

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and
SAMSUNG ELECTRONICS AMERICA, INC.

Petitioner

v.

RESONANT SYSTEMS, INC.,

Patent Owner

Case IPR2023-01025

Patent 9,941,830

Petition for *Inter Partes Review* of U.S. Patent No. 9,941,830

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PETITIONERS' EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent 9,941,830 B2 (“’830Pat.”)
1002	File History of U.S. Patent 9,941,830 (Application No. 15/181,249) (“’249 application” or “’830FH”)
1003	Declaration of Andrew Wolfe, Ph.D. (“Wolfe”)
1004	Curriculum Vitae of Andrew Wolfe, Ph.D.
1005	Reserved
1006	Reserved
1007	Reserved
1008	Reserved
1009	Reserved
1010	Reserved
1011	Reserved
1012	Reserved
1013	Reserved
1014	Reserved
1015	Reserved
1016	Reserved
1017	Complaint in <i>Resonant Systems, Inc. v. Samsung Elecs. Co., Ltd.</i> , 2:22-cv-00423 (E.D. Tex. October 26, 2022)
1018	Docket Control Order in <i>Resonant Systems, Inc. v. Samsung Elecs. Co., Ltd.</i> , 2:22-cv-00423 (E.D. Tex.)
1019	Discovery Order in <i>Resonant Systems, Inc. v. Samsung Elecs. Co., Ltd.</i> , 2:22-cv-00423 (E.D. Tex.)
1020	Reserved
1021	Reserved
1022	Reserved
1023	U.S. Patent 9,369,081 B2 (“’081Pat.”)
1024	File History of U.S. Patent 9,369,081 (Application No. 14/469,210) (’210 application” or “’081FH”)

1025	U.S. Patent 8,860,337B2 (“337Pat.”)
1026	File History of U.S. Patent 8,860,337B2 (Application No. 13/345,607) (“607 application” or “337FH”)
1027	U.S. Patent 8,093,767B2 (“767Pat.”)
1028	File History of U.S. Patent 8,093,767B2 (Application No. 12/782,697) (“697 application” or “767FH”)
1029	File History of Provisional Patent Application 61/179,109 (“109 application”)
1030	U.S. Patent Application Publication 2011/0144426A1 (“Blenk”)
1031	U.S. Patent Application Publication 2011/0248817A1 (“Houston”)
1032	U.S. Patent Application Publication 2007/0261185A1 (“Guney”)
1033	U.S. Patent Application Publication No. US2012/0133308 (“308Pub.”)
1034	Reserved
1035	Reserved
1036	Reserved
1037	Reserved
1038	Reserved
1039	Reserved
1040	Reserved
1041	Reserved
1042	Reserved
1043	Stipulation of Grounds Pursued in District Court Litigation

LISTING OF CHALLENGED CLAIMS

Reference	Claim Limitation
Claim 1	
1[pre]	A vibration module comprising:
1[a]	a housing;
1[b]	a moveable component;
1[c]	a power supply;
1[d]	user-input features;
1[e]	a driving component that drives the moveable component to oscillate within the housing; and
1[f]	a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values.
Claim 2	
2[pre]	The vibration module of claim 1 wherein the control component is one of:
2[a]	an variable oscillator circuit with additional control circuitry; and
2[b.i]	a control component that includes a microprocessor,
2[b.ii]	a control program, stored in an electronic memory within, or separate from, the microprocessor, the control program executed by the microprocessor to control supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by the one or more stored values.
Claim 3	
3	The vibration module of claim 1 wherein the control component receives output signals from sensors within the vibration module during operation of the vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors.
Claim 4	

4	The vibration module of claim 1 wherein the control component adjusts the 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 the vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.
Claim 5	
5[a]	The vibration module of claim 4 wherein the one or more operational control parameters is a strength of vibration produced by the oscillation of the moveable component; and
5[b]	wherein the one or more operational control outputs is a frequency at which the control component drives the moveable component to oscillate, the control component dynamically adjusting the power supplied to the driving component to produce oscillation of the movable component at a resonant frequency for the vibration module.
Claim 6	
6[a]	The vibration module of claim 4 wherein the one or more operational control parameters include both a strength of vibration produced by the oscillation of the moveable component and a current operational mode; and
6[b]	wherein the one or more operational control outputs is a control output that determines a current supplied by the power supply to the driving component and a frequency at which the control component drives the moveable component to oscillate.
Claim 7	
7	The vibration module of claim 1 wherein the driving component comprises one or more electromagnetic coils that generate magnetic fields parallel to the directions in which the moveable component is driven by the driving component.
Claim 8	
8[a]	The vibration module of claim 1 wherein the housing is a tube, capped at both ends by movable-component-repelling components selected from one of mechanical springs and magnets;

8[b]	wherein the movable component is a magnet shaped to slide within the tube; and
8[c]	wherein the driving component is an electromagnetic coil.
Claim 9	
9[a]	The vibration module of claim 1 wherein the housing is a tube, capped at both ends by movable-component-repelling components; and
9[b]	wherein the moveable component includes an electromagnetic-coil driving component and microprocessor.
Claim 10	
10	The vibration module of claim 1 further including rotational driving components that induce rotational motion of the movable component in addition to translational motion induced by the driving component.
Claim 11	
11	The vibration module of claim 1 wherein the vibration module further includes two or more driving components, each, when activated, driving the moveable component to oscillate with an amplitude particular to the activated driving component.
Claim 12	
12[a]	The vibration module of claim 1 wherein housing includes a power supply, the microprocessor, and a moveable-component track orthogonal to a long axis of the housing;
12[b]	wherein the moveable component is a plunger that moves a first direction and a second direction opposite from the first direction within the moveable-component-track; and
12[c]	wherein the driving component comprising two electromagnetic driving coils and a centering magnet.
Claim 13	
13[a]	The vibration module of claim 1 wherein the moveable component is a clamped mechanical arm to which two magnets are attached; and
13[b]	wherein the driving component comprising an electromagnetic coil that, when opposite currents are applied at a particular frequency to the electromagnetic coil, causes the mechanical arm to vibrate.
Claim 14	

14	The vibration module of claim 1 further including flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the vibration module.
Claim 15	
15	The vibration module of claim 1 wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes.
Claim 16	
16[pre]	The vibration module of claim 15 wherein the complex vibration modes include:
16[a]	a primary oscillation frequency modulated by a modulating oscillation frequency;
16[b]	a beat frequency; and
16[c]	an aperiodic oscillation waveform.
Claim 17	
17	The vibration module of claim 1 wherein the control component controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude that are independently specified by user input received from the user-input features.
Claim 18	
18	The vibration module of claim 1 further including elastomeric bristles used to transfer vibration from the vibration module to a surface.
Claim 19	
19[pre]	A vibration module comprising:
19[a]	a housing;
19[b]	a moveable component;
19[c]	a power supply;
19[d]	user-input features;
19[e]	a driving component that drives the moveable component to oscillate within the housing;
19[f]	a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values; and

19[g]	flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the vibration module.
Claim 20	
20[pre]	A vibration module comprising:
20[a]	a housing;
20[b]	a moveable component;
20[c]	a power supply;
20[d]	user-input features;
20[e]	a driving component that drives the moveable component to oscillate within the housing; and
20[f]	a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values,
20[g]	wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes.

I. INTRODUCTION

This Petition presents a compelling case of anticipation of all claims of U.S. Patent No. 9,941,830 (“the ’830 patent”) (EX1001) based on a broken priority chain. Although the ’830 patent purports to claim priority through a chain of applications to a provisional application filed on May 18, 2009, none of the applications provide written description support for the *vibration module* genus, to which every claim of the ’830 patent is directed. Instead, the specification and original claims of *every* application in the priority chain repeatedly and uniformly disclose that applicants’ purported invention was directed to a linear *vibration module*. A POSITA reading these priority documents would clearly have understood that applicants were *not* in possession of the vibration module genus. Indeed, applicants admitted that the “vibration module” genus was new matter when they requested that the ’830 patent application be examined as an AIA transition application.

This broken priority chain is fatal to the validity of the ’830 patent claims. An earlier application in the chain, Application No. 13/345,607, published as U.S. Patent App. Publication No. 2012/0133308 (“the ’308 publication”) on May 31, 2012—more than one year before the June 13, 2016 priority date of the ’830 patent claims. Thus, the ’308 publication qualifies as prior art under AIA 35 U.S.C. §102(a)(1). Further, the ’308 publication includes a substantively identical

specification to the '830 patent and discloses a species (i.e., a linear vibration module) that anticipates the genus “vibration module” to which every challenged claim is directed.

II. GROUNDS FOR STANDING

Petitioners certify that the '830 patent is available for IPR and Petitioners are not barred or estopped from requesting IPR to challenge the claims on the ground herein. Petitioners file this Petition within one year of service of Patent Owner’s (“PO”) complaint against Petitioners in district court. *Resonant Systems, Inc. v. Samsung Electronics Co., Ltd. et al.*, Case No. 2:22-cv-00423 (E.D. Tex.) (“Samsung litigation”; Complaint served on Samsung Electronics America, Inc. on 10/31/2022).

III. STATEMENT OF PRECISE RELIEF REQUESTED

Petitioners respectfully request cancellation under 35 U.S.C. § 311 of claims 1–20 (“challenged claims”) in view of:

Prior Art	
U.S. Patent App. Publication No. 2012/0133308 (the “’308 publication”), published May 31, 2012; prior art under 35 U.S.C. § 102(a)(1) ¹ (EX1033)	

Grounds of Unpatentability	
1	Claims 1–20 are anticipated by the ’308 publication.

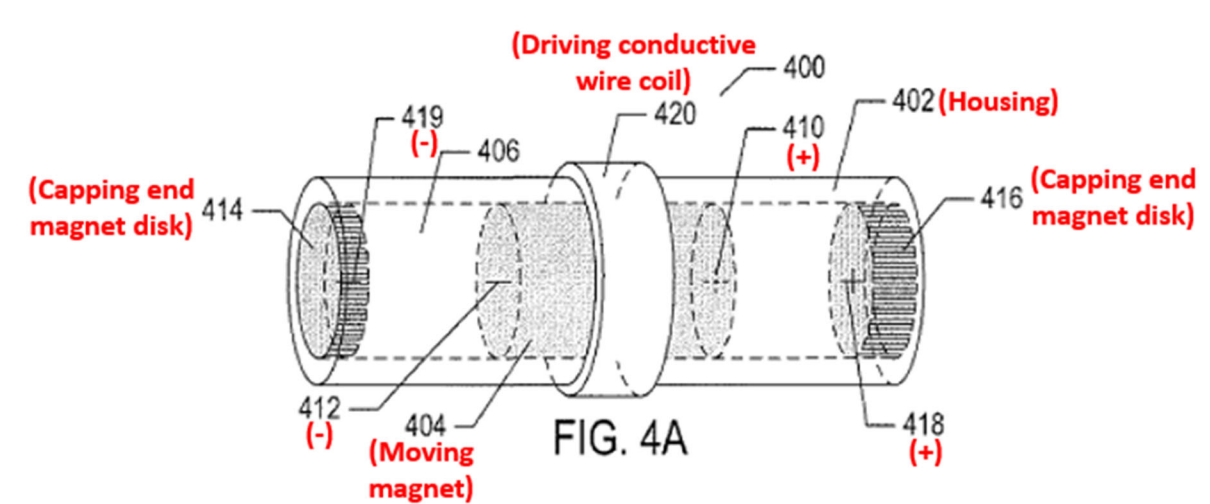
¹ References to 35 U.S.C. § 102 are to the AIA statute.

IV. OVERVIEW OF THE '830 PATENT

A. '830 Patent Specification

The '830 patent issued on April 10, 2018, from the '249 application (EX1002). The '830 patent discloses “linear vibration modules...that can be incorporated in a wide variety of appliances, devices, and systems to provide vibrational forces,” such as “consumer appliances” and “pagers.” '830Pat., Abstract, 1:25–33, 3:1–7, 3:62–64, 4:17–21. Its linear vibration modules (“LVMS”) and linear-resonant vibration modules (“LRVMS”) “are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LVM or LRVM, rather than as a by-product of an unbalanced rotation,” addressing problems with prior art unbalanced vibration-inducing motors. *Id.*, 4:21–36.

Figure 4A depicts an LRVM including housing 402, weight 404, capping end magnet disks 414, 416, and coil 420:



Id., Fig. 4A (annotated), 4:49–5:10. During operation, current is applied in a first direction to coil 420, creating magnetic force that accelerates weight 404 parallel to the housing, and current is then applied in the opposite direction resulting in acceleration in the opposite direction (i.e., “oscillates back and forth”). *Id.*, 5:11–41.

Importantly, the ’830 patent specification does ***not*** disclose an embodiment of the invention directed to the “vibration module” genus that encompasses both linear and non-linear oscillation. Rather, as noted above, both the abstract and summary disclose that the invention is directed to linear vibration modules that produce linear oscillation. *Id.*, Abstract (“The current application is directed to various types of linear vibrational modules...to provide vibrational forces. The 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.”),² 3:11–19 (disclosing same in “Summary” section). The detailed description likewise begins with a paragraph disclosing that the application is directed to linear vibration modules.

Detailed Description ... The current application is directed to various linear vibration modules (“LRMs”), including various types of linear-resonant vibration modules (“LRVMs”), that can be used within a wide variety of different types of appliances, devices, and systems, to generate vibrational forces. The LVMs and LRVMs that represent embodiments of the current application are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LVM or LRVM, rather than as a by-product of an unbalanced rotation, as in the case of currently employed unbalanced electric motors.

Id., 4:17-27.

Further, the detailed description discloses *every* figure describing the invention (i.e., Figures 4–25) is directed to linear vibration modules. As to certain figures, the ’830 patent specification specifically touts the benefits of linear modules

² All emphases added unless otherwise noted.

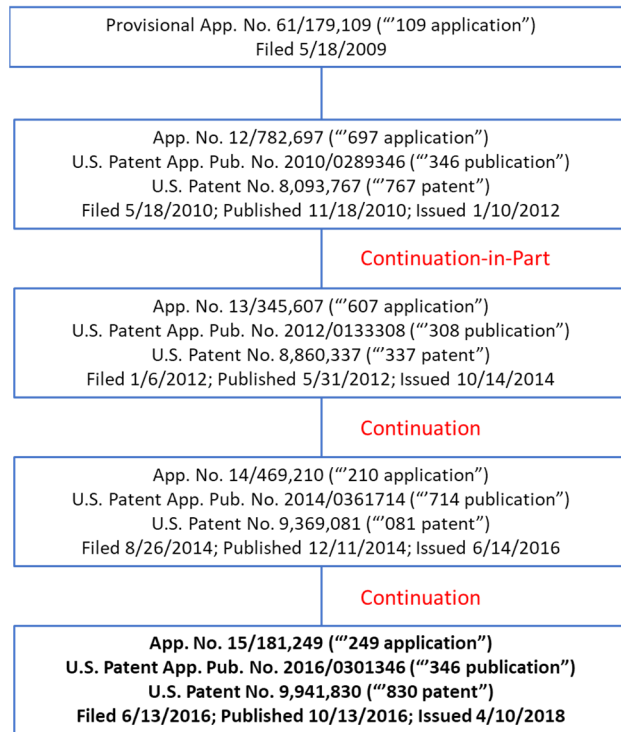
over non-linear vibration modules. *Id.*, 4:49–52 (“FIGS. 4A-G illustrate one particular LRV*M*, and operation of the particular LRV*M* ...”), 5:11–12 (“FIGS. 4B-G illustrate operation of the LRV*M* shown in FIG. 4A.”), 5:52–56 (“FIGS. 5A-B illustrate an H-bridge switch that can be used ... to change the direction of current applied to the coil that drives linear oscillation within an LRV*M*.”), 6:6–9 (“FIG. 6 provides a block diagram of the LRV*M*, illustrated in FIGS. 4A-G ...”), 6:52–56 (“FIGS. 7A–C provide control-flow diagrams that illustrate the control program, executed by the CPU, that controls operation of an LRV*M* ...”), 8:41–44 (“FIG. 8 represents the range of frequencies and vibrational forces that can be achieved by different implementations of LRV*M* and LRV*M* control programs”), 8:62–66 (“FIG. 9 shows a plot of the amplitude/frequency space and regions in that space that can be operationally achieved by unbalanced electrical motors and by LRV*M*s that represent embodiments of the current application.”), 9:20–22 (“FIGS. 10–17 show a variety of different alternative implementations of LRV*M*s that represent different embodiments of the current application.”), 10:55–57 (“FIG. 18 illustrates an enhancement of an implementation of the linear-resonant vibration module...”), 11:25–34 (describing Fig. 19 as illustrating “plots of amplitude versus frequency for a high-Q and a low-Q vibration device” and stating “linear-resonant vibration module, when controlled to vibrate at a resonant frequency...generally operates as a

high-Q device”), 12:20–46 (describing Figure 20 as illustrating “portions of amplitude/frequency space accessible to various types of vibration modules” and stating that “a linear vibration module with user-controlled variable amplitude and variable frequency can provide a much broader range of amplitude/frequency combinations than currently available vibration modules”), 12:54–13:19 (describing Figure 21 as illustrating “the dependence between frequency and amplitude in a low-Q linear vibration module as well as a modified dependence that can be obtained by control circuitry”), 13:31–33 (“FIGS. 22A–23 illustrate interesting vibrational modes produced by driving a linear-resonant vibration module simultaneously at two different frequencies.”), 14:3–4 (“FIGS. 24A–25 illustrate incorporation of paramagnetic flux paths into a linear vibration module.”).

B. ’830 Patent Priority

The ’830 patent purports to claim priority through a series of applications to Provisional Application No. 61/179,109 (“the ’109 application”), filed May 18, 2009. To demonstrate why the ’830 patent’s priority date is no earlier than the filing of its original claims on June 13, 2016, the disclosures of the earlier applications are discussed below.

The ’830 patent’s priority chain is depicted below.



C. Originally-Filed Applications in Priority Chain

As summarized below, like the '830 patent specification, each application in the priority chain discloses that the invention is directed to linear vibration modules. Thus, the only support for the challenged claims directed to a generic "vibration module" is the '830 originally-filed claims.

1. '109 Application

The '109 application is titled “linear vibrating motor for sex toy.” EX1029, 1.³ In the overview of the invention, the '109 application discloses that applicants' purported invention was directed to “several variations of a linear resonating vibration motor primarily for use in adult sex toys.” *Id.*, 7. The overview further discloses that “[w]hile most vibrating motors used for adult sex toys use rotary motors that push an off-center weight around to create vibrations, *this invention moves a weight back and forth (linearly) to create vibrations.*” *Id.*

The '109 application further discloses two examples of a “linear vibrator”—(1) a “Thumper”; and (2) a “Pattycake.” *Id.*, 8–12. The Thumper “creates vibrations by forcing [a] moving magnet to move back and forth.” *Id.*, 8. The Pattycake “creates vibrations by forcing the plunger to move up and down.” *Id.*, 10.

The '109 application includes two claims, which are both directed to an adult sex toy that includes “electromagnets that linearly move a mass within the sex toy to create vibrations.” *Id.*, 12 (claim 1).

³ Pin cites to the applications discussed in Sections IV.C–IV.D refer to internal pagination of the PDFs.

2. '697 Application

The '697 application (EX1028) is the first non-provisional application in the priority chain and was filed on May 18, 2010. EX1027, (22), (60). The '697 application led to the issuance of the '767 patent on January 10, 2012. *Id.*, (21), (45).

The '697 application is titled “linear-resonant vibration module.” EX1028, 19. The abstract discloses the embodiments of the “present invention” are directed to “linear-resonant vibration modules that can be incorporated into a wide variety of appliances, devices, and systems to provide vibrational forces.” *Id.*, 36.

The summary and detailed description disclose that the invention is directed to linear vibration modules. *Id.*, 22 (“Summary...Various embodiments of the present invention comprise linear-resonant vibration modules that can be incorporated in a wide variety of appliances, devices, and systems to provide vibrational forces. The 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.”), 23 (“Detailed Description...Embodiments of the present invention include various types of linear-resonant vibration modules (“LVRMs”)...The LVRMs that represent embodiments of the present invention are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LRVm, rather than as a by-product of an

unbalanced rotation, as in the case of currently employed unbalanced electric motors.”).

Further, the ’697 application discloses figures illustrating the invention (i.e., Figs. 4–18), which show that the invention is directed to linear vibration modules. *Id.*, 24–33.

The ’697 application includes one originally-filed claim, which is likewise directed to a linear vibration module. *Id.*, 35 (“[Claim] 1. A linear resonant vibration module comprising: ... a magnetic weight that moves linearly within the chamber ... control components that apply current that periodically alternates, in direction, to the coil to linearly oscillate the magnetic weight within the chamber in order to produce vibrational forces.”).

3. ’607 Application

The ’607 application (EX1026) was filed on January 6, 2012 as a continuation-in-part of the ’697 application. EX1033, (22), (63). The ’607 application led to the issuance of the ’337 patent on October 14, 2014. EX1025, (21), (45).

The ’607 application is titled “linear vibration modules and linear-resonant vibration modules.” EX1026, 24. Like its parent ’697 application, the ’607 application abstract discloses that the application is directed to linear vibration

modules. *Id.*, 52 (“Abstract...The current application is directed to various types of linear vibrational modules, including linear-resonant vibration modules...The 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.”).

Also like the '697 application, the summary and detailed description disclose that the invention is directed to linear vibration modules. *Id.*, 27 (“Summary...The current application is directed to various types of linear vibrational modules, including linear-resonant vibration modules, that can be incorporated in a wide variety of appliances, devices, and systems to provide vibrational forces. The 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.”), 29 (“Detailed Description...The current application is directed to various linear vibration modules (‘LRMs’), including various types of linear-resonant vibration modules (‘LRVMs’)...The LVMs and LRVMs that represent embodiments of the current application are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LVM or LRVM, rather than as a by-product of an unbalanced rotation, as in the case of currently employed unbalanced electric motors.”).

Again like the '697 application, the '607 application discloses with respect to Figs. 4–18 that the invention is directed to linear vibration modules. *Id.*, 30–39. Additionally, the '607 application includes new Figs. 19–25, which are also directed to linear vibration modules. *Id.*, 40–45.

The '607 application includes 18 originally-filed claims, each directed to a linear vibration module. *Id.*, 48 (“[Claim] 1. A linear vibration module comprising: ...a driving component that drives the moveable component in each of two opposite directions within the housing...”), 48–51 (claims 2–18 depending directly or indirectly from claim 1).

4. '210 Application

The '210 application (EX1024) was filed on August 26, 2014 as a continuation of the '607 application. EX1023, (22), (63). The '210 application led to the issuance of the '081 patent on June 14, 2016. *Id.*, (45).

The '210 application is titled “linear vibration modules and linear-resonant vibration modules.” EX1024, 11. Relative to the '607 application, the '210 application includes a substantively identical abstract, summary, and introductory paragraph to the detailed description. *See id.*, 39 (“Abstract...The current application is directed to various types of linear vibrational modules, including linear-resonant vibration modules, that can be incorporated in a wide variety of appliances, devices,

and systems to provide vibrational forces. The 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.”), 14 (“Summary...The current application is directed to various types of linear vibrational modules, including linear-resonant vibration modules, that can be incorporated in a wide variety of appliances, devices, and systems to provide vibrational forces. The 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.”), 16 (“Detailed Description...The current application is directed to various linear vibration modules (‘LRMs’), including various types of linear-resonant vibration modules (‘LRVMs’)...The LVMs and LRVMs that represent embodiments of the current application are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LVM or LRVM, rather than as a by-product of an unbalanced rotation, as in the case of currently employed unbalanced electric motors.”).

The ’210 application also includes a substantively identical description of the invention (i.e., Figures 4–25) as the ’607 application. *See id.*, 17–33.

Additionally, the 18 originally-filed claims of the ’210 application are directed to a linear vibration module, and are identical to the originally-filed claims of the

'607 application. *Id.*, 35 (“[Claim] 1. A linear vibration module comprising: ...a driving component that drives the moveable component in each of two opposite directions within the housing...”), 35–38 (claims 2–18 depending directly or indirectly from claim 1).

5. '249 Application

The '249 application (EX1002) was filed on June 13, 2016 as a continuation of the '210 application. '830Pat., (22), (63). The '249 application led to the issuance of the challenged '830 patent on April 10, 2018. *Id.*, (45). The '249 application is titled “linear vibration modules and linear-resonant vibration modules.” EX1002, 40. The '249 application has a substantively identical specification to its parent '607 and '210 applications, and its specific disclosures were described above with respect to the '830 patent specification, the '607 application, and the '210 application. *See id.*, 40-63 (specification), 69 (Abstract).

Unlike the earlier applications, however, applicants deleted all references to “linear” in the 20 originally-filed claims of the '249 application, such that the claims are directed to the “vibration module” genus and not the species of a linear vibration module. *See id.*, 64-68.

This is readily apparent when comparing the original-filed claims in the '249 application in redline against the originally-filed claims of the parent '607 and '210 applications. Claim 1–18 are reproduced below with redline.

1. A ~~linear~~ vibration module comprising:

...

a driving component that drives the moveable component ~~in each of two opposite directions~~ to oscillate within the housing; and

a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by ~~user input received from the user-~~
~~input—features~~ one or more stored values.

2. The ~~linear~~ vibration module of claim 1 wherein the control component is one of ...

3. The ~~linear~~ vibration module of claim 1 wherein the control component receives output signals from sensors within the ~~linear~~ vibration module during operation of the ~~linear—~~vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors.

4. The ~~linear~~ vibration module of claim 1 wherein the control component adjusts the 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 the ~~linear~~ vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

5. The ~~linear~~ vibration module of claim 4

wherein the one or more operational control parameters is a strength of vibration produced by the ~~linear~~ oscillation of the moveable component; and

wherein the one or more operational control outputs is a frequency at which the control component drives the moveable component to ~~linearly~~ oscillate, the control component dynamically adjusting the power supplied to the driving component to produce ~~linear~~ oscillation of the movable component at a resonant frequency for the ~~linear~~ vibration module.

6. The ~~linear~~ vibration module of claim 4

wherein the one or more operational control parameters include both a strength of vibration produced by the ~~linear~~ oscillation of the moveable component and a current operational mode; and

wherein the one or more operational control outputs is a control output that determines a current supplied by the power supply to the driving component and a frequency at which the control component drives the moveable component to ~~linearly~~ oscillate.

7. The ~~linear~~ vibration module of claim 1 wherein the driving component comprises one or more electromagnetic coils that generate magnetic fields parallel to the directions in which the moveable component is driven by the driving component.

8. The ~~linear~~ vibration module of claim 1

wherein the housing is a ~~linear~~ tube, capped at both ends by movable-component-repelling-components selected from one of mechanical springs and magnets;

wherein the movable component is a magnet shaped to slide within the ~~linear~~ tube; and

wherein the driving component is an electromagnetic coil.

9. The ~~linear~~ vibration module of claim 1

wherein the housing is a ~~linear~~ tube, capped at both ends by movable-component-repelling components; and

wherein the moveable component includes an electromagnetic-coil driving component and microprocessor.

10. The ~~linear~~ vibration module of claim 1 further including rotational driving components that induce rotational motion of the movable component in addition to translational motion induced by the driving component.

11. The ~~linear~~ vibration module of claim 1 wherein the ~~linear~~ vibration module further includes two or more driving components, each, when activated, driving the moveable component to ~~linearly~~ oscillate with an amplitude particular to the activated driving component.

12. The ~~linear~~ vibration module of claim 1

wherein housing includes a power supply, the microprocessor, and a moveable-component track orthogonal to a long axis of the housing;

wherein the moveable component is a plunger that moves a first direction and a second direction opposite from the first direction within the moveable-component-track; and

wherein the driving component comprising two electromagnetic driving coils and a centering magnet.

13. The ~~linear~~ vibration module of claim 1

wherein the moveable component is a clamped mechanical arm to which two magnets are attached; and

wherein the driving component comprising an electromagnetic coil that, when opposite currents are applied at a particular frequency to the electromagnetic coil, causes the mechanical arm to vibrate.

14. The ~~linear~~ vibration module of claim 1 further including flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the ~~linear~~ vibration module.

15. The ~~linear~~ vibration module of claim 1 wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes.

16. The ~~linear~~ vibration module of claim 15 wherein the complex vibration modes include: a primary oscillation frequency modulated by a modulating oscillation frequency; a beat frequency; and an aperiodic oscillation waveform.

17. The ~~linear~~ vibration module of claim 1 wherein the control component controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude that are independently specified by user input received from the user-input features.

18. The ~~linear~~ vibration module of claim 1 further including elastomeric bristles used to transfer vibration from the ~~linear~~-vibration module to a surface.

Id., 64-68.

Further, originally-filed independent claims 19–20 are new claims that delete all references to “linear.” *Id.*, 64, 67–68. The substantive difference between claim 1 and claims 19 and 20 is that claims 19 and 20 incorporate the limitations from dependent claims 14 and 15, respectively, into claim 1. *Id.*, 66–68. Thus, claims 19 and 20 are identical in scope to claims 14 and 15 reproduced above.

As explained below, the originally-filed claims in the ’249 application issued in the ’830 patent without amendment.

D. Relevant Prosecution History of the ’249 Application (’830FH)

1. Applicants Acknowledged That the ’830 Patent Claims Included New Matter When They Requested Examination Under the AIA

During prosecution, applicants requested that the ’249 application be examined as an AIA first-inventor-to-file application.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☒ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

EX1002, 8.

Subsequently, the examiner examined the application under the AIA.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Id., 104.

Notably, applicants also filed the '210 application after March 16, 2013 but did not request examination under AIA law.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

EX1024, 8.

As reflected in the summaries of the '210 and '249 applications above, the only substantive differences between the claims in the '210 application and in the '249 application are as follows:

- (1) in the '249 application, applicants deleted all references to a “linear” vibration module, such that the claims are directed to the “vibration module” genus; and
- (2) in the '249 application, applicants amended the claims to require that the control component controls supply of power from the power supply based on *stored values* rather than user input.

These are the only possible reasons that could have prompted applicants to request examination of the '249 application under the AIA. Further, as to (2), the '607 application (which issued as the '337 patent) was filed before March 16, 2013 and disclosed controlling supply of power based on stored values.

Thus, the only new matter would be (1)—i.e., broadening the claims to cover the “vibration module” genus.

2. The Examiner Allowed the Original Claims Without Amendment

The Examiner rejected claims 1–18 based on non-statutory double patenting over claim 1 of the '081 patent in view of Guney (US2007/0261185). EX1002, 105. The Examiner stated that claim 1 of the '081 patent discloses a housing, a movable component, a power supply, user-input features, and a control component. *Id.* The Examiner stated that claim 1 of the '081 patent “lacks disclosing stored values,” which Guney disclosed. *Id.* Importantly, the examiner did not reject the claims of the '249 application over the disclosures in the '081 patent specification.

The Examiner also rejected claims 19–20 of the '249 application based on non-statutory double patenting over claim 1 of the '337 patent in view of Guney. *Id.*, 105–106. As with the '081 patent, the Examiner stated that claim 1 of the '337 patent did not disclose stored values, but Guney did. *Id.* Once again, the Examiner did not

reject the claims of the '249 application over the disclosures in the '337 patent specification.

The Examiner also rejected claims 1–12 as being obvious over Blenk (US2011/0144426) in view of Houston (US2011/0248817). *Id.*

In response, applicants traversed the double patenting rejections on the grounds that they were legally improper. *Id.*, 119–120. As to the rejection based on Blenk and Houston, applicants relied on the preamble reciting a “vibration module” to distinguish the prior art. *See id.*, 120–121.

The Examiner subsequently allowed the claims without amendment. *Id.*, 132–134.

V. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA at the time of the alleged invention of the '830 patent⁴ would have had a bachelor's degree in electrical engineering, mechanical engineering, computer science, or a similar field and two years of experience related to electronic consumer product design. The POSITA could have also obtained similar knowledge and experience through other means. *Wolfe*, ¶30.

⁴ For purposes of this petition, the formulation of a POSITA applies under the 2016 priority date. *Wolfe*, ¶30.

VI. CLAIM CONSTRUCTION

A. The Preamble's Recitation of a "Vibration Module" is Limiting

The preamble of each challenged claim recites a "vibration module," which is a limitation for several reasons.

First, the preamble is "necessary to give life, meaning, and vitality to the claim[s]." *Catalina Marketing Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quotations omitted).

Second, the preamble provides antecedent basis for subsequent terms in the body of certain claims. *See, e.g.*, EX1001, Claim 3 ("wherein the control component receives output signals from sensors within the vibration module"), Claim 4 ("wherein the control component adjusts the 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 the vibration module"), Claim 5 ("the control component dynamically adjusting the power supplied to the driving component to produce oscillation of the movable component at a resonant frequency for the vibration module"), Claim 11 ("wherein the vibration module further includes two or more driving components"), Claim 14 ("further including flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the vibration module"), Claim 18 ("further

including elastomeric bristles used to transfer vibration from the vibration module to a surface”), Claim 19 (“A vibration module comprising: ... flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the vibration module.”); *see, e.g., In re Fought*, 941 F.3d 1175, 1178 (Fed. Cir. 2019).

Third, during prosecution, applicants relied on the preamble to distinguish prior art (EX1002, 120–121), which confirms the preamble’s recitation of a “vibration module” is a claim limitation. *See, e.g., In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1348 (Fed. Cir. 2002) (“This language shows a clear reliance by the patentee on the preamble to persuade the Patent Office that the claimed invention is not anticipated by the prior art. As such, the preamble is a limitation of the claims.”); *Data Engine Techs. LLC v. Google LLC*, 10 F.4th 1375, 1381 (Fed. Cir. 2021) (“[W]e have held that where the preamble is relied on to distinguish prior art during prosecution, it cannot later be argued that the preamble has no weight.”); *Novatek, Inc. v. Sollami Co.*, 559 Fed. App’x 1011, 1017 (Fed. Cir. 2014) (nonprecedential).

B. Constructions Under § 112, ¶ 6 (MPF)

No claim terms in the Challenged Claims use the term “means,” and thus, there is a rebuttable presumption that the claim terms are not MPF. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). The presumption,

however, is overcome for all “component” limitations in the Challenged Claims. *See* MPEP §2181 (“The following is a list of non-structural generic placeholders that may invoke 35 U.S.C. 112[, ¶6]: ... ‘component for.’”). Petitioners identify below the specific portions of the specification that describe the corresponding structure for each such limitation.

None of the MPF constructions require linear oscillation, and do not limit the claims to a “linear” vibration module.

1. “moveable component”

Limitation (Function Underlined)	Corresponding Structure
Claims 1, 19, 20: “ <u>moveable component</u> ” (i.e., a component that <u>moves</u>)	A moving weight. <i>E.g.</i> , EX1001, Figs. 4A–4G (weight 404), Fig. 6 (oscillating mass 634).

2. “driving component”

Limitation (Function Underlined)	Corresponding Structure
Claims 1, 19, 20: “a driving component that <u>drives the moveable component to oscillate within the housing</u> ”	One or more electromagnetic coils. <i>E.g.</i> , EX1001, Figs. 4A–4G (coil 420); Fig. 6 (coil 626); Fig. 13 (first coil 1302 and second coil 1304).

3. “control component”

Limitation (Function (or Additional Function for Dependent Claims) Underlined)	Corresponding Structure

Claims 1, 19, 20: “a control component that <u>controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values</u> ”	Processor and H Bridge Switch, where processor is programmed with an algorithm to perform the following steps: (1) set the mode and strength to default values or values represented by selections made by user input to the user input features, (2) provide a corresponding output to the power supply, and (3) provide a corresponding output to the H-bridge switch. EX1001, 7:20–34, 8:20–30, Fig. 7A, Fig. 7C.
Claim 3: “wherein the control component <u>receives output signals from sensors within the vibration module during operation of the vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors</u> ”	Claim 1 structure with the processor further programmed with an algorithm to perform the following steps: (1) convert the received output signal into an integer, (2) compare that integer to a specific value, (3) adjust one or more operational control outputs based on that comparison. EX1001, 7:24–29, 7:42–8:19, Figs. 7A, 7B.
Claim 4: “wherein the control component <u>adjusts the 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 the vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control</u>	Claim 1 structure with the processor further programmed with the same claim 3 algorithm.

<u>parameters</u> ” ⁵	
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C. Claims 4–6

In claims 4 (and therefore its dependent claims 5–6), “[t]he one or more operational control outputs of the control component,” “the sensors,” and “the one or more sensors” do not have proper antecedent basis. Petitioners address multiple possible interpretations: (1) the first two terms should be “~~the~~ one or more operational control outputs of the control component” and “~~the~~ sensors,” and (2) claim 4 should depend from claim 3 rather than claim 1. Because claims 4–6 are unpatentable under either possibility, the Board need not resolve the correct interpretation.⁶ See *Realtime Data v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019). *Wolfe*, ¶¶115–122.

⁵ Claims 5 and 6 depend from claim 4 and recite additional limitations related to “the one or more operational control parameters” and “the one or more operational control outputs.” Petitioners address those limitations below.

⁶ Petitioners reserve the right to raise and address indefiniteness, enablement, and/or written description issues regarding Claims 4–6 in other proceedings.

VII. DETAILED EXPLANATION OF THE GROUNDS

A. The '109, '697, '607, and '210 Applications Do Not Provide Written Description Support for the '830 Patent Claims

The Board can consider the challenged claims' priority date. *See SAP Am., Inc. v. Lakshmi Arunachalam*, IPR2014-00414, Paper 24, 22 (Aug. 17, 2015); *Indivior UK Ltd. v. Dr. Reddy's Lab'ys S.A.*, 18 F.4th 1323, 1328–30 (Fed. Cir. 2021). A priority claim to an earlier application is valid only if the earlier application, *inter alia*, provides adequate written description for the claims pursuant to §112. 35 U.S.C. § 120; *Anascape, Ltd. v. Nintendo of Am., Inc.*, 601 F.3d 1333, 1335 (Fed. Cir. 2010) (“To obtain the benefit of the filing date of a parent application, the claims of the later-filed application must be supported by the written description in the parent ‘in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.”) (quotations omitted). “[T]he critical inquiry is whether the applicant has provided a description that in a definite way identifies the claimed invention in sufficient detail that a person of ordinary skill would understand that the inventor was in possession of it at the time of filing.” *Alcon Rsch. Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1190–91 (Fed. Cir. 2014) (quotations omitted).

Each challenged claim is directed to the “vibration module” genus in its preamble, and the preamble is limiting. *See* Section VI.A. Additionally, applicants

deleted language from the body of independent claims 1, 19, and 20 of the '830 patent requiring oscillation in each of two opposite directions (i.e., linear oscillation), broadening those claims to the vibration module genus not requiring linear oscillation. *See* EX1001, Claim 1 (“a driving component that drives the moveable component ~~in each of two opposite directions~~ to oscillate within the housing”) (redline showing changes from earlier claims in '337/'081 patents), Claims 19-20 (including a similar limitation).

The '830 patent specification discloses that “oscillation” is not necessarily linear. EX1002, 1:44–48 (“As shown in FIGS. 2A-B, the asymmetrically-mounted weight creates an *elliptical oscillation* of the end of the shaft”).

Each challenged claim recites a generic “vibration module” as a limitation and further deletes all references to linear oscillation. As summarized above, however, none of the earlier-filed applications provide written description support for a generic “vibration module.” Rather, applicants repeatedly and consistently described their invention as being directed to linear vibration modules in each of the '109, '697, '607, and '210 applications (and even in the specification of '249 application, which issued as the '830 patent). The originally-filed claims of each earlier application are likewise directed to a linear vibration module. Thus, applicants were not in possession of the claimed “vibration module” genus. Applicants' decision to

prosecute the '249 application under the AIA confirms that the earlier applications do not provide written description support for the “vibration module” genus.

Because the earlier applications do not provide written description support for a generic “vibration module,” the '830 patent claims are not entitled to an earlier priority date. *See, e.g., Chester v. Miller*, 906 F.2d 1574, 1577 (Fed. Cir. 1990) (“The CCPA noted in *Lukach* that although a patent might contain a disclosure satisfying the written description requirement with respect to the claims in that patent, it could still be section 102(b) prior art as to broader claims of a subsequent application although not containing a disclosure satisfying the section 112 description requirement with respect to the anticipated broader claims. This apparent anomaly is most likely to occur when the prior art reference discloses a species of a genus sought to be claimed. That is exactly what happened in the instant case”); *Application of Lukach*, 442 F.2d 967, 970 (CCPA 1971) (stating “the description of a single embodiment of broadly claimed subject matter constitutes a description of the invention for anticipation purposes..., whereas the same information in a specification might not alone be enough to provide a description of that invention for purposes of adequate disclosure”); *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1158–59 (Fed. Cir. 1998) (“Instead of suggesting that the '589 patent encompasses additional shapes, the specification specifically distinguishes the prior art as inferior

and touts the advantages of the conical shape of the '589 cup. Such statements make clear that the '589 patent discloses only conical shaped cups and nothing broader. The disclosure in the '589 specification, therefore, does not support the later-claimed, generic subject matter in claims 1 and 9 of the '262 patent.”) (citations omitted); *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1345–46 (Fed. Cir. 2005) (“The inadequacy of the specification in this case is similar to the failing identified in *Tronzo*.”); *see also Smith & Nephew, Inc. et al. v. Arthrex, Inc.*, IPR2016-00818, Paper 8 at 14–15 (Oct. 4, 2016) (“[T]he distinction between a tapered and a non-tapered screw in the priority chain is a sufficient basis for finding the written description in the priority chain inadequate to support claims...in the [challenged] patent that are not limited to a tapered elongated body on a bioabsorbable screw.”).

B. The '830 Patent Is Entitled Only to a June 13, 2016 Priority Date Based on Its Originally-Filed Claims

When a continuation application is filed with a claim having limitations not supported by earlier-filed applications to which the continuation claims priority, the continuation does not receive the benefit of the earlier application’s filing date. *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1346 (Fed. Cir. 2000).

The '830 patent claims are only entitled to a June 13, 2016 priority date based on the filing of the original claims in the '249 application directed to the “vibration

module” genus. *See, e.g., ScriptPro LLC v. Innovation Assocs., Inc.*, 833 F.3d 1336, 1341 (Fed. Cir. 2016) (“As we have explained, original claims are part of the specification and in many cases will satisfy the written description requirement.”) (quotations omitted).

C. The ’308 Publication Is AIA § 102(a)(1) Prior Art and Anticipates All Claims of the ’830 Patent

Because the ’830 patent claims are only entitled to a priority date as of June 13, 2016, the ’308 publication—which published on May 31, 2012—qualifies as AIA § 102(a)(1) prior art. Further, the ’308 publication contains a substantively identical specification to the ’830 patent and discloses a species (i.e., a linear vibration module) that anticipates each claim of the ’830 patent directed to the “vibration module” genus. Indeed, it is black letter law that, although disclosure of a species may not be sufficient to support a generic claim (as is the case here), the disclosed species can nevertheless anticipate such a generic claim. *See, e.g., Chester*, 906 F.2d at 1577; *Application of Lukach*, 442 F.2d at 970; *In re Guess*, 347 Fed. App’x 558, 560 (Fed. Cir. 2009) (nonprecedential) (“A disclosure of a species anticipates a claim to a genus.”); *Brown v. 3M*, 265 F.3d 1349, 1351 (Fed. Cir. 2001) (“When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within the scope of the claim is known in the prior art.”); *Application of Slayter*, 276

F.2d 408, 411 (CCPA 1960) (“It is well settled that a generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus; in other words, whatever would infringe if subsequent will anticipate if prior.”).

D. The ’308 Publication Anticipates Claims 1-20

The ’308 publication includes a substantively identical specification to the ’830 patent and discloses a species (i.e., a linear vibration module) that anticipates the genus “vibration module” to which every challenged claim is directed. This Petition provides examples of how the ’308 publication anticipates each challenged claim. *See Wolfe*, ¶132.

1. Claim 1

a. 1[pre]

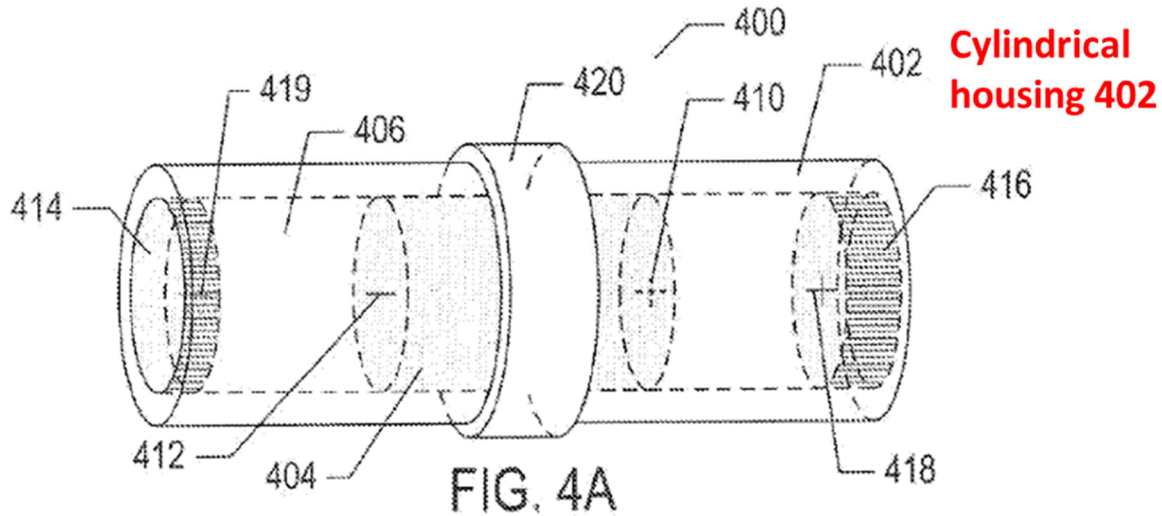
1[pre] is a limitation. *See* Section VI.A. The ’308 publication discloses 1[pre]. The ’308 publication discloses a species linear vibration module of the genus “vibration module,” as shown, for example, in Figures 4A–4G that, as described with respect to 1[e], produces linear oscillation. ’308Pub., [0028] (“FIGS. 4A–G illustrate one particular [linear-resonant vibration module] LRVM...”).



Id., Fig. 4A, Abstract (“The current application is directed to various types of linear vibrational modules...The vibrational forces are produced by linear oscillation of a weight or member...”), [0010] (describing the linear vibration module in the “Summary” section), [0027] (describing the linear vibration module in the introductory paragraph to the “Detailed Description”), Claim 1; *Wolfe*, ¶133.

b. 1[a]

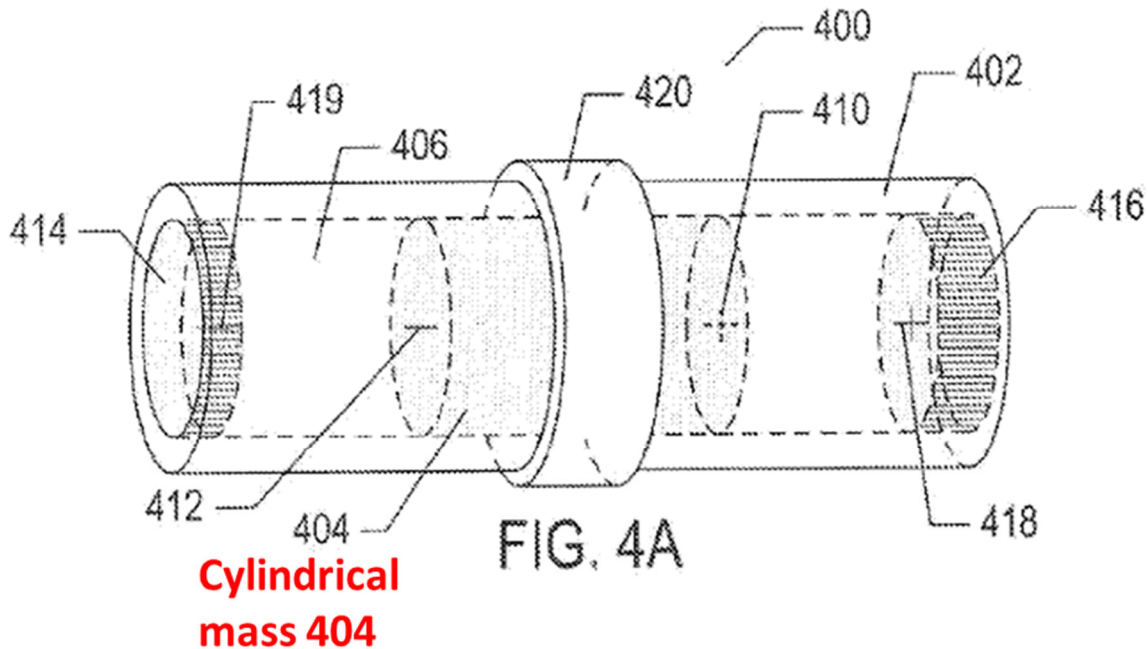
The '308 publication discloses 1[a]. The housing is shown, for example, as cylindrical housing 402 in Figure 4A. '308Pub., [0028] (“The LRVM includes a cylindrical housing 402 within which a solid, cylindrical mass 404, or weight, can move linearly along the inner, hollow, cylindrically shaped chamber 406 within the cylindrical housing or tube 402.”).



Id., Fig. 4A, [0028] (“[A] coil of conductive wire 420 girdles the cylindrical housing, or tube 402 at approximately the mid-point of the cylindrical housing.”), [0029], [0032], [0041]–[0042]; Figs. 4B–4G, 6, 12, 13, Claim 1 (“1. A linear vibration module comprising: ... a housing.”). *Wolfe*, ¶134.

c. 1[b]

The '308 publication discloses 1[b] under non-MPF or MPF. For either, the '308 publication discloses, for example, “a solid, cylindrical mass 404, or weight, [that] can move linearly.” '308Pub., [0028]. In the embodiment shown in Fig. 4A, the weight is a magnet. *Id.* (“The weight is a magnet...”).



Id., Fig. 4A, Claim 1 (“1. A linear vibration module comprising: ... a moveable component.”). *Wolfe*, ¶135.

d. 1[c]

The '308 publication discloses 1[c]. The power supply is shown, for example, as element 612 in Figure 6. '308Pub., [0032]–[0033] (describing Figure 6 as representing a block diagram of the LRVM shown in Figs. 4A–G and including “power supply 612”).

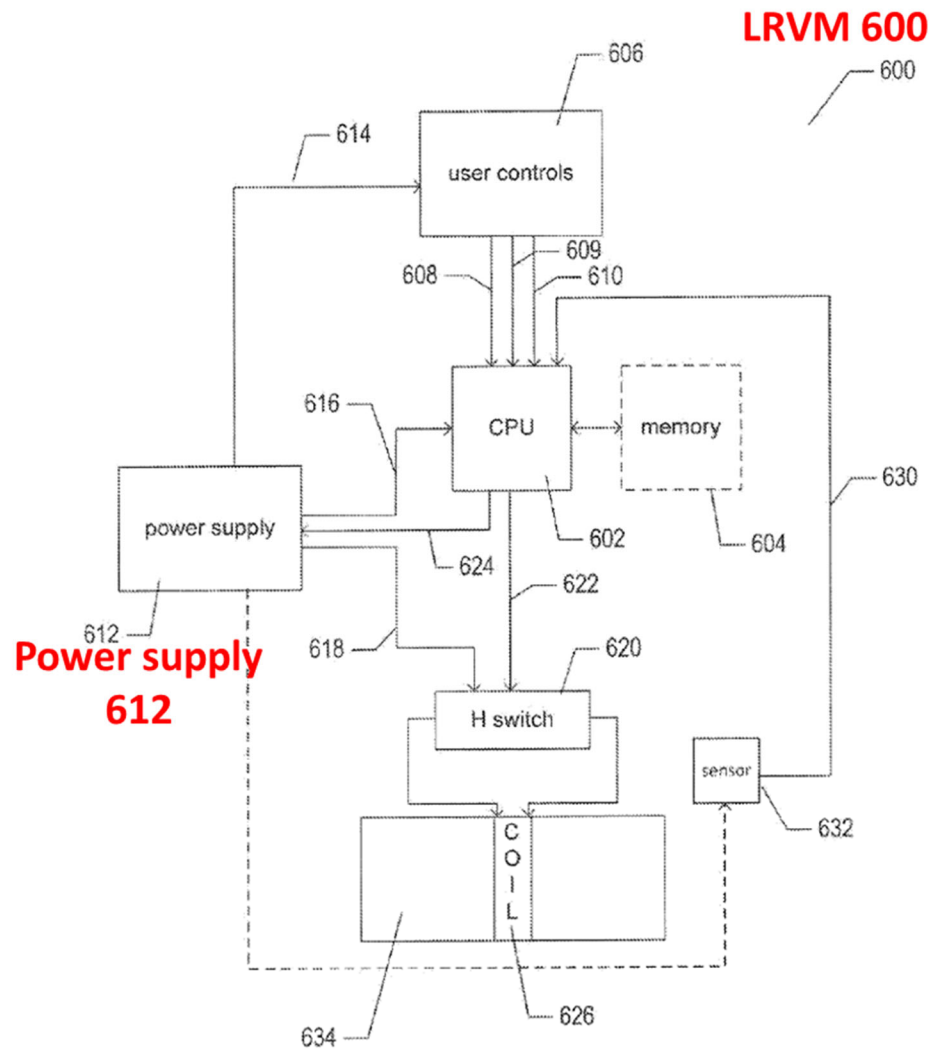


FIG. 6

Id., Fig. 6, Claim 1 (“1. A linear vibration module comprising: ... a power supply.”).

Wolfe, ¶136.

e. 1[d]

The '308 publication discloses 1[d]. The user-input features are shown, for example, as user controls 606 in Figure 6.

The CPU receives inputs from the user controls 606 that together comprise a user interface. These controls may include any of various dials, pushbuttons, switches, or other electromechanical-control devices. As one example, the user controls may include[] a dial to select a strength of vibration, which corresponds to the current applied to the coil, a switch to select one of various different operational modes, and a power button.

'308Pub., [0033].

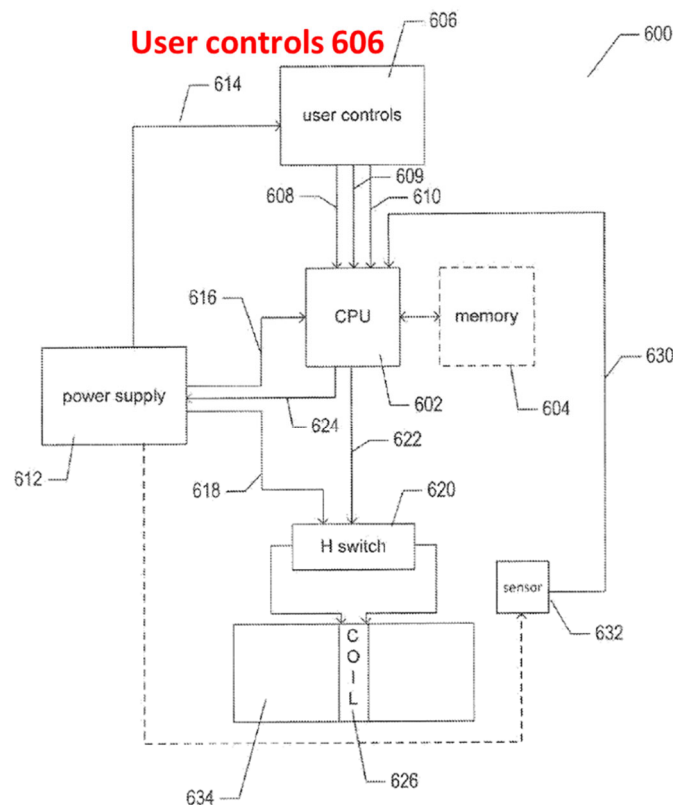
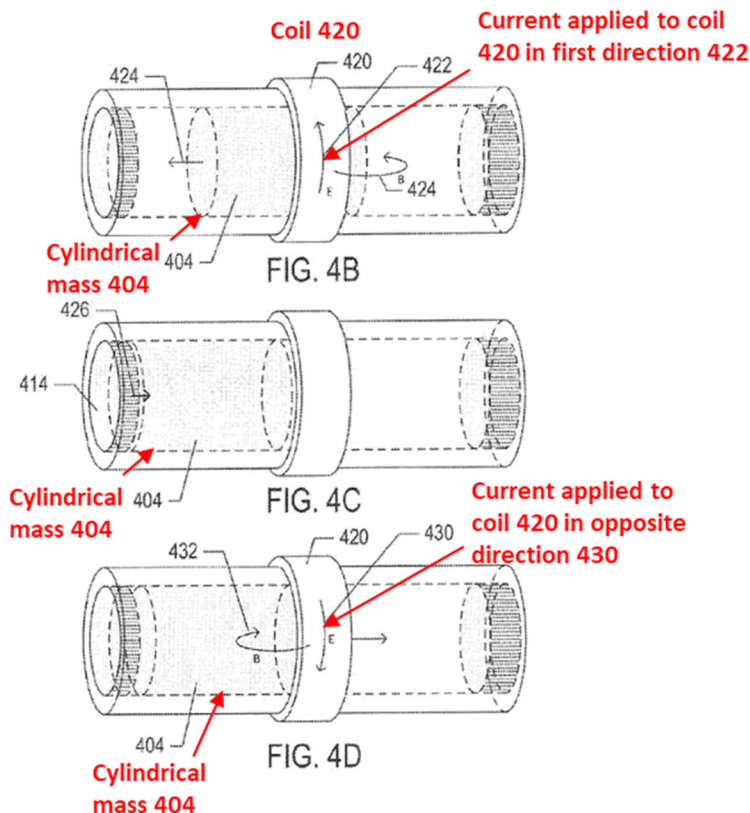


FIG. 6

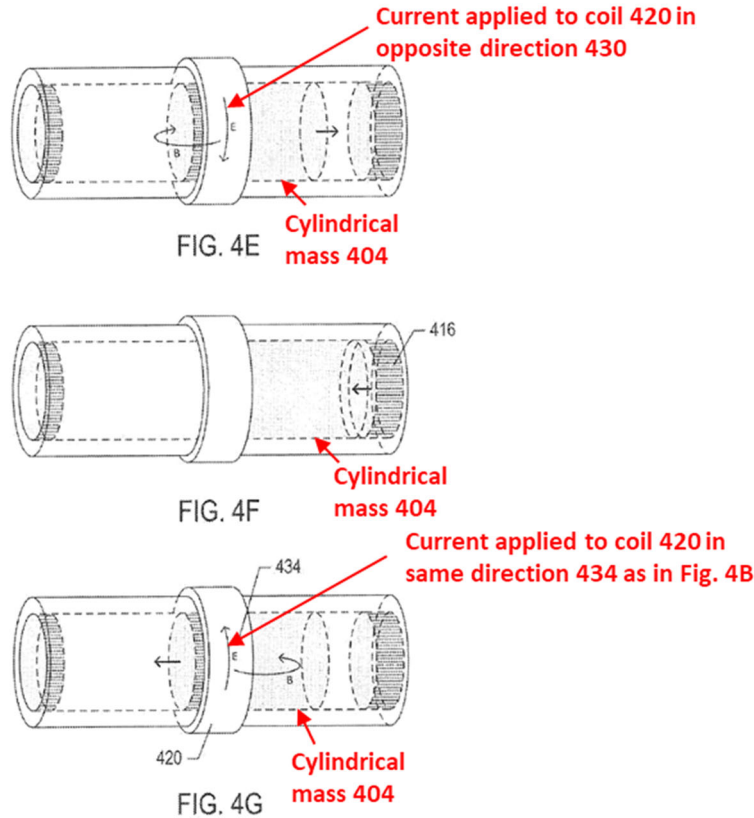
Id., Fig. 6, [0027], [0032], Claim 1 (“1. A linear vibration module comprising: ... user-input features.”). *Wolfe*, ¶137.

f. 1[e]

The '308 publication discloses 1[e] under non-MPF or MPF. Under either, the '308 publication discloses a coil that causes the movable component to oscillate within the housing. The coil is shown, for example, as element 420 in Figs. 4A–G and its operation is described with respect to Figs. 4B–G. Changing the direction of current through the coil causes the moveable component (weight 404) to oscillate linearly (i.e., back and forth) within the housing. '308Pub., [0028].



Id., Figs. 4B-D.



Id., Figs. 4E-G, [0031].

Under non-MPF, the '308 publication includes the following claim that discloses 1[e]: "1. A linear vibration module comprising: ... a driving component that drives the moveable component in each of two opposite directions within the housing." *Id.*, Claim 1. *Wolfe*, ¶¶138–139.

g. 1[f]

The '308 publication discloses 1[f] under MPF or non-MPF. *Wolfe*, ¶¶140–153.

(i) MPF

Under MPF, the '308 publication discloses this limitation both with respect to its default operation mode and with respect to a change in user input.

With respect to Figs. 6, 7A, and 7C, the '308 publication discloses an H-Bridge switch and a processor programmed with an algorithm to (1) set mode and strength variables to default values and/or values represented by selections made by user input to the user input features, (2) provide a corresponding output to the power supply, and (3) provide a corresponding output to the H-bridge switch. *See* '308Pub., [0031] (describing operation of H-bridge switch), [0032]–[0033] (describing block diagram of LRVM, including a H-bridge switch 620 and CPU 602, i.e., a processor), [0034] (describing algorithm depicted in Fig. 7A), [0036] (describing algorithm depicted in Fig. 7C).

(a) Default Operation

With respect to Fig. 7A, the '308 publication discloses steps 702, 706, 708, 714, and 716. These steps are shown below.

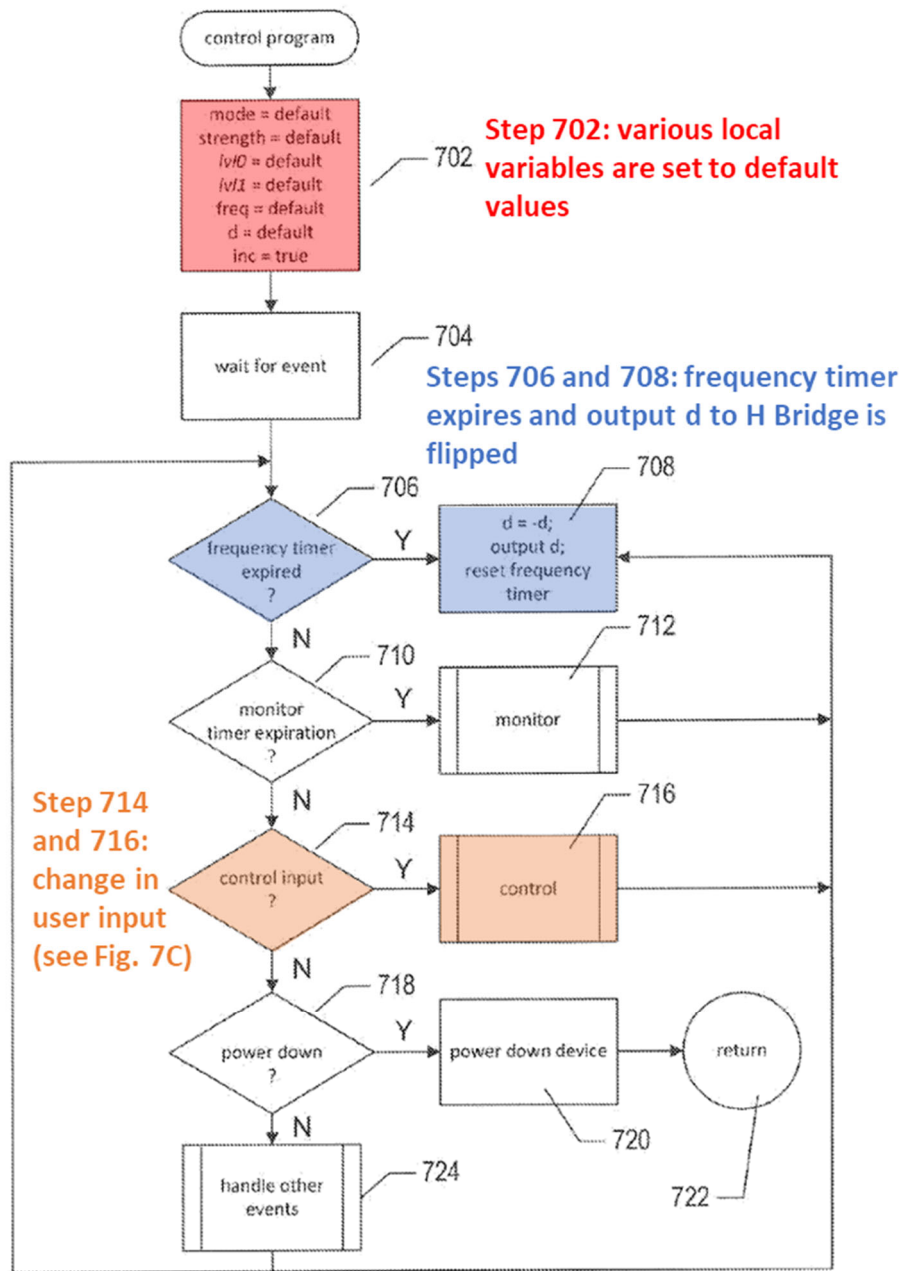


FIG. 7A

Id., Fig. 7A.

The '308 publication discloses that the “[t]he program begins execution, in step 702, upon a power-on event...” *Id.*, [0034]. Thereafter, “various local variables

are set to default values,” including values corresponding to mode and strength. *Id.* A POSITA would have understood that both the variables mode and strength are “stored values” because they are stored in the processor memory or other memory in the linear vibration module.⁷ *Wolfe*, ¶144. Indeed, the ’308 publication explicitly discloses with respect to certain of the variables that they are “stored.” *See, e.g.*, ’308Pub., [0035] (disclosing with respect to the “monitor” routine relevant to feedback control that the routine “stores the integer value in variable lvl1” and disclosing that the “monitor” routine “decreases the value stored in the variable freq” under certain conditions); *Wolfe*, ¶144.

The control program uses both the default operation mode (with its associated default for the freq variable) and a stored value corresponding to the strength variable to cause the moveable component to oscillate at a frequency and amplitude specified by these stored values.

⁷ The ’308 publication discloses that the control program and “other values needed during execution of the control program” may be stored in on-board memory of the microprocessor. *Id.*, [0033]. Alternatively, the control program may be stored in a low-powered memory chip or flash memory. *Id.*

As to frequency, in step 706, the control program executed by the processor flips the value of output d to the H Bridge switch when the frequency timer expires based on the default mode and the associated stored freq variable. '308Pub., [0034] (“When an event occurs, the control program begins a series of tasks, the first of which is represented by the conditional step 706, to determine what event has occurred and appropriately handle that event. When the frequency timer has expired, as determined in step 706, the value of the output signal d is flipped, in step 708, and output to the H-bridge switch, with the frequency timer being reset to trigger a next frequency-related event. The frequency-timer interval is determined by the current value of the variable freq.”); *Wolfe*, ¶146.

As to amplitude, a POSITA reading Fig. 6 and Fig. 7A together would have understood that the control program causes the processor to output a control input 624 to the power supply 612 based on the stored strength variable. '308Pub., [0033] (“The power supply 612 receives a control input 624 from the CPU to control the current supplied to the H-bridge switch 618 for transfer to the coil 626.”); *Wolfe*, ¶147. Further, the '308 publication discloses that the magnitude of the supplied current corresponds to amplitude of vibration. '308Pub., [0053] (“The user is additionally provided with an input feature to allow the user to control the current or

duty cycle used to drive the linear vibration module and to thus increase and decrease the amplitude of vibration produced by the linear vibration module.”); *Wolfe*, ¶147.

(b) User Input

The '308 publication discloses that when there is a change in user input (e.g., steps 714 and 716), the control routine shown in Fig. 7C is invoked. '308Pub., [0034] (“[W]hen the event corresponds to a change in the user input through the user interface, as determined in step 714, the routine “control” is called in step 716.”).

Fig. 7C “provides a control-flow diagram for the routine ‘control,’ called in step 716 in FIG. 7A.” *Id.*, [0036]. The '308 publication discloses that in step 760 of Fig. 7C, “the variables mode and strength are set to the currently selected mode and vibrational strength, represented by the current states of control features in the user interface.” *Id.* Then, “in step 762, the routine ‘control’ computes an output value p corresponding to the currently selected strength, stored in the variable strength, and outputs the value p to the power supply so that the power supply outputs an appropriate current to the coil.” *Id.*

Fig. 7C is reproduced below.

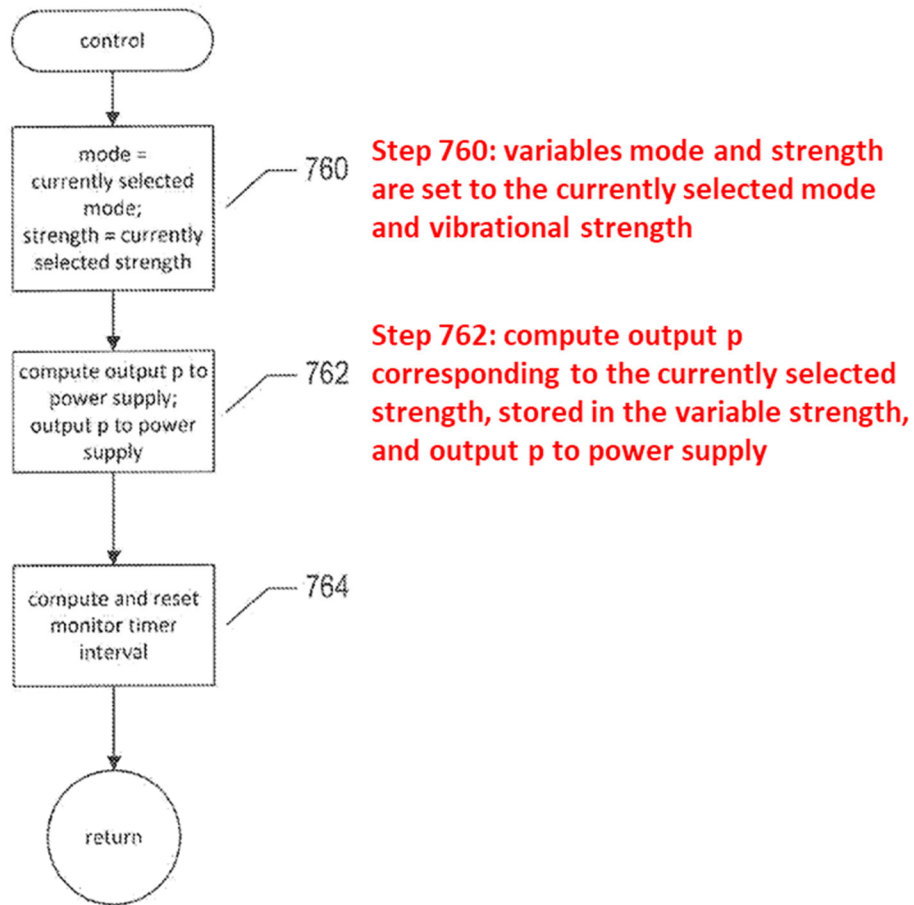


FIG. 7C

A POSITA would have understood that at the completion of the routine in Fig. 7C, the program returns to Fig. 7A, where the linear vibration module would now operate according to the value stored in the freq variable associated with the user-selected mode. *Wolfe*, ¶151. As described above with respect to the default operation in steps 706 and 708, the control program executed by the processor flips the value

of output d to the H Bridge switch when the frequency timer expires based on the user-selected mode and the associated freq variable. *Id.*; '308Pub., [0034]

(ii) Non-MPF

The same disclosures described for MPF meet this limitation under non-MPF. Additionally, like the '830 patent, the '308 publication discloses a variable oscillator circuit for allowing the user to control frequency and a user input feature for allowing the user to control current (i.e., amplitude of vibration). '308Pub., [0052]–[0053]. *See also* Section VII.D.2.b. Although not corresponding structures under MPF because the '830 patent does not disclose sufficient detail regarding them, this disclosure teaches 1[f] under non-MPF.

The '308 publication discloses the following claim limitation: “a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features.” *Id.*, Claim 1. As described above with respect to MPF, this disclosure of controlling supply of power based on user-input also discloses controlling supply of power based on stored values.

2. Claim 2⁸

a. 2[pre]

The '308 publication discloses 2[pre]. *See* 1[pre], 1[f]; *see also* '308Pub., Claim 2 (“The linear vibration module of claim 1 wherein the control component is one of.”); *Wolfe*, ¶¶154–158.

b. 2[a]

The '308 publication discloses 2[a]. The claimed variable oscillator circuit with additional control circuitry is structure and is therefore not MPF. To the extent 2[a] is not invalid under §112, the '308 publication discloses it. *See* '308Pub., [0052]–[0053]. Specifically, the '308 publication discloses a “variable-frequency oscillator circuit [that] can be controlled by user input to drive the H switch or other H-switch-like circuit to operate the linear vibration module at different frequencies.” *Id.*, [0053]. For controlling amplitude, the '308 publication discloses that “[t]he user is additionally provided with an input feature to allow the user to control the current

⁸ Petitioners reserve the right to challenge claim 2 under §112 in other proceedings on the basis that the disclosed variable oscillator circuit in the '830 patent—which is the same oscillator circuit disclosed in the '308 publication—only controls frequency and does not control amplitude of vibration.

or duty cycle to drive the linear vibration module and to thus increase and decrease the amplitude of vibration...” *Id.*

Further, the ’308 publication discloses the following claim limitation that discloses 2[a]: “2. The linear vibration module of claim 1 wherein the control component is one of: ... an [sic] variable oscillator circuit with additional control circuitry.” *Id.*, Claim 2. *Wolfe*, ¶¶155–156.

c. 2[b.i]

The ’308 publication discloses 2[b.i]. *See* 1[f]. The ’308 publication discloses the following claim limitation that discloses 2[b.i]: “2. The linear vibration module of claim 1 wherein the control component is one of: ... a control component that includes a microprocessor.” ’308Pub., Claim 2. *Wolfe*, ¶157.

d. 2[b.ii]

The ’308 publication discloses 2[b.ii]. *See* 1[f]. Because this limitation discloses a microprocessor (i.e., structure), it is not subject to MPF. Moreover, the ’308 publication discloses the following claim limitation that discloses 2[b.ii]: “2. The linear vibration module of claim 1 wherein the control component is one of: ... a control program, stored in an electronic memory within, or separate from, the microprocessor, the control program executed by the microprocessor to control supply of power from the power supply to the driving component to cause the

moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features.” ’308Pub., Claim 2. As described above with respect to 1[f], this disclosure of controlling supply of power based on user-input also discloses controlling supply of power based on stored values. *Wolfe*, ¶158.

3. Claim 3

The ’308 publication discloses claim 3 under non-MPF or MPF. Under non-MPF, the ’308 publication discloses the following claim that discloses claim 3: “3. The linear vibration module of claim 1 wherein the control component receives output signals from sensors within the linear vibration module during operation of the linear vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors.” ’308Pub., Claim 3.

Further, under either non-MPF or MPF, the ’308 publication discloses that the processor described with respect to 1[f] is further programmed with an algorithm to perform the following steps: (1) convert the received output signal into an integer, (2) compare that integer to a specific value, (3) adjust one or more operational control outputs based on that comparison. *Wolfe*, ¶¶159–168.

- a. The control component receives output signals from the sensors and adjusts the “operational control output” d to the H bridge switch based on the sensor output signals corresponding to strength of vibration**

With respect to Fig. 7A, the '308 publication discloses step 712 that calls routine “monitor,” which is illustrated in Fig. 7B. '308Pub., [0034]–[0035]. The monitor routine is described in [0035]. In the monitor routine, the output signals are received from sensors in step 730 and the control component adjusts the variable freq and resets the frequency timer as described below. The '308 publication discloses that changing the variable “freq” also adjusts the interval of the frequency timer, which in turn changes how often the output d to the H Bridge Switch is flipped (i.e., adjusts operational control output “d”). '308Pub., Fig. 7A, [0034] (“When the frequency timer has expired, as determined in step 706, the value of the output signal d is flipped, in step 708, and output to the H-bridge switch, with the frequency timer being reset to trigger a next frequency-related event. The frequency-timer interval is determined by the current value of the variable freq.”).

Thus, the monitor routine results in the control component adjusting the “operational control output” d to the H bridge switch based on the sensor output signals corresponding to strength of vibration.

b. Discussion of Fig. 7B

Fig. 7B is reproduced below.

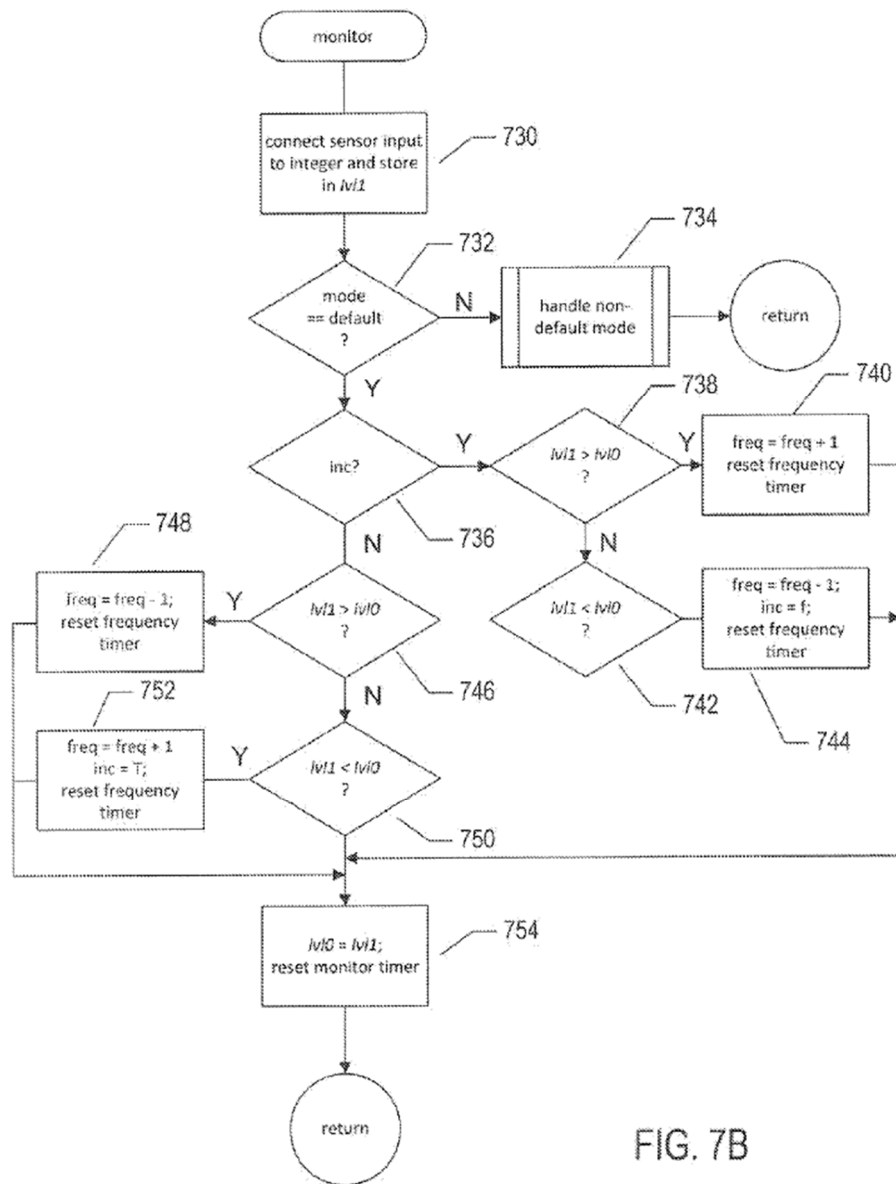


FIG. 7B

The '308 publication discloses that, in step 730, the sensor input is converted to an integer representing the current vibrational force and stored in variable lv11. *Id.*, [0035]. Subsequently, the routine determines whether the module is operating in “default mode” in step 732 and, if yes, the routine uses continuous feedback control in order operate the module “as close as possible to the resonant frequency.” *Id.*

In the “default mode,” in order to optimize vibrational force, the routine determines whether a boolean variable (“inc”) is set to TRUE or FALSE in step 736. *Id.* If inc is set to TRUE, this means that the frequency is currently being increased to obtain a resonant frequency. *Id.*, [0035].

If variable inc is set to TRUE (the routine is currently increasing the frequency) and the routine determines in step 738 that the currently-sensed vibrational strength (lv11) is greater than the previously-sensed vibrational strength (lv10), the routine determines that the vibrational force has been recently increased by increasing the frequency, increases the “freq” variable again in step 740, and resets the frequency timer (presumably to a shorter interval, such that the output d is flipped more often). *Id.* The routine then proceeds to step 754 where the value in lv11 is stored in lv10 and exits the monitor routine. *Id.*

Otherwise, if it is determined in step 742 that the currently-sensed vibrational strength (lv11) is less than the previously sensed vibrational strength (lv10), then the routine determines that it has increased frequency past the resonance frequency. As a result, in step 744, the routine decreases the variable “freq,” sets the variable inc to FALSE, and resets the frequency timer (e.g., to a longer interval, such that the output d is flipped less often and produces a lower frequency). *Id.* The routine then

proceeds to step 754 where the value in lvl1 is stored in lvl0 and exits the monitor routine. *Id.*

If the routine determines in step 736 that inc is set to FALSE (frequency is currently being decreased) and determines in step 746 that the currently-sensed vibrational strength (lvl1) is greater than the previously-sensed vibrational strength (lvl0), the routine in step 748 decreases the value stored in variable “freq” (as this means that decreasing the frequency previously resulted in increasing the vibrational strength). The routine also resets the frequency timer (e.g., to a longer interval, such that the output d is flipped less often and produces a lower frequency). *Id.* The routine then proceeds to step 754 where the value in lvl1 is stored in lvl0 and exits the monitor routine. *Id.*

Otherwise, if it is determined in step 750 that the currently-sensed vibrational strength (lvl1) is less than the previously sensed vibrational strength (lvl0), then in step 752 the routine increases the value stored in the variable “freq,” sets the variable inc to TRUE, and resets the frequency timer (presumably to a shorter interval, such that the output d is flipped more often and produces an increased frequency). *Id.* (“Otherwise, when lvl1 is less than lvl0, as determined in step 750, then the routine “monitor” increases the value stored in the variable freq, sets the variable inc to

TRUE, and resets the frequency timer in step 752.”). The routine then proceeds to step 754 where the value in lv11 is stored in lv10 and exits the monitor routine. *Id.*

4. Claim 4⁹

“The one or more operational control outputs of the control component,” “the sensors,” and “the one or more sensors” in claim 4 do not have proper antecedent basis, and Petitioners address multiple possible interpretations: (1) the first two terms should be “~~the~~ one or more operational control outputs of the control component” and “~~the~~ sensors,” and (2) this claim should depend from claim 3 rather than claim 1. Under either non-MPF or MPF, the ’308 publication discloses claim 4.

As described with respect to claim 3, the ’308 publication discloses the control component receives output signals from the sensors and adjusts the “operational control output” d to the H bridge switch based on the sensor output signals corresponding to strength of vibration. The control component seeks to produce desired outputs from the sensors corresponding to a strength of vibration (i.e., the operational control parameter) at a frequency that is as close as possible to the resonant frequency. *See* VII.D.3.

⁹ Petitioners reserve the right to raise and address the indefiniteness of claim 4 in other proceedings.

Under non-MPF, the '308 publication discloses the following claim that discloses claim 4: “4. The linear vibration module of claim 1 wherein the control component adjusts the 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 the linear vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.” '308Pub., Claim 4; *Wolfe*, ¶¶169–172.

5. Claim 5¹⁰

The '308 publication discloses 5[a] and 5[b] under non-MPF or MPF. *See* analysis of Claim 3, 4. Under non-MPF, the '308 publication discloses the following claim limitation that discloses 5[a] and 5[b]: “5. The linear vibration module of claim 4 wherein the one or more operational control parameters is a strength of vibration produced by the linear oscillation of the moveable component, wherein the one or more operational control outputs is a frequency at which the control component drives the moveable component to linearly oscillate, the control component dynamically adjusting the power supplied to the driving component to produce linear

¹⁰ Petitioners reserve the right to raise and address indefiniteness, enablement, and/or written description issues regarding claim 5 in other proceedings.

oscillation of the movable component at a resonant frequency for the linear vibration module.” ’308Pub., Claim 5. *Wolfe*, ¶¶173–174.

6. Claim 6¹¹

The ’308 publication discloses 6[a] and 6[b] under non-MPF or MPF. The only feedback control disclosed in the ’830 patent is the same feedback control disclosed in the ’308 publication described above with respect to claims 3 and 4. To the extent claim 6 is not invalid under §112, the ’308 publication discloses 6[a]. *See* analysis of Claim 3, 4.

Under non-MPF, the ’308 publication discloses the following claim limitation that discloses 6[a] and 6[b]: “6. The linear vibration module of claim 4 wherein the one or more operational control parameters include both a strength of vibration produced by the linear oscillation of the moveable component and a current operational mode, wherein the one or more operational control outputs is a control output that determines a current supplied by the power supply to the driving component and a frequency at which the control component drives the moveable component to linearly oscillate.” ’308Pub., Claim 6. *Wolfe*, ¶¶175–178.

¹¹ Petitioners reserve the right to raise and address indefiniteness, enablement, and/or written description issues regarding claim 6 in other proceedings.

7. Claim 7¹²

The '308 publication discloses claim 7. The '308 publication discloses that a magnetic field is generated that includes a component that is parallel to the direction of movement of the moveable component—and consequently that component of the magnetic field generates a magnetic force parallel to the direction of movement of the moveable component. '308Pub., [0029], Figs. 4D, 4G.

The '308 publication discloses the following claim that discloses claim 7: “7. The linear vibration module of claim 1 wherein the driving component comprises one or more electromagnetic coils that generate magnetic fields parallel to the directions in which the moveable component is driven by the driving component.” '308 publication, Claim 7. *Wolfe*, ¶¶179–180.

8. Claim 8

a. 8[a]

As explained below, the '308 publication discloses 8[a]. *Wolfe*, ¶181.

(i) “wherein the housing is a tube”

¹² Petitioners reserve the right to argue claim 7 is not enabled, indefinite, and/or lacks written description support in other proceedings because the '830 patent's vibration module generates a magnetic force—not a magnetic field—parallel to the direction in which the moveable component is driven.

The '308 publication discloses the aspect of 8[a] requiring that the housing is a tube. '308Pub., [0028] (“The LRVM includes a cylindrical housing 402 within which a solid, cylindrical mass 404, or weight, can move linearly along the inner, hollow, cylindrically shaped chamber 406 within the cylindrical housing or tube 402.”), [0032], [0039] (“Note that the weight and chamber may be cylindrical, in cross section, as discussed above with reference to FIG. 4A, or may have other shapes, including rectangular or hexagonal cross-sections.”).

The '308 publication discloses the following claim limitation that discloses this aspect of 8[a]: “8. The linear vibration module of claim 1 wherein the housing is a linear tube.” '308 publication, Claim 8. *Wolfe*, ¶¶182–183.

(ii) “capped at both ends by movable-component-repelling components selected from one of mechanical springs and magnets”

The '308 publication discloses the aspect of 8[a] requiring that the housing is capped at both ends by mov[e]able-component-repelling components selected from one of mechanical springs and magnets. '308Pub., [0028] (explaining that “[t]he cylindrical chamber 406 is capped by two magnetic disks 414 and 416” and that the “weight is repelled” by the disks, such that they “act much like springs”), [0061] (explaining that alterations to the LRVM can include “altering the strength of the end-cap magnets or mechanical springs used to facilitate reversal of direction of the

moving mass...”), [0039] (explaining with respect to the embodiment in Fig. 10 that “in place of the end magnets 1002 and 1004, mechanical springs may alternatively be used”); Figs. 4A–4G, 10, 11.

The ’308 publication discloses the following claim limitation that discloses this aspect of 8[a]: “8. The linear vibration module of claim 1 wherein the housing is a linear tube, capped at both ends by movable-component-repelling components selected from one of mechanical springs and magnets.” ’308Pub., Claim 8. *Wolfe*, ¶¶184–185.

b. 8[b]

The ’308 publication discloses 8[b]. *See* 1[b]. The ’308 publication discloses the following claim limitation that discloses 8[b]: “8. The linear vibration module of claim 1...wherein the movable component is a magnet shaped to slide within the linear tube.” ’308Pub., Claim 8. *Wolfe*, ¶186.

c. 8[c]

The ’308 publication discloses 8[c]. *See* 1[e]. The ’308 publication discloses the following claim limitation that discloses 8[c]: “8. The linear vibration module of claim 1...wherein the driving component is an electromagnetic coil.” ’308Pub., Claim 8. *Wolfe*, ¶187.

9. Claim 9

a. 9[a]

The '308 publication discloses 9[a]. *See* 8[a]. The '308 publication discloses the following claim limitation that discloses 9[a]: “9. The linear vibration module of claim 1 wherein the housing is a linear tube, capped at both ends by movable-component-repelling components.” '308Pub., Claim 9. *Wolfe*, ¶188.

b. 9[b]

The '308 publication discloses 9[b]. The same disclosures discussed above with respect to claim 1 apply to this limitation, except that the moveable component is instead moving mass/weight 1102. Figure 11 depicts the control unit (i.e., microprocessor) and driving coil (i.e., electromagnetic-coil driving component) incorporated into the moving mass. To note, although the text does not describe the driving coil as being incorporated into the moving mass, this is clearly shown in Figure 11. '308Pub., [0040] (“FIG. 11 shows a similar implementation in which the control unit and power supply are incorporated into the moving mass 1102.”).

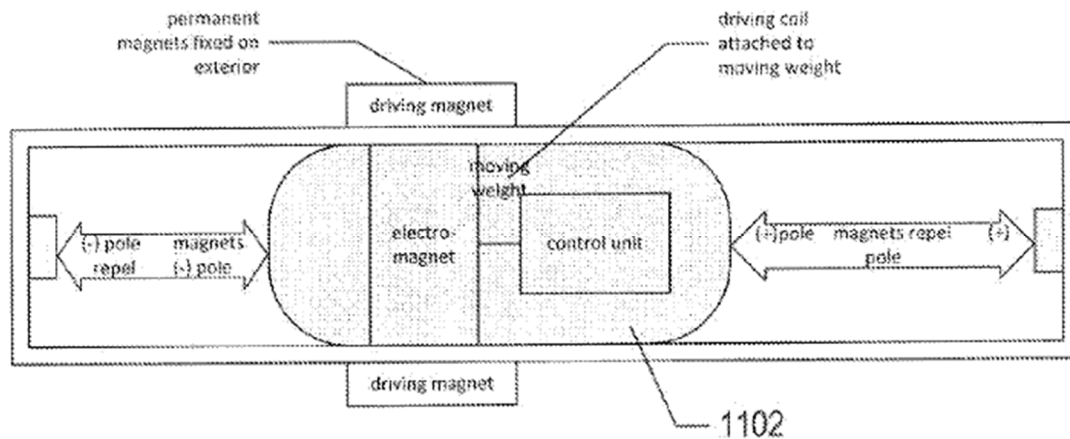
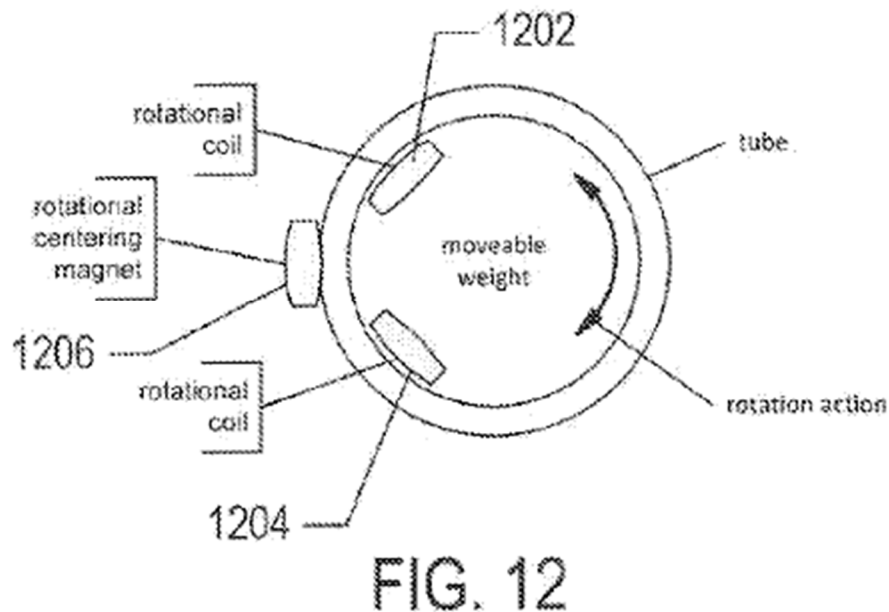


FIG. 11

The '308 publication discloses the following claim limitation that discloses 9[b]: “The linear vibration module of claim 1 ... wherein the moveable component includes an electromagnetic-coil driving component and microprocessor.” '308Pub., Claim 9. *Wolfe*, ¶¶189–190.

10. Claim 10

The '308 publication discloses claim 10. The same disclosures discussed above with respect to claim 1 apply to this claim, except that the module further includes the rotational driving components 1202 and 1204 shown in Fig. 12 that induce rotational motion of the movable component in addition to translational motion induced by the driving component. '308Pub., [0041].



The '308 publication discloses the following claim that discloses claim 10:

“10. The linear vibration module of claim 1 further including rotational driving components that induce rotational motion of the movable component in addition to translational motion induced by the driving component.” '308Pub., Claim 10. *Wolfe*, ¶¶191–192.

11. Claim 11

The '308 publication discloses claim 11. The same disclosures discussed above with respect to claim 1 apply to this claim, except that the module further includes the two driving components 1302 and 1304 shown in Fig. 13. '308Pub., [0042] (“FIG. 13 illustrates an embodiment in which multiple electromagnetic coils

are employed. In FIG. 13, *two coils 1302 and 1304* are placed in two different positions on the housing. The *first coil 1302* may be used to drive linear oscillation of the moving mass 1306, while the *second coil may be activated in order to shorten the length of the chamber within which the moving mass linearly oscillates*, essentially serving as a second repelling magnet. In this implementation of the LRVM, the moving mass may linearly oscillate with at least *two different amplitudes*, depending on whether or not the second coil 1304 is activated to repel the moving mass. Additionally more complex patterns of current reversal in the two coils can be employed to produce complex multi-component vibrational modes of the moving mass.”).

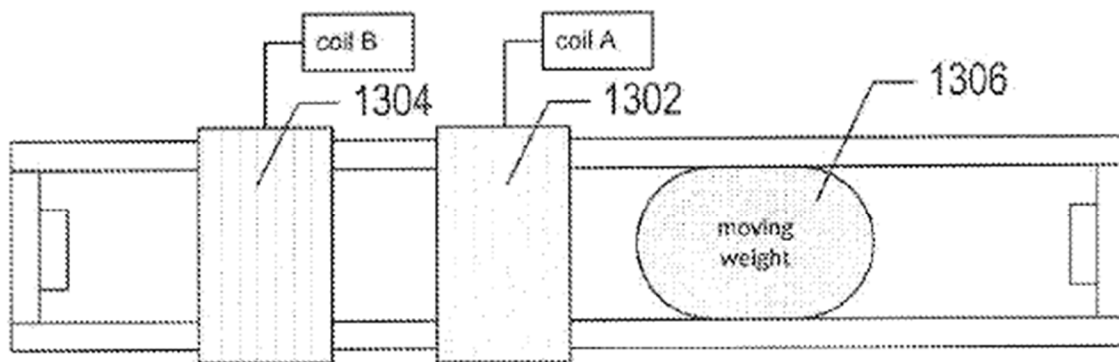


FIG. 13

The '308 publication discloses the following claim that discloses claim 11:
“11. The linear vibration module of claim 1 wherein the linear vibration module

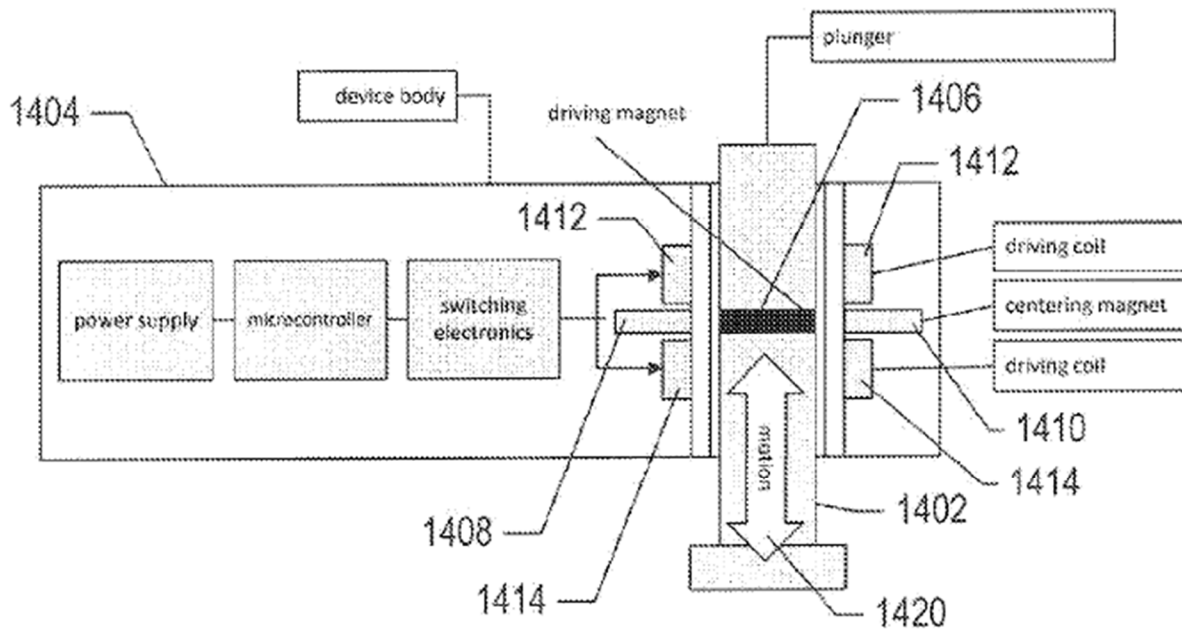
further includes two or more driving components, each, when activated, driving the moveable component to linearly oscillate with an amplitude particular to the activated driving component..” ’308Pub., Claim 11. *Wolfe*, ¶¶193–194.

12. Claim 12

a. 12[a]

The ’308 publication discloses 12[a].¹³ The same disclosures discussed above with respect to claim 1 apply to this claim, except that certain of the module’s components are depicted in Fig. 14. ’308Pub., [0044] (“FIG. 14 illustrates an alternative LRVM an implementation of the linear-resonant vibration module to which current application is directed in which a plunger linearly oscillates to produce a vibration. The plunger 1402 is slideably contained within a moveable-component track orthogonal to a long axis of the main housing 1404 of the LRVM that includes the power supply, microcontroller, and other control components.”).

¹³ Petitioners reserve the right to argue in other proceedings that the lack of proper antecedent basis renders “the microprocessor” indefinite.



The '308 publication discloses the following claim that discloses limitation 12[a]: “12. The linear vibration module of claim 1 wherein housing includes a power supply, the microprocessor, and a moveable-component track orthogonal to a long axis of the housing.” '308Pub., Claim 12. *Wolfe*, ¶¶195–196.

b. 12[b]

To the extent this limitation is not indefinite due to the fact that the plunger is a component outside of the housing (whereas claim 1 requires that the moveable component “oscillate within the housing”), the '308 publication discloses 12[b] in its disclosures regarding Fig. 14.'308Pub., [0044] (“*The plunger* is girdled by, or includes, a driving magnet 1406 that is attracted to, and seeks to be positioned in

alignment with, a centering magnet 1408 mounted within the housing. Applying current to one of two driving coils 1412 and 1414 forces the driving magnet away from the equilibrium position shown in FIG. 14. By rapidly switching the direction of current applied to the driving coils, the microcontroller can control the *plunger to linearly oscillate in an up-and-down fashion, as indicated by arrow 1420.*”).

The '308 publication discloses the following claim that discloses limitation 12[b]: “12. The linear vibration module of claim 1...wherein the moveable component is a plunger that moves a first direction and a second direction opposite from the first direction within the moveable-component-track.” '308Pub., Claim 12. Wolfe, ¶¶197–198.

c. 12[c]

The '308 publication discloses 12[c] in its disclosures regarding Figure 14 of driving coils 1412 and 1414 and centering magnet 1408. '308Pub., [0044] (“The plunger is girdled by, or includes, a driving magnet 1406 that is attracted to, and seeks to be positioned in alignment with, a *centering magnet 1408* mounted within the housing. Applying current to one of *two driving coils 1412 and 1414* forces the driving magnet away from the equilibrium position shown in FIG. 14.”).

The '308 publication discloses the following claim that discloses limitation 12[c]: “12. The linear vibration module of claim 1...wherein the driving component

comprising two electromagnetic driving coils and a centering magnet.” ’308Pub., Claim 12. *Wolfe*, ¶¶193–194.

13. Claim 13

a. 13[a]

The ’308 publication discloses 13[a] in its disclosures regarding Figure 15 of spring-like member 1502 clamped at one end to the housing and driving magnets 1506 and 1508 attached to spring-like member 1502 ’308Pub., [0045] (“FIG. 15 shows yet another LRVM an implementation of the linear-resonant vibration module to which current application is directed. In this an implementation of the linear-resonant vibration module to which current application is directed, a spring-like member 1502 is clamped at one end 1504 to the housing. Driving magnets 1506 and 1508 are fixed to the spring-like member 1502, and when current is rapidly reversed in a coil 1510, the spring-like member 1502 is induced to vibrate at a relatively high frequency.”), [0045] (describing Fig. 16, where “spring member 1602 is extended to provide an external massage arm 1604 that extends out from the housing”), [0047] (describing Fig. 17, which adds a “mechanical vibration adjustment feature” to the embodiments of either Figs. 15 or 16).

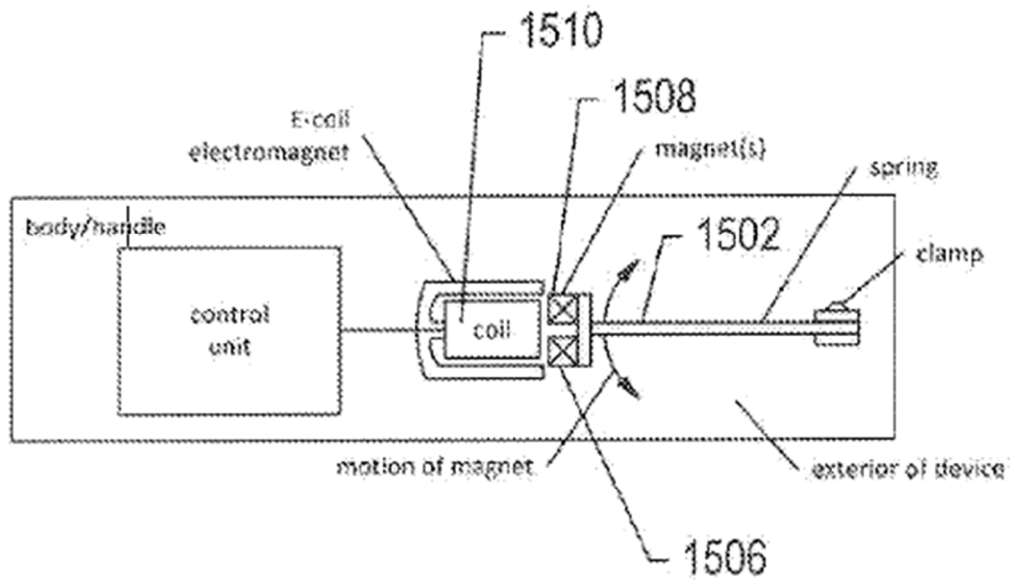


FIG. 15

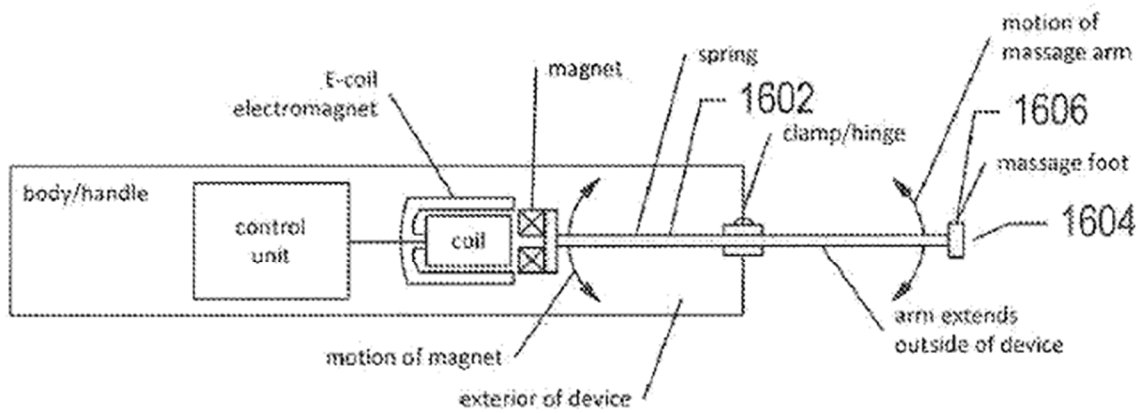


FIG. 16

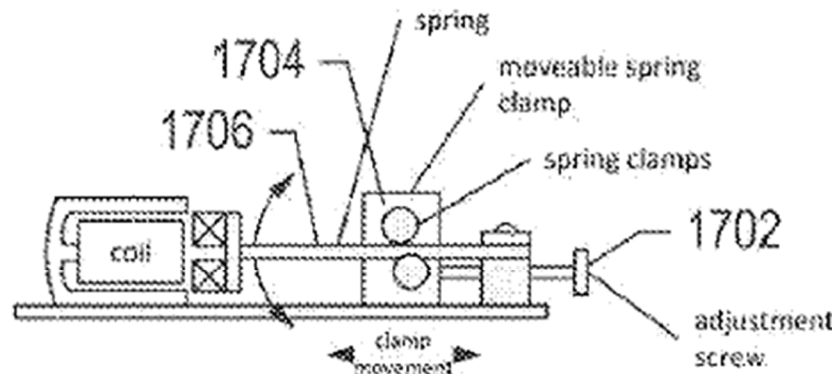


FIG. 17

The '308 publication discloses the following claim that discloses limitation 13[a]: “13. The linear vibration module of claim 1 wherein the moveable component is a clamped mechanical arm to which two magnets are attached.” '308Pub., Claim 13. *Wolfe*, ¶¶201–202.

b. 13[b]

The '308 publication discloses 13[b] in its disclosures regarding Figure 15 of coil 1510. '308Pub., [0045] (“Driving magnets 1506 and 1508 are fixed to the spring-like member 1502, and when current is rapidly reversed in a coil 1510, the spring-like member 1502 is induced to vibrate at a relatively high frequency.”).

The '308 publication discloses the following claim that discloses limitation 13[b]: “13. The linear vibration module of claim 1...wherein the driving component

comprising an electromagnetic coil that, when opposite currents are applied at a particular frequency to the electromagnetic coil, causes the mechanical arm to vibrate.” ’308Pub., Claim 13. *Wolfe*, ¶¶203–204.

14. Claim 14

The ’308 publication discloses claim 14. Specifically, the ’308 publication discloses an embodiment in Figs. 24A–25 with paramagnetic flux paths added to the linear vibration module (i.e., elements 2410, 2411, 2414, and/or 2415). ’308Pub., [0058]–[0060] (“FIGS. 24A–25 illustrate incorporation of paramagnetic flux paths into a linear vibration module. ... When introduced into a magnetic field, paramagnetic materials provide a lower-resistance path for magnetic flux ... FIG. 24[B] shows a linear vibration module with added paramagnetic flux paths. These include flux paths around the stator coils 2410–2411 as well as flux-path disks 2414–2415 at the ends of the cylindrical magnet 2416 within the linear vibration module...FIG. 25 illustrates flux-path magnetic stops incorporated within a linear vibration module to which the current application is directed.”).

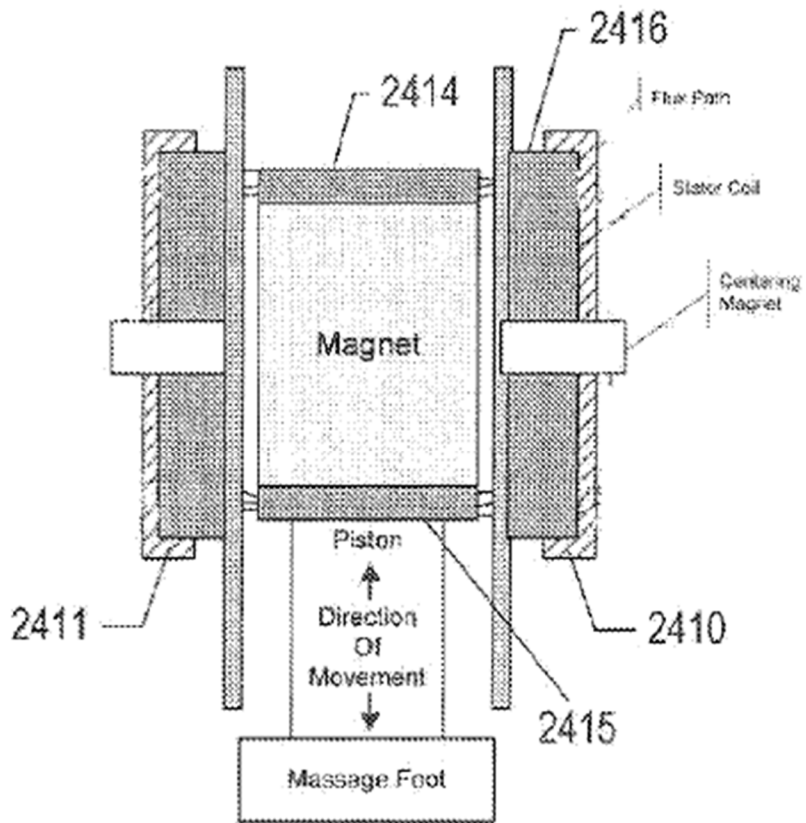


FIG. 24B

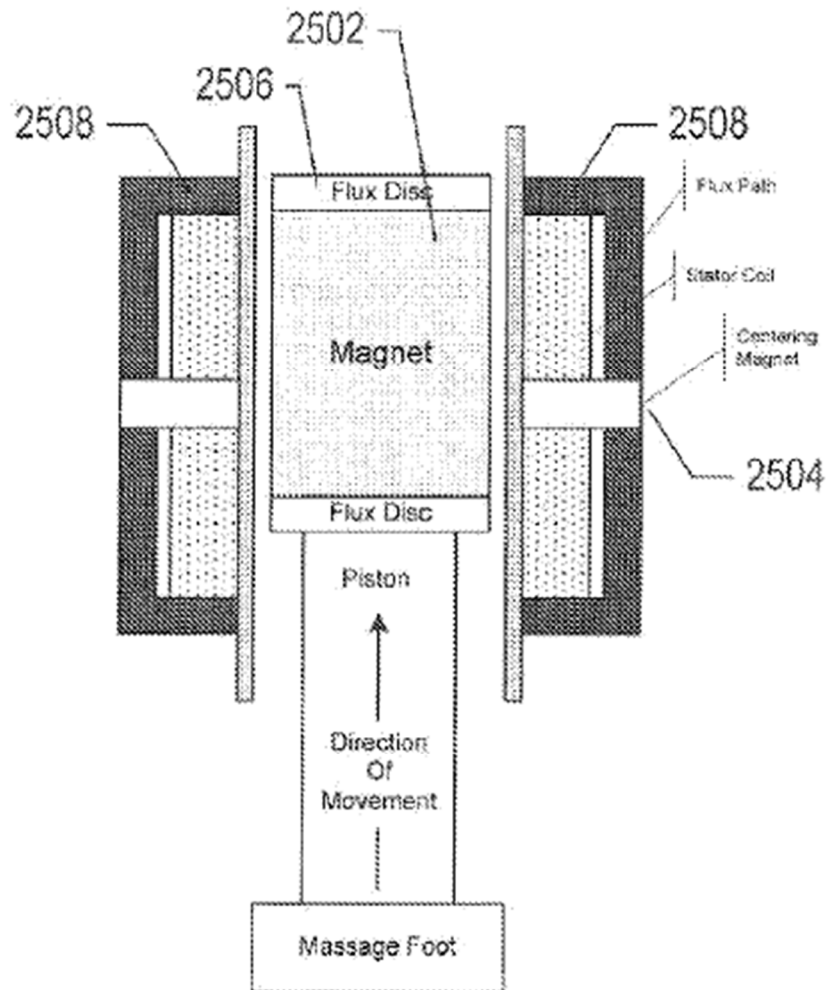


FIG. 25

The '308 publication discloses the following claim that discloses claim 14:

“14. The linear vibration module of claim 1 further including flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the linear vibration module.” '308Pub., Claim 14.

Wolfe, ¶¶205–206.

15. Claim 15¹⁴

The '308 publication discloses claim 15. '308Pub., [0035], [0042], [0056]. Specifically, the '308 publication discloses that Figures 22A–23 “illustrate interesting vibrational modes produced by driving a linear-resonant vibration module simultaneously at two different frequencies.” *Id.*, [0056] (“As one example, a microprocessor-controlled or microcontroller-controlled linear vibration module can be programmed to drive the device simultaneously at two different frequencies. FIGS. 22A–23 illustrate interesting vibrational modes produced by driving a linear-resonant vibration module simultaneously at two different frequencies.”).

¹⁴ Petitioners reserve the right to challenge claim 15 under §112 in other proceedings.

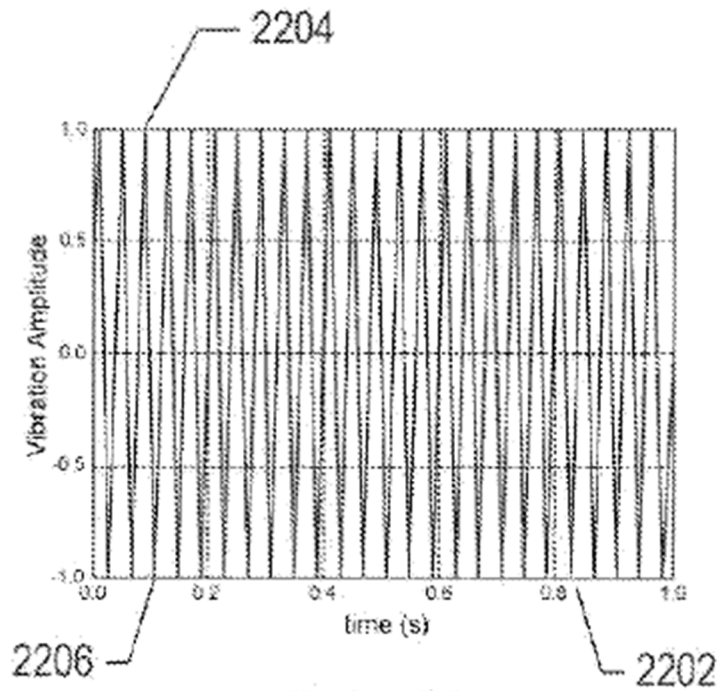


FIG. 22A

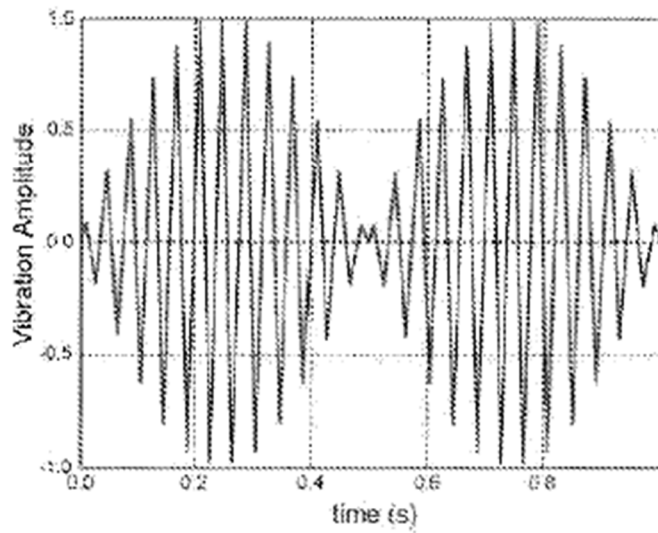


FIG. 22B

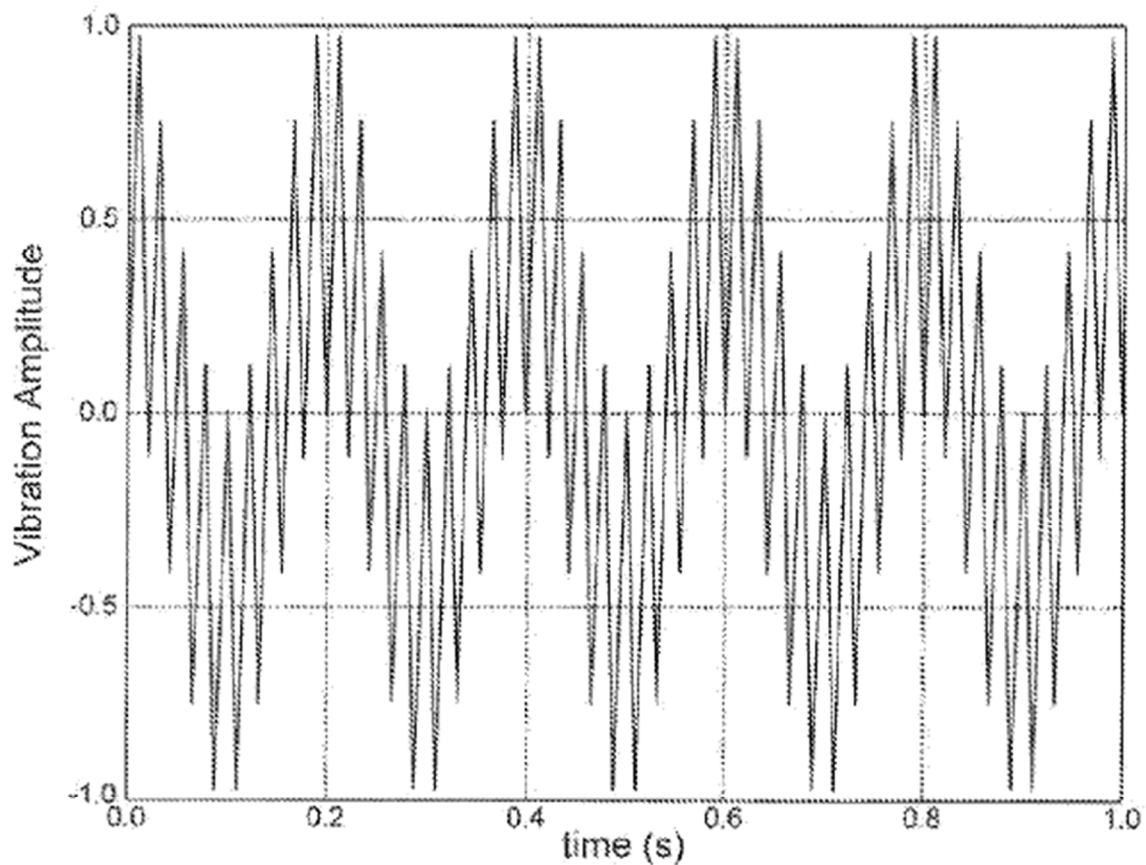


FIG. 23

Further, the '308 publication discloses the following claim that discloses claim 15: "15. The linear vibration module of claim 1 wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes." '308Pub., Claim 15. *Wolfe*, ¶¶207–208.

16. Claim 16¹⁵

a. 16[pre]

The '308 publication discloses 16[pre]. *See* Claim 15; '308Pub., Claim 16 (“16. The linear vibration module of claim 15 wherein the complex vibration modes include...”). *Wolfe*, ¶209.

b. 16[a]

The '308 publication discloses 16[a]. *See* Claim 15; '308Pub., [0056] (“FIG. 22B illustrates a vibration mode of the linear vibration module driven at a primary operational frequency of 25 Hz with an added modulating 1 Hz operational frequency. Driving the linear vibration module by both a primary and a modulating frequency produces low-frequency pulses of high-frequency vibration.”).

¹⁵ Petitioners reserve the right to challenge claim 16 under §112 in other proceedings.

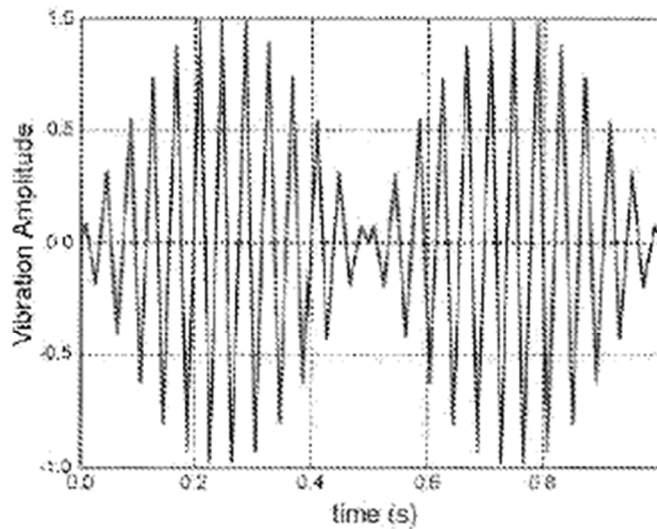


FIG. 22B

The '308 publication discloses the following claim that discloses claim limitation 16[a]: “16. The linear vibration module of claim 15 wherein the complex vibration modes include: a primary oscillation frequency modulated by a modulating oscillation frequency.” '308Pub., Claim 16. *Wolfe*, ¶¶210–211.

c. 16[b]

The '308 publication discloses 16[b]. *See* Claim 15; '308Pub., [0056] (“FIG. 23 illustrates a different complex vibrational mode in which two driving frequencies combine to produce a lower-frequency beat-wave form. The vibrational mode illustrated in FIG. 23 is produced by a primary driving frequency of 25 Hz, as in FIG. 22A, with a second driving frequency of 20 Hz.”).

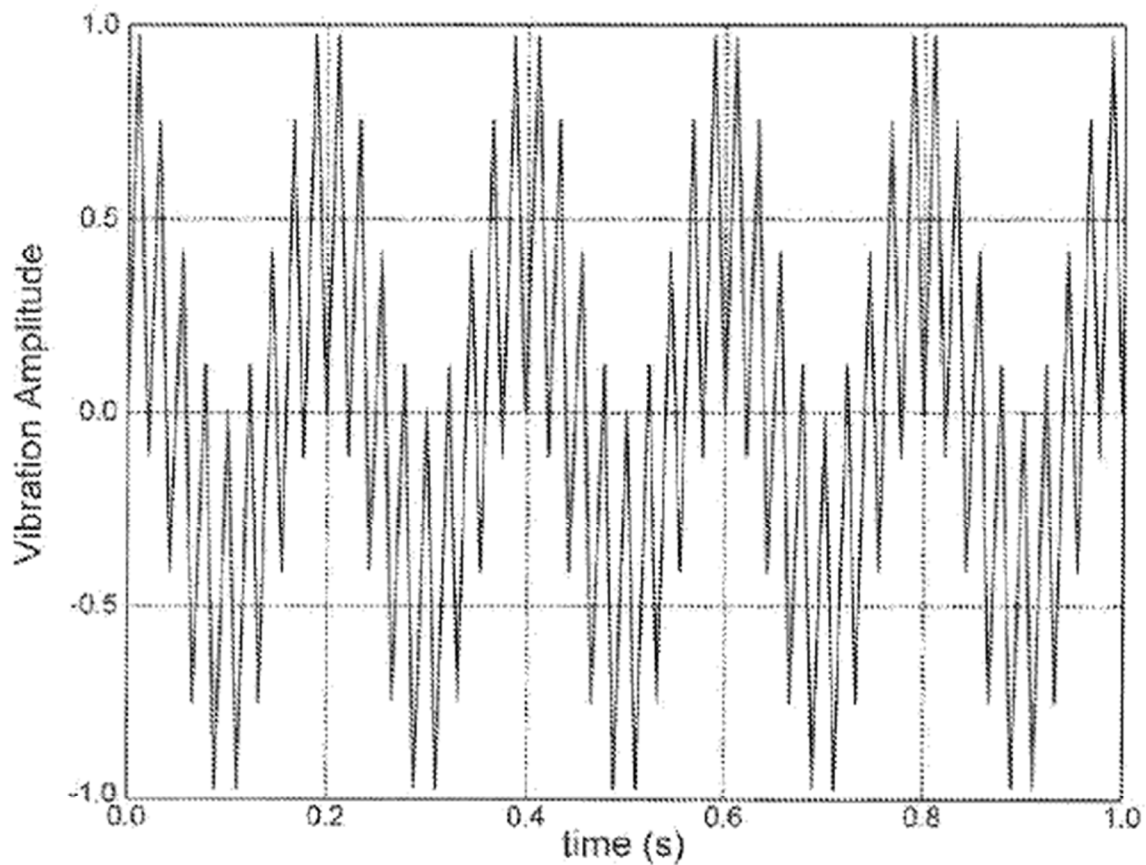


FIG. 23

The '308 publication discloses the following claim that discloses claim limitation 16[b]: “16. The linear vibration module of claim 15 wherein the complex vibration modes include:...a beat frequency.” '308Pub., Claim 16. *Wolfe*, ¶¶212–213.

d. 16[c]

The '308 publication discloses 16[c]. *See* Claim 15; '308Pub., [0056] (“By varying the number, relative amplitudes, and frequencies of two or more driving signals, a microprocessor-controlled or microcontroller-controlled linear-resonance vibration module can be controlled to produce any number of complex vibrational patterns and modes, including periodic modes, modes with multiple different periods, various modulated vibration modes, and even fully a periodic vibration modes that do not repeat time.”).

The '308 publication discloses the following claim that discloses claim limitation 16[b]: “16. The linear vibration module of claim 15 wherein the complex vibration modes include:...an aperiodic oscillation waveform.” '308Pub., Claim 16. *Wolfe*, ¶¶214–215.

17. Claim 17

The '308 publication discloses claim 17 under non-MPF or MPF. *See* 1[f], 2[a]. As discussed with respect to 1[f], the '308 publication discloses a user selecting a strength of vibration and an operational mode, which result in the control component controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude that are independently specified by user input received from the user-input

features. Further, as described with respect to 1[f] and 2[a], under non-MPF, the '308 publication discloses a variable oscillator circuit and user input feature that separately control frequency and amplitude of vibration, respectively. *See* '308Pub., [0027], [0036], [0053].

The '308 publication discloses the following claim that discloses claim 17: “17. The linear vibration module of claim 1 wherein the control component controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude that are independently specified by user input received from the user input features.” '308Pub., Claim 17. *Wolfe*, ¶¶216–217.

18. Claim 18

The '308 publication discloses claim 18 in its disclosures with respect to Figure 18 of elastomeric bristles 1802–1805. *See* '308Pub., [0048] (“FIG. 18 illustrates an enhancement of an implementation of the linear-resonant vibration module to which current application is directed shown in FIG. 16. In this embodiment, the massage foot is enhanced to include elastomer bristles 1802–1805 to transfer the linear oscillation of the massage foot to human skin or another substrate. The elastomeric bristles, or pad or brush comprising numerous elastomeric bristles, allow transmission of vibration to a surface even at low

operational powers, when a rigid or even semi-compliant massage foot would instead simply stop moving for inability to overcome frictional forces.”).

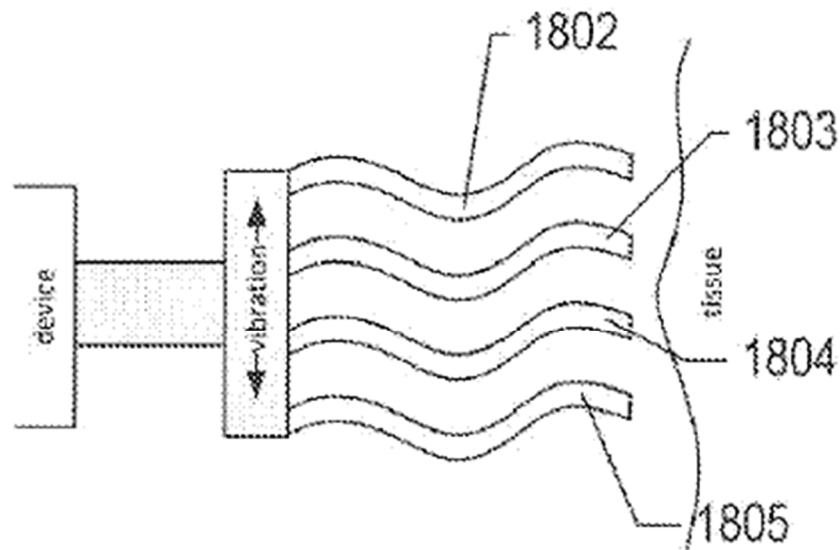


FIG. 18

The '308 publication discloses the following claim that discloses claim 18:
“18. The linear vibration module of claim 1 further including elastomeric bristles used to transfer vibration from the linear vibration module to a surface.” '308Pub.,
Claim 18. *Wolfe*, ¶¶218–219.

19. Claim 19

a. 19[pre]

19[pre] is a limitation. *See* Section VI.A. The '308 publication discloses 19[pre]. *See* 1[pre]; '308Pub., Claim 1; *Wolfe*, ¶220.

b. 19[a]

The '308 publication discloses 19[a]. *See* 1[a]; '308Pub., Claim 1; *Wolfe*, ¶221.

c. 19[b]

The '308 publication discloses 19[b] under non-MPF or MPF. *See* 1[b]; '308Pub., Claim 1; *Wolfe*, ¶222.

d. 19[c]

The '308 publication discloses 19[c]. *See* 1[c]; '308Pub., Claim 1; *Wolfe*, ¶223.

e. 19[d]

The '308 publication discloses 19[d]. *See* 1[d]; '308Pub., Claim 1; *Wolfe*, ¶224.

f. 19[e]

The '308 publication discloses 19[e] under non-MPF or MPF. *See* 1[e]; '308Pub., Claim 1; *Wolfe*, ¶225.

g. 19[f]

The '308 publication discloses 19[f] under non-MPF or MPF. *See* 1[f]; '308Pub., Claim 1; *Wolfe*, ¶226.

h. 19[g]

The '308 publication discloses 19[g]. *See* Claim 14; '308Pub., Claim 14; *Wolfe*, ¶227.

20. Claim 20¹⁶

a. 20[pre]

20[pre] is a limitation. *See* Section VI.A. The '308 publication discloses 20[pre]. *See* 1[pre]; '308Pub., Claim 1; *Wolfe*, ¶228.

b. 20[a]

The '308 publication discloses 20[a]. *See* 1[a]; '308Pub., Claim 1; *Wolfe*, ¶229.

c. 20[b]

The '308 publication discloses 20[b] under non-MPF or MPF. *See* 1[b]; '308Pub., Claim 1; *Wolfe*, ¶230.

¹⁶ Petitioners reserve the right to challenge claim 20 under §112 in other proceedings.

d. 20[c]

The '308 publication discloses 20[c]. *See* 1[c]; '308Pub., Claim 1; *Wolfe*, ¶231.

e. 20[d]

The '308 publication discloses 20[d]. *See* 1[d]; '308Pub., Claim 1; *Wolfe*, ¶232.

f. 20[e]

The '308 publication discloses 20[e] under non-MPF or MPF. *See* 1[e]; '308Pub., Claim 1; *Wolfe*, ¶233.

g. 20[f]

The '308 publication discloses 20[f] under non-MPF or MPF. *See* 1[f]; '308Pub., Claim 1; *Wolfe*, ¶234.

h. 20[g]

The '308 publication discloses 20[g] under non-MPF or MPF. *See* Claim 15; '308Pub., Claim 15; *Wolfe*, ¶235.

VIII. THE DISCRETIONARY FACTORS FAVOR INSTITUTION

A. 35 U.S.C. § 314(a)

The weight of the factors articulated in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 6 (Mar. 20, 2020) (precedential) favors institution.¹⁷

1. Stay

Factor 1 is neutral. Petitioners have not requested a stay but intend to do so. *See Fintiv*, 12.

2. Trial Date

Any comparison of a projected FWD date against trial date is at best speculative, but the docket control order in the Samsung litigation currently sets jury selection for August 5, 2024. EX1018. This factor should not be strictly applied, however, because Petitioners would be deprived of a reasonable opportunity to file an IPR (and make meaningless the one-year statutory deadline) entirely based on Plaintiff's choice of jurisdiction.

¹⁷ The *Fintiv* framework should not be followed because it is legally invalid as (1) exceeding the Director's authority, (2) arbitrary and capricious, and (3) adopted without notice-and-comment rulemaking.

3. Diligence/Investment

Factor 3 weighs strongly against discretionary denial. Petitioners filed this petition at an early stage of litigation, within eight months after being served with the Complaint, eight weeks after Resonant served amended infringement contentions on April 14, 2023, and before Samsung will file invalidity contentions on June 16, 2023. *See* EX1017, 1020. The Markman hearing is not scheduled until February 15, 2024, approximately eight months away. EX1018. At institution, much work in district court will remain (e.g., claim construction briefing, fact and expert discovery, and dispositive motions). *Id.*

4. Overlap

Factor 4 weighs against discretionary denial. Petitioners challenge claims 1–20, whereas Resonant has alleged infringement of only claims 1–8 and 17. EX1017. Accordingly, a material number of the challenged claims will not be addressed by the district court.

Petitioners have stipulated that, unless the Board denies or later vacates institution of this Petition, Petitioners will not seek resolution of invalidity in the co-pending litigation based on the specific grounds asserted in this Petition or any grounds including the '308 publication, the primary reference in this Petition. EX1033, EX1043.

5. Other Considerations

Even if the *Fintiv* factors favor discretionary denial (which they do not), the merits are compelling here.

B. 35 U.S.C. § 325(d)

The Board should not exercise its discretion under § 325(d) to deny institution of Petitioners' petition. *See Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8, 17–18 (Dec. 15, 2017) (precedential).

1. Step 1 (Factors (a), (b), and (d))

During prosecution, the Examiner rejected claims 19 and 20 of the '249 application based on non-statutory double patenting over claim 1 of the '337 patent. Although the '308 publication has the same specification as the '337 patent, the Examiner did not evaluate the disclosures in the '337 patent during prosecution. Nor did the Examiner evaluate the disclosures in the specification or published claims of the '308 publication as AIA § 102(a)(1) prior art. Petitioners respectfully submit that because the Examiner did not consider the disclosures in the specification or published claims of the '308 publication as AIA § 102(a)(1) prior art during prosecution, the Office has not previously considered the prior art or arguments in this Petition.

2. Step 2 (Factors (c), (e), and (f))

If the Board reaches step 2, the Board should find that the Examiner committed material error. For the reasons explained in this Petition, the '308 publication discloses a species linear vibration module that anticipates claims 1-20 of the '830 patent directed to the vibration module genus. Yet, the Examiner failed to consider, and thus overlooked, the disclosures of the '308 publication when evaluating the patentability of the now-issued '830 patent claims. This was material error. *See Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8 (Feb. 13, 2020) (precedential) (“[A] material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims.”).

IX. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Parties-in-Interest

Petitioners identify Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. as the real parties-in-interest.

B. Related Matters

To the best of Petitioners' knowledge, the '830 patent has not been challenged in any *inter partes* review prior to this proceeding and is or has been involved in the following district court litigations:

Name	No.	Court	Filed
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<i>Resonant Systems, Inc. v. Samsung Electronics Co., Ltd. et al.</i>	2:22-cv-00423	E.D. Tex.	Oct. 26, 2022
<i>Resonant Systems, Inc. v. Sony Group Corporation (Japan) et al.</i>	2:22-cv-00424	E.D. Tex.	Oct. 26, 2022
<i>Resonant Systems, Inc. d/b/a RevelHMI v. Apple, Inc.</i>	7:23-cv-00077	W.D. Tex.	Jun. 1, 2023

C. Lead and Backup Counsel

Lead Counsel	Back-Up Counsel
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D. Service Information

Please address all correspondence to lead and back-up counsel at the addresses shown above. Petitioners consent to electronic service by e-mail.

X. FEES

Petitioners concurrently electronically submit the required fees for this Petition. The Board is authorized to charge Arnold & Porter Kaye Scholer LLP's deposit account, No. 50-2387, for any fee deficiency.

Date: June 14, 2023

Respectfully submitted,

/Jessica Kaiser/

Jessica Kaiser, Lead Counsel

Reg. No. 58,937

CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing Petition for *Inter Partes* Review contains 13,985 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

/Jessica Kaiser/
Jessica Kaiser (Reg. No. 58,937)
Lead Counsel

CERTIFICATE OF SERVICE

I certify that on June 14, 2023, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 9,941,830 and supporting exhibits to be served via overnight delivery on the Patent Owner at the following correspondence address of record as listed on PAIR:

Olympic Patent Works PLLC
4979 Admiral Street
Gig Harbor, WA 98332

A courtesy copy was also sent via electronic mail to Patent Owner's litigation counsel listed below:

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