceiving sound via

touch. *Id.* “By contrast, Kajiwara places no special emphasis on the frequency range of 120–180 Hz; it does not address why it was included in Fig. 20, nor how frequencies lower than 120 Hz might be reproduced.” *Id.* at 30. According to Patent Owner, “[i]n these circumstances, Kajiwara, alone or in combination with Miyazaki or Park494, is insufficient to render obvious the claimed results in the 40–200 Hz range.” *Id.* (citing Ex. 2001 ¶¶ 88–89); *see also id.* at 29 (quoting *Genentech, Inc. v. Hospira, Inc.*, 946 F.3d 1333, 1341–42 (Fed. Cir. 2020)).

(3) *Our Analysis*

In cases such as this where the claim recites an operative range, the United States Court of Appeals for the Federal Circuit “and its predecessor have recognized that ‘where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.’” *E.I. DuPont*, 904 F.3d at 1006 (quoting *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)). “A more specific application of this general principle is that ‘[a] *prima facie* case of obviousness typically exists when the ranges” recited in a claim “overlap the ranges disclosed in the prior art.’” *Id.* (quoting *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003)). As a result, “such overlap creates a presumption of obviousness.” *Id.*

However, “[t]here are several ways by which the patentee may rebut that presumption.” *E.I. DuPont*, 904 F.3d at 1006. One of the several ways identified by the Federal Circuit is by a patent owner showing that the claimed range is critical or special:

First, a modification of a process parameter may be patentable if it “produce[s] a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” *Aller*, 220 F.2d at 456. A claimed range that demonstrates such

unexpected results is referred to as a “critical” range, and the patentee has the burden of proving criticality. *Id.*

Id.; *see also Genentech*, 946 F.3d at 1341–42 (“One way in which the patentee may rebut the presumption of obviousness is by showing that there is something special or critical about the claimed range.” (citing *E.I. DuPont*, 904 F.3d at 1006, 1008)); *E.I. DuPont*, 904 F.3d at 1006–1008 (placing the burden of production on the patent owner in an *inter partes* review).

In this case, Petitioner relies exclusively on overlapping ranges to show that Kajiwara teaches the disputed limitation. *See* Pet. 47–48. If that was all the evidence in this case, i.e., absent rebuttal evidence from Patent Owner, that would have been sufficient to show a reasonable likelihood of obviousness of the recited “frequency range of 40–200 Hz.”¹¹ *See E.I. DuPont*, 904 F.3d at 1006.

However, Patent Owner has come forward with sufficient evidence of the criticality of the recited 40–200 Hz range. *See* Prelim. Resp. 29–30 (citing Ex. 1001, 9:25–44). The ’885 patent discusses the criticality of the range, with respect to both the lower 40 Hz limit and upper 200 Hz limit, to “reproduce the tactile component of a musical experience with previously unattainable high fidelity.” Ex. 1001, 9:25–44; *see also id.* at 1:25–27 (identifying 200 Hz as the highest frequency where sound is “perceived not

¹¹ As explained above, given our determination that Petitioner has not made a sufficient showing that the cited references teach or suggest the critical, claimed range of 40–200 Hz, we need not address Patent Owner’s other arguments, including, for example, that the frequency response of Kajiwara’s deformable members does not apply to ferrofluid or a device like the one described in Miyazaki.

only as vibration of the ear drum but also by touch receptors in the skin”).

Specifically, the ’885 patent recites:

Below approximately 40 Hz, in sub-resonance frequencies 502, the output of vibration module 500 is constrained by the “travel limit” (e.g. travel limit 31 of FIG. 3A) because as voltage is increased, the mass (e.g. mass 304 of FIG. 3B) travels farther, and increasing the voltage too high results in the travel exceeding x_{max} and causes the mass to come into contact with the frame (e.g. housing 305 of FIG. 3B), producing an undesirable acoustic knocking sound. . . . The viscosity and volume of the damping fluid (e.g. viscous ferrofluid 410 of FIG. 4B) in vibration module 500 were adjusted to damp resonance that would be evident at 30-50 Hz, to achieve the relatively uniform, non-peaked, response evident in FIG. 5C between 40 and 200 Hz in range 503. The absence of resonant peak in the response makes it possible to reproduce the tactile component of a musical experience with previously unattainable high fidelity.

Id. at 9:25–44. By identifying that sounds below 200 Hz are perceived by both the ear and the skin and specifically noting the constraint of the travel limit at 40 Hz, the ’885 patent expressly teaches the criticality of the claimed range of 40–200 Hz. *See* Ex. 2001 ¶ 89 (Dr. Okamura testifying that “[a] person of ordinary skill in the art would have understood that the claimed 40–200 Hz range was specifically designed”).

Although the ’885 patent expressly teaches the criticality of the claimed range, neither Petitioner nor Dr. Hannaford addresses it, instead relying solely on the fact that Kajiwara discloses a different, partially overlapping range with a particular resonant frequency. *See* Pet. 47; Ex. 1003 ¶¶ 121–122, 161–163. Accordingly, based on the current record, Patent Owner’s evidence is sufficient to overcome the presumption of obviousness with respect to overlapping ranges.

Because Kajiwara does not teach or suggest the critical, claimed range of 40–200 Hz, Petitioner has not sufficiently shown that the combination of Miyazaki, Park494, and Kajiwara teaches or suggests limitation [20g]. Accordingly, Petitioner has not shown a reasonable likelihood that claim 20 is unpatentable over the combination of Miyazaki, Park494, and Kajiwara.

E. Ground 2: Miyazaki, Park494, Park728

1. Park728

Park728 is entitled “Linear Vibrator Having Broadband” and is directed “to a small-sized linear vibrator having a structure capable of generating a great vibratory force, outputting various types of vibrations in broadband and accurately coupling a magnet.” Ex. 1007, code (54), 1:13–17.

Park728 teaches how the resonant frequency of a linear vibrator can be set: “The resonant frequency is related to the entire mass and strength of the system, such that the resonant frequency can be set up by changing mass and strength.” Ex. 1007, 4:63–65. Park728 further teaches that, for its disclosed linear vibrator, it is preferred that “the resonant frequency band is preferably determined within an 80~180 Hz band.” *Id.* at 4:66–67.

2. Analysis of Claim 20

We focus our analysis on the same disputed limitation discussed in the previous section II.D.4. Petitioner argues that “Park728 teaches that ‘the resonant frequency band is preferably determined within an 80~180 Hz band.’” Pet. 55 (quoting Ex. 1007, 4:66–67). Petitioner also argues that Park728 teaches a resonant peak that occurs at around 175 Hz and that the “optimal frequency range for haptic actuators” used in mobile devices was 100–300 Hz. *Id.* at 56–57 (citing Ex. 1007, Fig. 5, 1:40-44; Ex. 1003 ¶¶ 58–62, 172–174, 185). According to Petitioner, Park728’s range of 80–180 Hz

overlaps the 40–200 Hz range claimed in claim 1 of the '885 patent and that “overlap in ranges creates a presumption of obviousness.” *Id.* at 58–59, 61 (citing *E.I. DuPont*, 904 F.3d at 1006).

Patent Owner relies on substantially the same argument as set forth in section II.D.4.(2). *See* Prelim. Resp. 54.

For the same reasons as discussed above in section II.D.4.(3), we are not persuaded by Petitioner’s argument regarding overlapping ranges.

Because Park728 does not teach or suggest the critical, claimed range of 40–200 Hz, Petitioner has not sufficiently shown that the combination of Miyazaki, Park494, and Park728 teaches or suggests limitation [20g]. Accordingly, Petitioner has not shown a reasonable likelihood that claim 20 is unpatentable over the combination of Miyazaki, Park494, and Park728.

CONCLUSION

For the foregoing reasons, we determine that Petitioner fails to show a reasonable likelihood that it would prevail with respect to the claim challenged in the Petition.¹² We, therefore, do not institute an *inter partes* review of the challenged claim based on the Petition.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that no *inter partes* review is instituted as to any claim of the '885 patent.

¹² Because we find Petitioner has not shown a reasonable likelihood that Petitioner would prevail with respect to the claim challenged in the Petition, Patent Owner’s arguments for discretionary denial are moot.

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