UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

GUI GLOBAL PRODUCTS, LTD.,
Patent Owner.

Case IPR2021-00473
Patent 10,589,320

DECLARATION OF HAMID TOLIYAT, PH.D. REGARDING APPLE'S PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,589,320

Apple v. GUI Global Products
IPR2021-00473
GUI Ex. 2022

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I, Hamid Toliyat, of College Station, Texas, declare as follows:

I. INTRODUCTION

1. I have been retained by Beck Redden LLP on behalf of Patent Owner Gwee Global Products, Inc. ("Gwee") as an independent expert in the above referenced Inter Partes Review proceeding.

2. I have been asked by counsel for Gwee to address the issues raised in the IPR Petition, including issues raised in its Exhibit 1003, the Declaration of Dr. Jeremy Cooperstock, including whether the references relied upon by Dr. Cooperstock teach or suggest the claim limitations of Claims 1-5 and 7-13 of the challenged patent, U.S. Patent No. 10,589,320 (the "'320 patent").

3. My opinions, which are based upon my education, experience and review the materials filed in this proceeding and otherwise cited herein, and the bases for those opinions are set forth herein.

4. In writing this Declaration, I have considered matters including my own knowledge and experience, including my teaching and work experience. Although my qualifications exceed those of a POSITA for the challenged '320 patent, my statements and opinions expressed herein are so expressed from the perspective of a POSITA.

5. I have no financial interest in either party or in the outcome of this proceeding. I am being compensated for my time spent on this matter on an hourly

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basis. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

II. QUALIFICATIONS

6. My background and qualifications are set forth in my curriculum vitae attached as Exhibit 2023. In summary,

7. I have over 35 years of experience in the field of power electronics, microcontrollers, electric motors, motor control, and wireless power transfer.

8. I received my B.S. from Sharif University of Technology in 1982, M.S. degree from West Virginia University in 1986, and Ph.D. degree from the University of Wisconsin-Madison in 1991, all in electrical engineering.

9. In March 1994 I joined the Department of Electrical and Computer Engineering at Texas A&M University. I am currently the Raytheon endowed professor of electrical engineering.

10. I received the Nikola Tesla Field Award for "outstanding contributions to the design, analysis and control of fault-tolerant multiphase electric machines" from IEEE in 2014, the Cyril Veinott Award in Electromechanical Energy Conversion from the IEEE Power Engineering Society in 2004, Patent and Innovation Award from Texas A&M University System Office of Technology Commercialization's in 2020, 2016 and 2007, TEES Faculty Fellow Award in 2006, Distinguished Teaching Award in 2003, E.D. Brockett Professorship Award

in 2002, Eugene Webb Faculty Fellow Award in 2000, and Texas A&M Select Young Investigator Award in 1999. I also received the Space Act Award from NASA in 1999, and the Schlumberger Foundation Technical Awards in 2001 and 2000.

11. I was an Editor of IEEE Transactions on Energy Conversion. I also was Chair of the IEEE-IAS Industrial Power Conversion Systems Department of IEEE-IAS, and am a member of Sigma Xi. I am a fellow of the IEEE, the recipient of the 2008 Industrial Electronics Society Electric Machines Committee Second Best Paper Award as well as the recipient of the IEEE Power Engineering Society Prize Paper Awards in 1996 and 2006, and IEEE Industry Applications Society Transactions Third Prize Paper Award and Second Prize Paper Award in 2006 and 2016, respectively. I was the General Chair of the 2005 IEEE International Electric Machines and Drives Conference in San Antonio, Texas.

12. My main research interests and experience include power electronics, microcontrollers, analysis and design of electrical machines, variable speed drives for traction and propulsion applications, fault diagnosis of electric machinery, and sensorless variable speed drives.

13. I have supervised more than 120 graduate students, post docs, and research engineers. I have published over 520 technical papers, presented more than 99

invited lectures all over the world, and has 34 issued and pending U.S. patents. My publications are highly cited by colleagues -- more than 27,000 times.

14. I have purposely taught courses in two different areas within my department: power electronics, and electric machinery. I have developed and taught three new courses in the area of electromechanical motion devices. These are:

- ECEN 611 General Theory of Electromechanical Motion Devices, 3 credits
- ECEN 612 Computer Aided Design of Electromechanical Motion Devices, 4 credits
- ECEN 442/742 DSP-Based Electromechanical Motion Control, 3 credits

15. I am also a Professional Engineer in the State of Texas.

III. MATERIALS CONSIDERED

16. In writing this Declaration, I have considered matters including my own knowledge and experience, including my teaching and work experience, which includes overseeing POSITAs and persons studying to become POSITAs. I have reviewed Petitioner Apple's IPR Petition and the substantive Exhibits thereto, namely Exhibits APPLE-1001 – APPLE 1003; APPLE-1005 – APPLE-1068; as well as Gwee's Preliminary Response to Apple's IPR Petition and the substantive Exhibits thereto, namely GUI EXHIBIT 2001 and GUI EXHIBIT 2003 – GUI EXHIBIT 2017, and also the PTAB's Institution Decision. I have also reviewed

the declaration of Dr. Mark Horenstein submitted in the IPR proceeding involving Samsung's challenge to this patent. I have also reviewed the transcript from Dr. Cooperstock's deposition. I have also reviewed the Board's institution decision relative to the challenged patent. I have also had conversations with Mr. Walter Mayfield. one of the named inventors of the challenged patent. I have also considered other materials noted herein, namely:

Exhibit 2024	YouTube video of Powermat bearing a date of December 28, 2020 and accessible at https://www.youtube.com/watch?v=_SyU_eKd3pE.
Exhibit 2025	YouTube video of Powermat bearing a date of November 29, 2010 and accessible at https://www.youtube.com/watch?v=aLOYN6SgbFQ.
Exhibit 2026	YouTube video of Palm Touchstone bearing a date of July 11, 2011 and accessible at https://www.youtube.com/watch?v=wCyyJTszxH8.
Exhibit 2027	Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110715210021/http://

	www.wirelesspowerconsortium.com/technology/coupling-factor.html
Exhibit 2028	Li and Mi, WPT for EV Applications, IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 3, No. 1.
Exhibit 2029	Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110729035955/http://www.wirelesspowerconsortium.com/member-list.
Exhibit 2030	Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110821093859/http://www.wirelesspowerconsortium.com/about/our-vision.html
Exhibit 2031	Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110822142011/http://www.wirelesspowerconsortium.com/technology/total-energy-consumption.html

Exhibit 2032	An introduction to the Wireless Power Consortium standard and TI's compliant solutions" from the 1Q 2011 Texas Instruments Analog Applications Journal
Exhibit 2033	H. Shen, J. Lee and T. Chang, "Study of contactless inductive charging platform with core array structure for portable products," 2011 International Conference on Consumer Electronics, Communications and Networks, 2011
2034	Measuring Wireless Charging Efficiency In the Real World" from https://www.wirelesspowerconsortium.com/data/downloadables/1/4/8/1/measuring-wireless-charging-efficiency-in-the-real-world-wpc-michigan-sept-2015.pdf

17. The Cooperstock Declaration notes that the challenged patent was filed on November 27, 2019 with a priority claim dating back to the August 5, 2011 filing date of provisional application No. 61/515,752. For purposes of his Declaration, Dr. Cooperstock uses August 5, 2011 as the priority date for the patent and as the

assumed date of invention. I am thus using August 5, 2011 as the priority date for the patent and the date of invention as well.

18. As part of my independent analysis, I have considered my personal knowledge and experience; the knowledge of persons of ordinary skill ("POSITA") as of the invention date. My opinions are from the viewpoint of POSITA. Unless otherwise stated, my testimony herein refers to the knowledge and capabilities of a POSITA as of this invention date.

19. In this declaration I only address some of the statements, arguments, and contentions of Apple and Dr. Cooperstock, and I only address some of the challenged claim elements. This is being done primarily to focus on what appear to be the main disputed issues. It should not be assumed that I agree with anything not specifically addressed in this Declaration.

IV. SUMMARY OF CONCLUSIONS

20. This Declaration states and explains the opinions/conclusions that I have formed using my independent analysis. They are summarized as follows:

- Ground 1A: Claims 1, 2, 8, 9, and 11 are not obvious in view of Gundlach and Lee.
- Ground 1B: Claims 2 and 8 are not obvious in view of Gundlach, Lee, and Nishikawa.
- Ground 1C: Claim 11 is not obvious in view of Gundlach, Lee, and Rosener.

- Ground 1D: Claims 3 and 7 are not obvious in view of Gundlach, Lee, and Brown.
- Ground 1E: Claims 4, 5, 10, 12, and 13 are not obvious in view of Gundlach, Lee, and Mak-Fan.
- Ground 2A: Claims 1, 2, 8, 9, and 11 are not obvious in view of Gundlach, Lee, and Kim.
- Ground 2B: Claims 2 and 8 are not obvious in view of Gundlach, Lee, Kim, and Nishikawa.
- Ground 2C: Claim 11 is not obvious in view of Gundlach, Lee, Kim, and Rosener.
- Ground 2D: Claims 3 and 7 are not obvious in view of Gundlach, Lee, Kim, and Brown.
- Ground 2E: Claims 4, 5, 10, 12, and 13 are not obvious in view of Gundlach, Lee, Kim, and Mak-Fan.

V. LEGAL PRINCIPLES

21. I am not an attorney and have not been asked to offer any opinions on the law. I understand, however, that I must follow existing law and that I am offering opinions on the ultimate issue of obviousness. I have been provided with information about legal principles by counsel for Gwee, specifically as follows:

22. I have been informed by counsel and understand that in an Inter Partes Review proceeding, the party challenging the patent's validity must prove by a preponderance of the evidence that the patent claims are unpatentable. I have been further advised that the first step in assessing validity of a patent claim is to properly construe the claim at issue.

23. I have been informed by counsel and understand that Apple's challenges to the patentability of the claims of the '320 Patent are ultimately based on obviousness under 35 U.S.C. § 103. To be patentable under this statute, an invention much be such that it would not have been obvious to a person of ordinary skill in the art ("POSITA") at the time the invention was made. That is, the differences between the subject matter sought to be patented and the prior art must not be such that the claimed subject matter as a whole would have been obvious to a POSITA at the time the invention was made.

24. I have been informed by counsel and understand that when determining whether a claimed invention is obvious, one should consider the scope and content of the prior art, the level of ordinary skill in the relevant art, the differences between the claimed invention and the prior art, and whether the claimed invention would have been obvious to one of ordinary skill in the art in light of those differences. I understand that hindsight must not be used when comparing the prior art to the invention for obviousness.

25. I have been informed by counsel and understand that the scope of the prior art includes analogous art, and that two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

26. I have been informed by counsel and understand that obviousness may be shown by demonstrating that it would have been obvious to modify what is taught in a single reference to arrive at the patented invention, and/or by showing that it would have been obvious to combine the teachings of more than one reference to arrive at the patented invention. I recognize that in determining whether prior art references would have been combined with one another and/or with other information within the knowledge of one of ordinary skill in the art, multiple approaches and rationales may be considered, including:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices, methods, or products in the same way;

- Applying a known technique to a known device, method, or product ready for improvement to yield predictable results;
- Applying a technique or approach that would have been "obvious to try" (choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);
- Known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

27. I have been informed by counsel and understand that if an independent claim is not obvious over a combination of references, then a claim that depends from the nonobvious independent claim is likewise not obvious in view of those references, because the dependent claim contains all of the limitations of the independent claim plus one or more further limitations.

28. In considering the question of obviousness, I have been informed by counsel and understand that the POSITA is a hypothetical person who is presumed to be aware of all of the pertinent prior art. The POSITA is not an automaton and may be

able to combine the teachings of multiple patents or references employing ordinary creativity and common sense, and that familiar items may have obvious uses in another context or beyond their primary purposes. The POSITA faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem. I also recognize that it is not necessary to demonstrate a precise teaching directed to the specific subject matter of the challenged claim, for a fact finder can take account of the inferences and creative steps that a POSITA would employ. A patent that merely claims predictable uses of old elements according to their established functions to achieve predictable results may be found invalid as obvious. Hence, an invention may be obvious if a POSITA, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to the solutions tried by the applicant. And, when there is a design need or market pressure to solve a problem, and there are a finite number of identified, predictable solutions, it may have been obvious to a POSITA to try the known options. Also, if a technique has been used to improve one device, and a POSITA would have recognized that it would improve similar devices in the same way, using the technique may have been obvious.

VI. PERSON OF ORDINARY SKILL IN THE ART

29. Dr. Cooperstock's Declaration opines that a POSITA would have had would have had at least a bachelor's degree in an academic area emphasizing electrical engineering, mechanical engineering, or a similar discipline, and at least two years of experience in the field working with electronic devices. He also opines that superior education could compensate for a deficiency in work experience, and vice-versa.

30. I note that the use of the phrase "at least" in Dr. Cooperstock's definition of a POSITA leaves the actual educational and other experience of a POSITA in doubt because it encompasses someone of greater education, training, and skill than a POSITA and could even include an expert in the field. As such, Dr. Cooperstock's definition of a POSITA is of questionable assistance in understanding the true qualifications of the POSITA and how such a person would understand and employ the teachings of the various references cited in the petition.

31. I concur with and adopt as my own the opinion previously expressed by Dr. Horenstein (in the declaration noted above) that a POSITA would have been someone having either a bachelor's degree in electrical engineering, computer science, or mechanical engineering with some level of post-baccalaureate electronic device or system design experience, or someone with an equivalent level of experience and training through other means.

32. I agree with Dr. Cooperstock that superior education might be able to compensate for a deficiency in work experience, and vice-versa.

33. Dr. Cooperstock's definition of a POSITA is somewhat different than mine; however, my opinions in this declaration would be the same regardless of whether or not my description or Dr. Cooperstock's description of a POSITA is used.

VII. CLAIM CONSTRUCTION

34. I do not see any expressed indication in Dr. Cooperstock's Declaration of any constructions for any claim terms. To the extent that Dr. Cooperstock has implied constructions in his Declaration, they are addressed herein where relevant. From the point of view of a POSITA, and based upon my review of the materials noted herein, primarily the challenged patent and its prosecution history, I also assigned the claim terms their plain and ordinary meanings as a POSITA would have understood them in the context of the '320 patent, unless otherwise noted herein.

VIII. OVERVIEW OF THE '320 PATENT

35. Gwee has already provided a relatively brief and straightforward overview of the challenged patent in its preliminary response, which I concur with and adopt as my own, including as follows:

36. The '320 Patent is entitled "SYSTEM COMPRISING A PORTABLE SWITCHING DEVICE FOR USE WITH A PORTABLE ELECTRONIC

DEVICE." The presumed invention date is noted above, and the patent issued on March 17, 2020. Independent claim 1 covers the following (with the elements labeled as designated by Dr. Cooperstock):

[1pre] A system comprising:

[1a] a portable switching device coupled to a portable electronic device;

[1b] wherein: the switching device and the electronic device are configured to selectively couple to each other employing magnetic force;

[1c] the switching device comprises a first case;

[1d] the electronic device comprises a second case and an electronic circuit that is responsive to the switching device;

[1e] a first magnet is fully disposed within the electronic device;

[1f] the electronic device comprises at least one element selected from the group consisting of beveled edges, ridges, recessed areas, grooves, slots, indented shapes, bumps, raised shapes, and combinations thereof; configured to correspond to complimentary surface elements on the switching device;

[1g] wherein the second case is decoupled from the first case by overcoming magnetic force;

[1h] the portable switching device is configured to activate, deactivate, or send into hibernation the portable electronic device;

[1i] the electronic device plays or pauses a remote device;

[1j] the switching device includes a lid and hinge attaching the lid to the switching device;

[1k] the lid is recessed to configure to the electronic device; and when coupled, the first case functions to protect the second case.

37. There are exemplary portable magnetic switching devices in FIGs. 1-26 of the ‘320 patent. The disclosed switching devices have functions such as activating, deactivating and hibernating electronic devices such as cell phones, smartphones, tablet computers and laptop computers. For example, the switching device 2401 shown in FIGs. 24 and 25, reproduced below, includes magnets 2504 to activate, deactivate, or hibernate a tablet computer 2400. Ex. 1001 at 18:6-10.

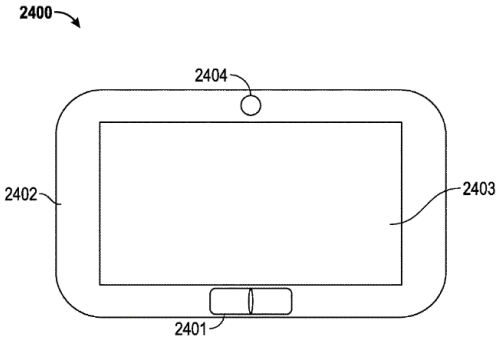


FIG. 24

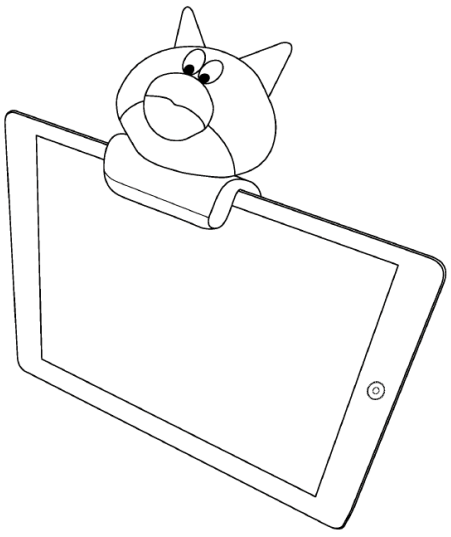


FIG. 26

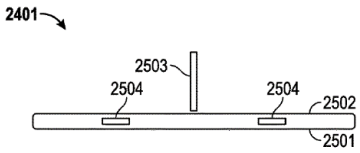


FIG. 25

38. Another example of a switching device is the doll-shaped device shown in FIG. 26, reproduced above, which is disclosed as a switching device for a version of the iPadTM. Id. at 5:57-59.

39. Aspects of disclosed embodiments of the invention comprise a switching device selectively coupled to the front of a portable electronic device. Id. at 18:6-10 ("switching device (2401) is selectively coupled to the front of the portable electronic device 2402 outside of the view screen 2403."). The switching device may have a magnet element to activate or deactivate a magnetic switch. Id. at 3:6-8, and see Figs 1A, 1B (illustrating a round switching device 100 having magnet 102); FIGs. 2A-2C (showing a square switching device 200 having magnet 202); FIG. 3 (showing a switching device 303 comprising a magnetic substrate); FIG. 4 (showing a switching device 402 with a magnet); and FIGs. 5A, 5B (showing a switching device 503/503a with magnets 506).

40. Aspects of disclosed embodiments of the invention further comprise a case for an electronic device having a magnetic switch, and in the area of the case over the magnetic switch, a recessed area functions to facilitate a switching device having a magnet moving past the switch in order to activate or deactivate the switch. Id. at 3:21-25. Examples of depicted recesses include indention 302 in FIG. 3, and recess 904 in FIG. 9, each reproduced below. Id. at 8:62-66; 11:40-51.

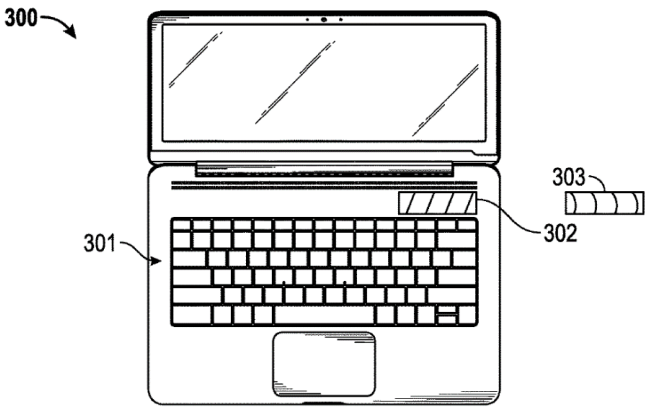


FIG. 3

41.

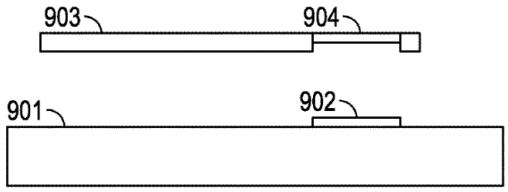


FIG. 9

42. Aspects of disclosed embodiments of the invention further comprise switching devices with beveled edges, id. at 8:33-38; 18:62-67, and switching devices that may be received into a groove, slot, or other indented geometrical shape to lower the profile of the switching device to facilitate closing a cover or prevent snagging a cleaning component. Id. at 8:55-59; 19:9-16.

43. Aspects of disclosed embodiments of the invention further comprise a switching device that includes at least one ferromagnetic or ferrimagnetic material within, it wherein the ferromagnetic or ferrimagnetic material may function to actuate a power switch or sensor that is capable of being actuated using a magnet. Id. at 3:58-64; 16:16-21.

44. Aspects of disclosed embodiments of the invention further comprise a switching device that activates or deactivates an electronic device by employing a magnet, the switching device having a body surrounding the magnet and at least one surface non-abrasive to the electronic device. Id. at 4:8-16.

45. Aspects of disclosed embodiments of the invention further comprise methods of conserving power when using a portable electronic device having a view screen and a switch that can activated or de-activated by introducing a magnetic field, wherein the switching device has at least one magnet and at least one surface that is non-abrasive to the surface of the view screen, wherein the method includes using the switching device to turn the portable electronic device off when the portable electronic device is not in actual use and then on when the portable electronic device is needed. Id. at 4:17-27.

46. Aspects of disclosed embodiments of the invention further comprise a switching device putting a tablet into hibernation mode with a single touch to the switching device as compared to the multiple touches required to do the same thing using the touch pad of the tablet. Id. at 20:18-24.

47. Aspects of disclosed embodiments of the invention further comprise a case for an electronic device having a magnetic switch, and in the area of the case over the magnetic switch, a recessed area (see above regarding recesses) that facilitates

a cleaning component having a magnet moving past the switch in order to activate or deactivate the switch. Id. at 3:21-26.

48. Aspects of disclosed embodiments of the invention further comprise the case of the switching device functioning to protect an electronic device's primary case. See, e.g., id. at 2:47-48; and FIG. 5A, reproduced below.

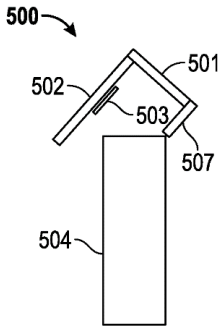


FIG. 5A

IX. GROUND 1A—Claims 1, 2, 8, 9, and 11 are not obvious in view of Gundlach and Lee.

A. Overview of Gundlach

49. Gundlach is a U.S. patent application entitled "WIRELESS HEADSET." I have been asked by counsel for Gwee to assume that Gundlach is prior art to the '320 patent.

50. Gundlach relates to a device that when in a first configuration, such as when expanded, becomes a wireless mono or stereo headset and when in a second

configuration, such as when collapsed, stores and charges in a host device such as a laptop computer or cell phone. Ex. 1005, [0002].

51. Gundlach seeks to address a problem with battery operated wireless headsets (with rechargeable batteries) requiring a cord connecting the headset to the laptop or wall outlet for charging, which adds yet another thing to store, carry and keep track of. Ex. 1005, [0005].

52. Gundlach observes that most portable and handheld computers have expansion slots built-in such as the ExpressCard™ or PC Card slots. Ex. 1005, [0006]. Many such slots have power that can be used to charge battery operated devices as well as high speed communications buses to interchange data. Ex. 1005, [0006].

53. One aspect of Gundlach's disclosure relates to a system for storing and charging a wireless device. Ex. 1005, [0008] The system may include a wireless device and a power supply capable of supplying power to the wireless device. Ex. 1005, [0008]. In an additional aspect, the disclosure relates to a system for storage or charging of a wireless device that may exhibit a form factor of a card capable of being inserted into a host device. Ex. 1005, [0008].

54. In one embodiment the device may have an articulating ear piece that when expanded may fit into or over the ear. Ex. 1005, [0056]. When collapsed the earpiece may be situated in a plane with the housing of the headset creating a

product thickness of, e.g., about 5 mm or less. Ex. 1005, [0056]. The relatively thin shape allows the headset to be stored and charged in a portable cradle, or it may be charged with a mini USB charger. Ex. 1005, [0056], [0066]. The portable cradle may be a holder, clip, case or card that fits inside a standard expansion slot conforming to any expansion slot standard including, for example, PCMCIA and Expresscard. Ex. 1005, [0056].

55. Thus, the overall size and shape of Gundlach's headset is designed to accommodate or fit within the form factor of a standard expansion slot. Ex. 1005, [0057]. For example, the device itself is preferably 24 mm x 60 mm x 5 mm when folded for storage purposes. A 34 mm x 75 mm x 5 mm headset cradle may be provided which may accommodate and fit within the size of a standard Expresscard slot. Ex. 1005, [0057]. Such device may fit into the 34 mm Expresscard slot for storage and charging inside a portable computer. Ex. 1005, [0057].

56. Gundlach's FIG. 1 is as follows:

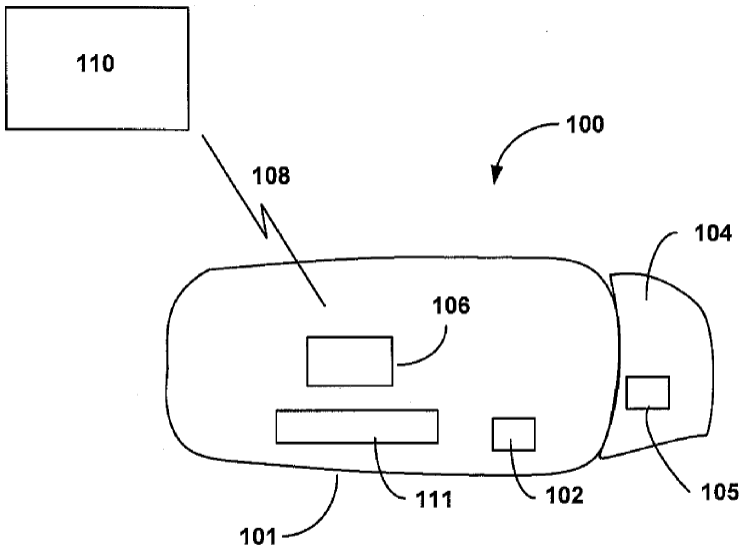


FIG. 1

57. As illustrated at FIG. 1, the wireless device 100 may include housing 101, microphone 102, and earpiece 104. Ex. 1005, [0058]. Speaker 105 may direct sound through the earpiece. Ex. 1005, [0058]. In addition, the wireless device may include transceiver 106 for sending and receiving information 108 from a host device 110, such as a computer, a cell phone or a media player. Ex. 1005, [0058]. Furthermore, the device may include a power source 111, such as a rechargeable or replaceable battery. Ex. 1005, [0058].

58. The wireless headset in Fig. 1 and other figures as well is expandable, having a first configuration, that when expanded may be used as a wireless mono or stereo headset, and that may be collapsed and stored. Ex. 1005, [0058]. Gundlach's Figs.

2a through 2f illustrate various views of wireless device 200, illustrating speaker 204 in a collapsed position against housing 201. Ex. 1005, [0058]. For example,

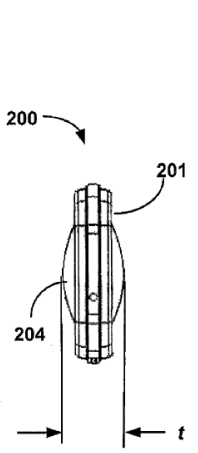


FIG. 2b

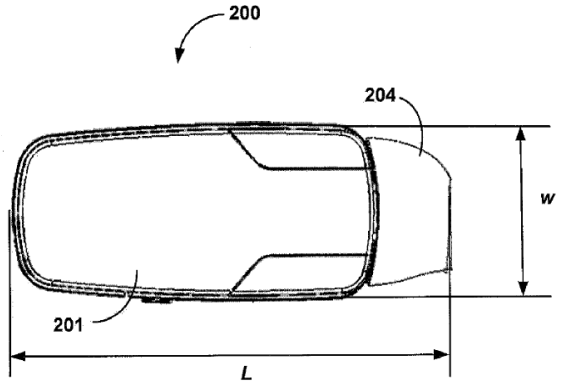


FIG. 2c

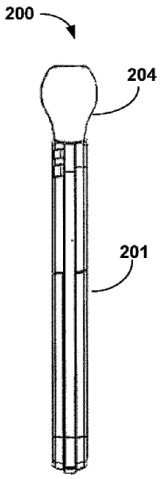


FIG. 2e

59. Gundlach's Figs. 3a and 3b illustrate back side 312 of the wireless device 300 in both a collapsed and expanded state. Ex. 1005, [0060], as follows:

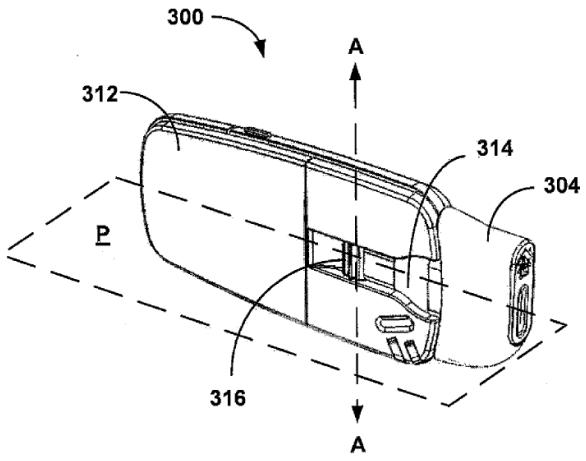


FIG. 3a

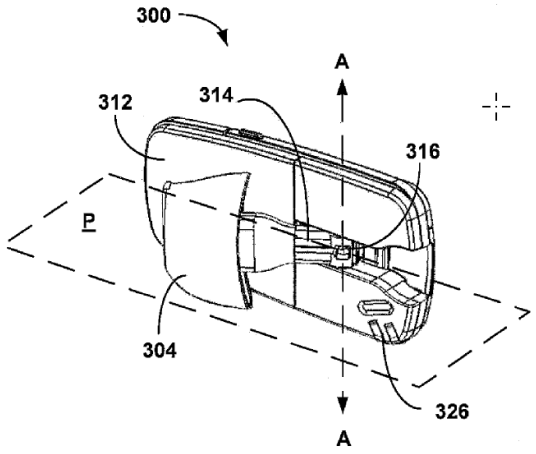


FIG. 3b

60. Here, Gundlach's speaker or earpiece 304 may be provided on an arm or boom 314 that may rotate away from the wireless device 300 in or through plane "P" perpendicular to side 312 of device 300 or around axis "A-A" defined by the hinge connection 316. Ex. 1005, [0060]. In addition to rotational motion of the arm in a plane perpendicular to the back side of the device, Gundlach Figs. 4a and 4b illustrate another embodiment wherein speaker 404 may also be rotated about axis "B-B" of the arm 414. Ex. 1005, [0061]. The earpiece may also be provided in a number of geometries, as illustrated in FIGS. 5a and 5b. Ex. 1005, [0062]. Thus, at least a portion of the earpiece may fit within a user's ear, and the earpiece may be utilized to retain the wireless device on the user's ear. Ex. 1005, [0062].

61. FIGS. 6a through 6d illustrate earpiece 604 having an ovoid shape, Ex. 1005, [0063], for example:

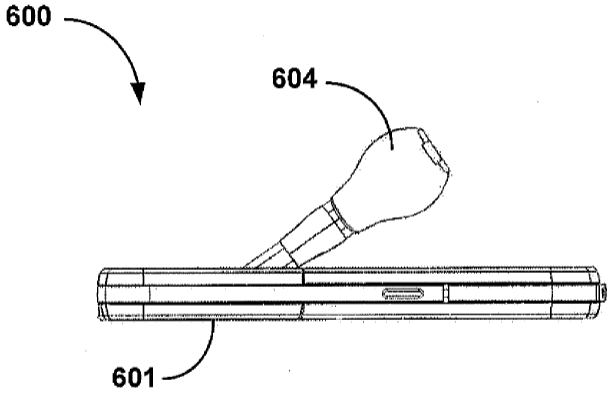


FIG. 6a

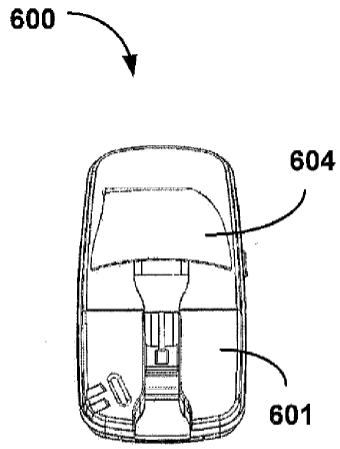


FIG. 6b

62. To further aid in adjustment of the earpiece, FIGS. 7a and 7b illustrate a configuration of device 700, wherein earpiece 704 is on pivoting arm 714, which pivots around an axis defined by pivoting arm 714. Ex. 1005, [0064].

63. Gundlach's wireless headset may also be provided with other design features. Ex. 1005, [0065]. For example, FIG. 8 illustrates an exploded view of the device 800 including housing 801, removable cover 820, and shoulder cap 822. Ex. 1005, [0065].

64. Gundlach also describes a cradle may be provided for the wireless headset. Ex. 1005, [0067]. Figures 10a through 10c illustrate cradle 1028 in which the wireless device 1000 may be inserted. Ex. 1005, [0067]:

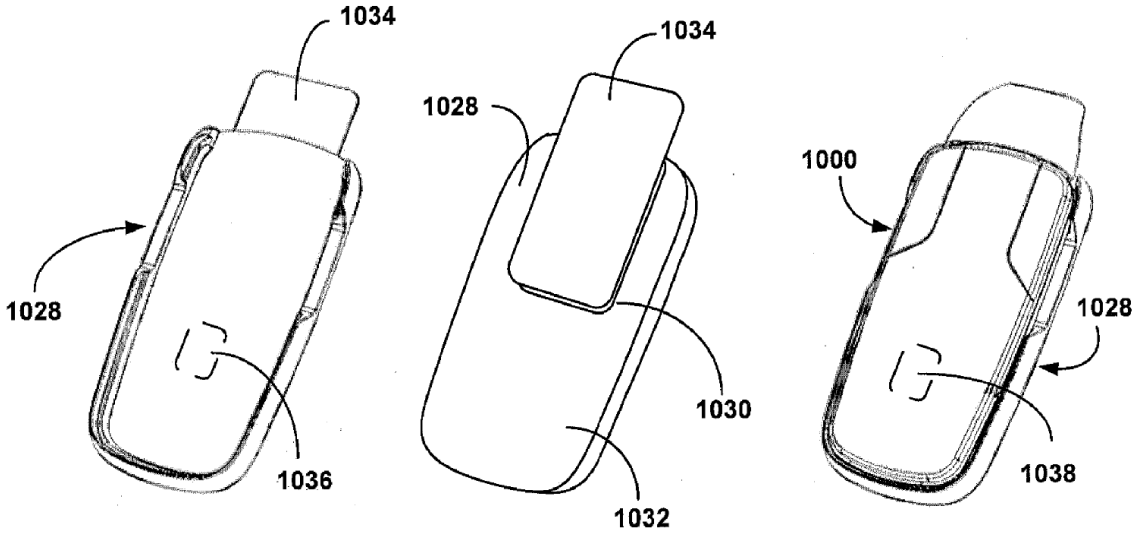


FIG. 10a FIG.10b FIG. 10c

65. Wireless device 1000 may be held to the cradle by magnet 1036, which may be embedded in cradle 1028. Ex. 1005, [0068]. Wireless device 1000 may also include ferromagnetic portion 1038, such as another magnet or ferrous material, which is attracted to the magnet in the cradle. Ex. 1005, [0068].

66. As illustrated in Figs. 11a through 11b, the cradle may also include a holder 1140 that may be clipped onto a belt or shirt pocket, or hung around the neck. Ex. 1005, [0069].

67. Gundlach's wireless headset may be stored and charged in a cradle that may have attributes, such as a form factor or configuration that may allow the cradle to be inserted into a slot in a host device. Ex. 1005, [0070]. Or, the wireless headset itself may take on a form factor of a slot in a host device. Ex. 1005, [0070].

68. Figure 12a illustrates cradle 1244 for wireless headset 1200 as shown in Figs. 7a and 7b. Ex. 1005, [0071]. The cradle may include battery charging circuitry, charge indicators, communication circuits and memory. Ex. 1005, [0071].

69. Figures. 13a and 13b illustrate cradle 1344 having the size attributes of an ExpressCard. Ex. 1005, [0072]. Cradle 1344 may be capable of receiving the wireless headset 1300 in a recess 1346 and providing power to the wireless headset for charging. Ex. 1005, [0073]. As illustrated, the cradle may include a number of electrical contacts 1324 capable of engaging electrical contacts (326 illustrated in FIG. 3) in the wireless headset. Ex. 1005, [0073].

70. Figures 14a and 14b illustrate an embodiment wherein cradle 1444 may assume the attributes of a PCMCIA card or PC card, having a recess 1446 to accommodate the wireless headset 1400. Ex. 1005, [0074].

71. In addition, the wireless headset itself may be of a form factor of a card slot and include a plug for engaging the portable computer or cell phone built into the headset. Ex. 1005, [0076] Such a device is illustrated Figs. 15a and 15b, wherein wireless headset 1500 may be provided in the form factor of a card, such as an ExpressCard. Ex. 1005, [0076].

72. Figures 16a and 16b illustrate an additional embodiment wherein wireless headset 1600 may be provided in the form factor of a card. Ex. 1005, [0077]. Similar to the device illustrated in Fig. 3, arm 1614 may pivot around hinge 1616. Ex. 1005, [0077]. In addition, in this embodiment, speaker 1604 may pivot away from card plug 1645, rather than towards the plug, as illustrated in Figs. 15a and 15b. Ex. 1005, [0077]. Arm 1614 and speaker 1604 may be stored in recess 1652 in the device housing. Ex. 1005, [0077].

73. In the example illustrated in Figs. 17a through 17c, wireless device 1700 may be provided on the host device 1710 itself. Ex. 1005, [0078].

74. In another example, illustrated in FIGS. 17b through 17c, a cradle 1740 may be retained onto the host device 1710. [0079]

75. As illustrated in Fig. 18, wireless device 1800 may be provided in a clamshell case 1860, Ex. 1005, [0080], as follows:

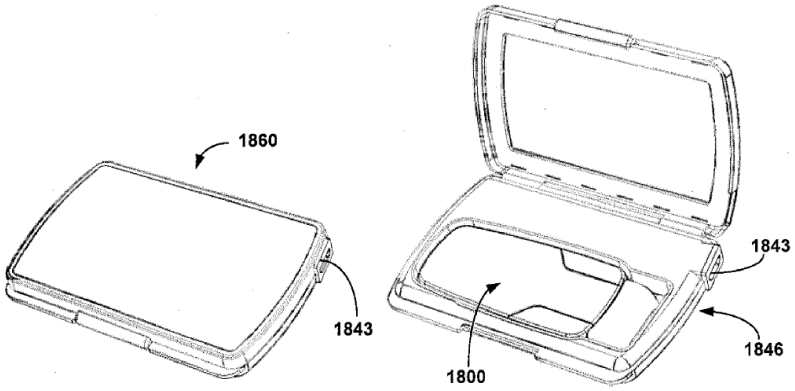


FIG. 18a *FIG. 18b*

76. Clamshell case 1860 has recess 1846 to accommodate the wireless device. Ex. 1005, [0080]. The case may contain a reserve power supply, such as a reserve battery and charging circuitry. Ex. 1005, [0080]. The case may include a power supply adapter 1843 for receiving power embedded in the case. The power supply adapter may be capable of receiving USB connector, including USB connectors of mini or micro format, or other connector capable of supplying power or data. Ex. 1005, [0080]. Thus, the wireless headset and case may be charged together and the wireless headset may receive data from a host device. Ex. 1005, [0080]. The case may include an indicator light indicating when the battery of the headset has reached full charge. Ex. 1005, [0080].

77. When not engaged with a slot or recess in a host device, the wireless headset may communicate with a host device wirelessly using various communication

protocols, such as Bluetooth, 802.11, RF, etc. Ex. 1005, [0081]. The host device (i.e. portable computer or cell phone) may include a transceiver for communicating with the wireless device. Ex. 1005, [0081]. Furthermore, the device may include a rechargeable battery. Ex. 1005, [0081].

78. In another embodiment the wireless device may be a wireless stereo headset that stores and charges in an expansion slot of a portable or handheld host device. [0082] Accordingly, such a headset may include speakers and/or a microphone. Ex. 1005, [0082]; Figs. 19a, 19b.

79. Dr. Cooperstock writes that Gundlach teaches a "relatively thin shape [that] may allow the headset to be stored and charged in a portable cradle," such as "a holder, clip, case or card." Ex. 1003, 26 (quoting Ex. 1005, [0055-0056].). I concur with this assessment.

80. Dr. Cooperstock writes that "Gundlach's Figures 2a-2d [] provide perspective, front, bottom, and top views of the wireless headset 200, highlighting its compact design." Ex. 1003, 26 (quoting Ex. 1005, [0055-0056].). I concur with this assessment.

B. Overview of Lee

81. Lee is entitled "WIRELESS BATTERY CHARGING OF ELECTRONIC DEVICES SUCH AS WIRELESS HEADSETS/HEADPHONES." Ex. 1006.

Lee's disclosure relates to certain "wireless battery charging of electronic devices such as wireless headsets/headphones." Ex. 1006, Abstract.

82. Lee states that, "[a]s improvements of technology become available, there is an opportunity for further reduction of size and weight of wireless headphones/headsets. Ex. 1006, 1:62-64. Thus, "[w]hat is needed in the art is a mechanism to re-charge batteries in wireless headphones/headsets in order to minimize size and weight…" Ex. 1006, 3:17-19. As noted below, one of Lee's stated means for reducing size and weight is to have a single coil within the wireless headphone/headset apparatus have the "dual role" of transducer coil and inductive coupling.

83. Dr. Cooperstock writes that the "basic paradigm of Lee's solution" is illustrated in Dr. Cooperstock's Figures 5 and 18, where "'[t]he power source 200 provides energy via a conductive means 202 to a power adapter 201,' and '[t]he power adapter 201 provides power to the wireless headphone/headset apparatus 204 via non-conductive means 203, typically inductive coupling.'" Ex. 1003, 32 (quoting Ex. 1006, 3:32-37.)

84. Dr. Cooperstock relies upon the method/apparatus depicted in Lee's FIG. 12, which depicts a method/apparatus for wirelessly charging the battery in wireless headphone/headset apparatus 460:

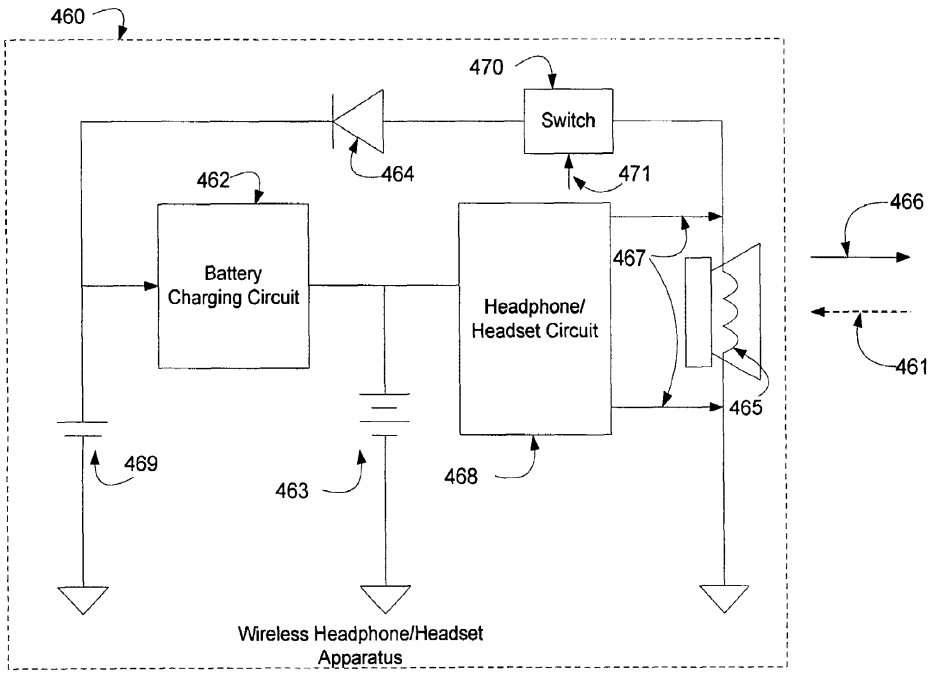


FIG. 12

85. In this embodiment, energy is transferred to the wireless headphone/headset apparatus 460 via inductive coupling 461 to energy collection element 465. Ex. 1006, 4:53-55. Energy collection element 465 has a "dual role and is also used as the transducer coil of a headphone/headset/audio speaker." Ex. 1006, 4:55-57. The energy received by coil 465 is transferred via battery charging circuit 462 to battery 463. Ex. 1006, 4:57-59. The coupled power from coil 465 is rectified (i.e., converted from AC to DC voltage) via rectifier 464. Ex. 1006, 4:59-61. The rectified voltage is filtered by energy storage capacitor 469. Ex. 1006, 4:61-62. Battery charging circuit 462 manages charging of the battery 463 by taking the energy received by coil 465 and providing the proper voltage to battery 463, which is used to power headphone/headset circuit 468. Ex. 1006, 4:62-5:1.

86. Switch 470 of headphone/headset apparatus 460 is controlled by switch control signal 471. Ex. 1006, 5:12-14. Switch control signal 471 causes switch 470 to open and close. Ex. 1006, 5:14-16. When the switch 470 is open (i.e., in non-charging mode), coil 465 is isolated from battery charging circuit 462, rectifier 464, and energy storage capacitor 469. Ex. 1006, 5:16-19. Per Lee, "[d]isconnecting these components reduces the load on the coil 465 and eliminates audio distortion caused by these component (e.g., when a stray magnetic field causes the coil 465 to deliver energy to these components)." Ex. 1005, 5:19-23. When switch 470 is closed (i.e., in charging mode), coil 465 is in electrical communication with battery charging circuit 462, and energy received by coil 465 is used to re-charge battery 463. Ex, 1006, 5:23-26.

87. Per Lee, "[p]referably, the switch 470 can sense when the headphone/headset apparatus 460 is near the power adapter, so that it automatically closes to the charge position when near the power adapter and automatically opens to the non-charge position when away from the power adapter." Ex. 1005, 5:30-34. Alternatively, power adapter 201 can be operative to wirelessly communicate with headphone/headset apparatus 460. Ex, 1006, 5:34-37. Per Lee, "[i]n this way, the power adapter can wirelessly transmit the switch control signal 471 to the headphone/headset apparatus 460 to cause the switch 470 to close when the headphone/headset apparatus 460 is near the adapter." Ex, 1006, 5:34-40.

C. Dr. Cooperstock's reasons for combining Gundlach and Lee are, to a POSITA, unfounded and unpersuasive, and heavily outweighed by the inefficiencies of such a system.

88. Dr. Cooperstock's attempt to combine Gundlach and Lee starts from an erroneous unpersuasive premise that a POSITA would not agree with. This erroneous premise is that a "POSITA considering Gundlach, and noting its limited disclosure on charging, would have seen a need for elaboration and description of design options to implement the charging functionality," which would have led to Lee. Ex. 1003, 33. Dr. Cooperstock's premise is erroneous because Gundlach provides ample disclosure on its conductive charging to a POSITA, because conductive charging would be a relatively simple and straightforward process for a POSITA. It is also erroneous because a search for "design options" for implementing for supplemental disclosure on Gundlach's conductive charging would not have led to Lee's inductive charging solutions.

89. A POSITA would not agree with Dr. Cooperstock's assertion that a "POSITA would have immediately noted Lee's similarity to Gundlach." Ex. 1003, 34. To the contrary, a POSITA would have immediately noted that Gundlach has conductive charging, and that Lee has inductive charging, and like Gundlach, Lee also discloses multiple embodiments for storing and charging a wireless headset in

a "power adapter" illustrated as a protective case. (Compare Lee, 3:32-37, 3:50-62, 6:39-46 with Gundlach [0080].)

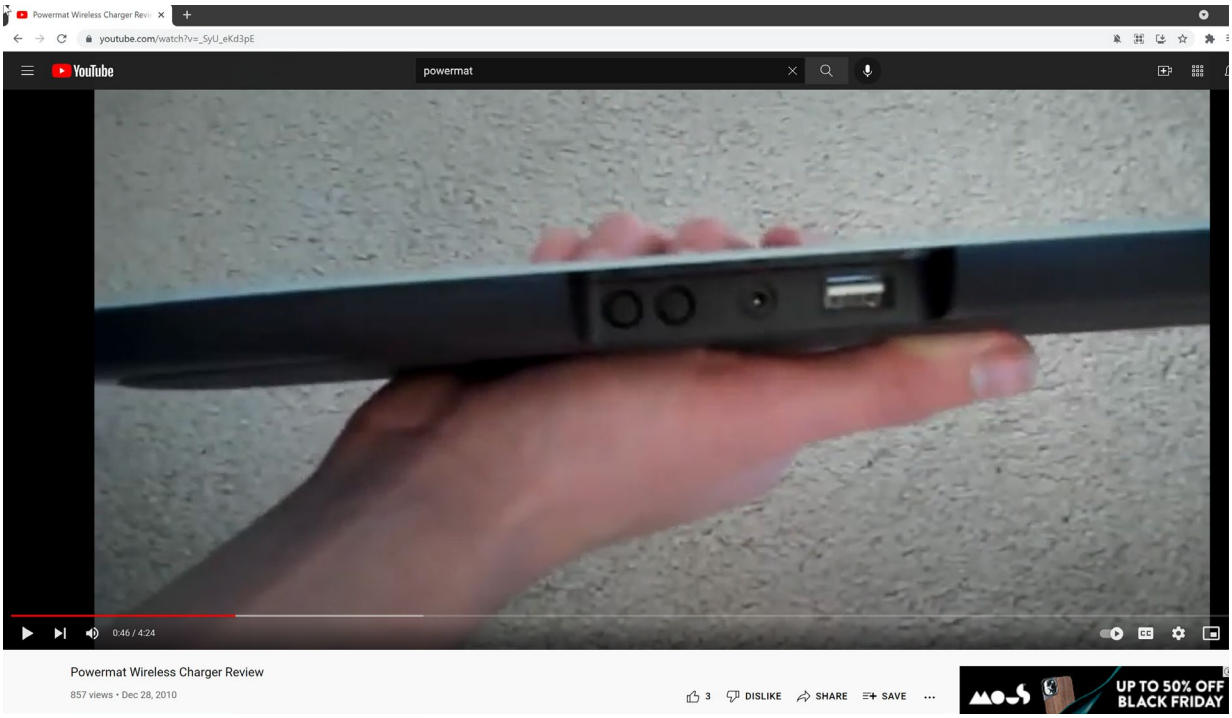
90. As explained below, inductive charging is significantly more complicated than conductive charging and involves significantly more design considerations. A POSITA would not agree with Dr. Cooperstock's contention that "it would have been relatively simple for a POSITA to simply exchange" Gundlach's conductive charging components with Lee's inductive charging components, see Ex. 1003, 37, nor would a POSITA agree with Dr. Cooperstock's contention that such modifications "would have been well within a POSITA's skill level and relatively straight forward," see Ex. 1003, 38, nor would a POSITA would have considered this significant redesign of Gundlach in view of Lee to be a "routine design process." See 1003, 40].

91. A POSITA would not agree with Dr. Cooperstock's assertion of a POSITA's "motivation to pursue the Gundlach-Lee combination" advocated by Dr. Cooperstock. See Ex. 1003, 40. To a POSITA, none of the three reasons proffered by Dr. Cooperstock in support of this assertion are persuasive.

92. Dr. Cooperstock's first basis for this alleged "motivation to pursue" is that a "POSITA would have known that inductive charging was an industry-recognized alternative to conductive charging that produced substantially similar results, particularly in the context of low-power portable devices." See Ex. 1003, 38. To

the contrary, a POSITA in the relevant 2011 timeframe (1) would not have seen inefficient inductive charging, including in particular the inductive charging from Lee's transducer coil advocated by Dr. Cooperstock, as an industry-recognized alternative to efficient conductive charging for low power portable devices being charged from a device with compact form factor and small battery; and (2) would not seek inductive charging, including in particular the inductive charging from Lee's transducer coil advocated by Dr. Cooperstock, as producing substantially similar results as conductive in the context of low-power portable devices.

93. Dr. Cooperstock asserts that, "[b]y the Critical Date in 2011, inductive chargers for smart phones and media players were already established as commercial products," and in support cites the Powermat and the Palm Touchstone charger. See Ex, 1003, 40; Ex. 1020; Ex. 1021; Ex. 1022. However, a POSITA would appreciate that Powermat and the Palm Touchstone charger in 2001 were not for portable charging. To the contrary, the Powermat was a conduit for power from a wall socket or USB connection. See, e.g., https://www.youtube.com/watch?v=_SyU_eKd3pE:


Powermat Wireless Charger Revi
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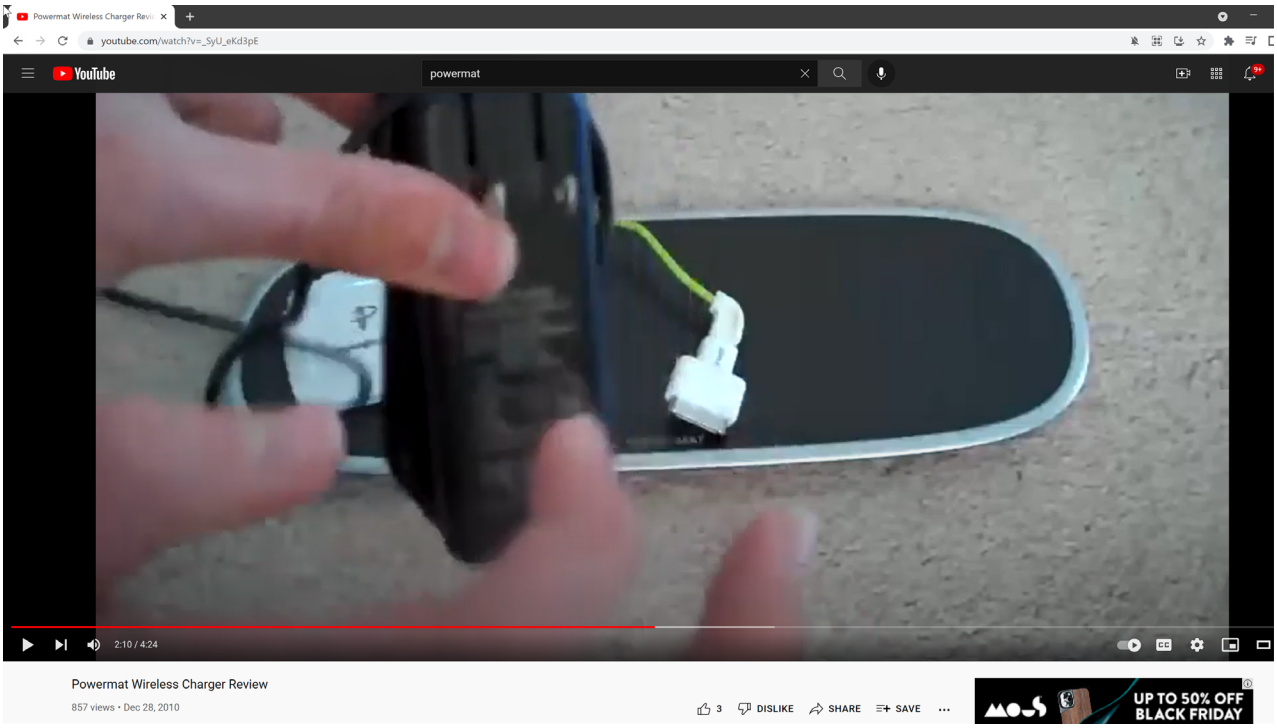
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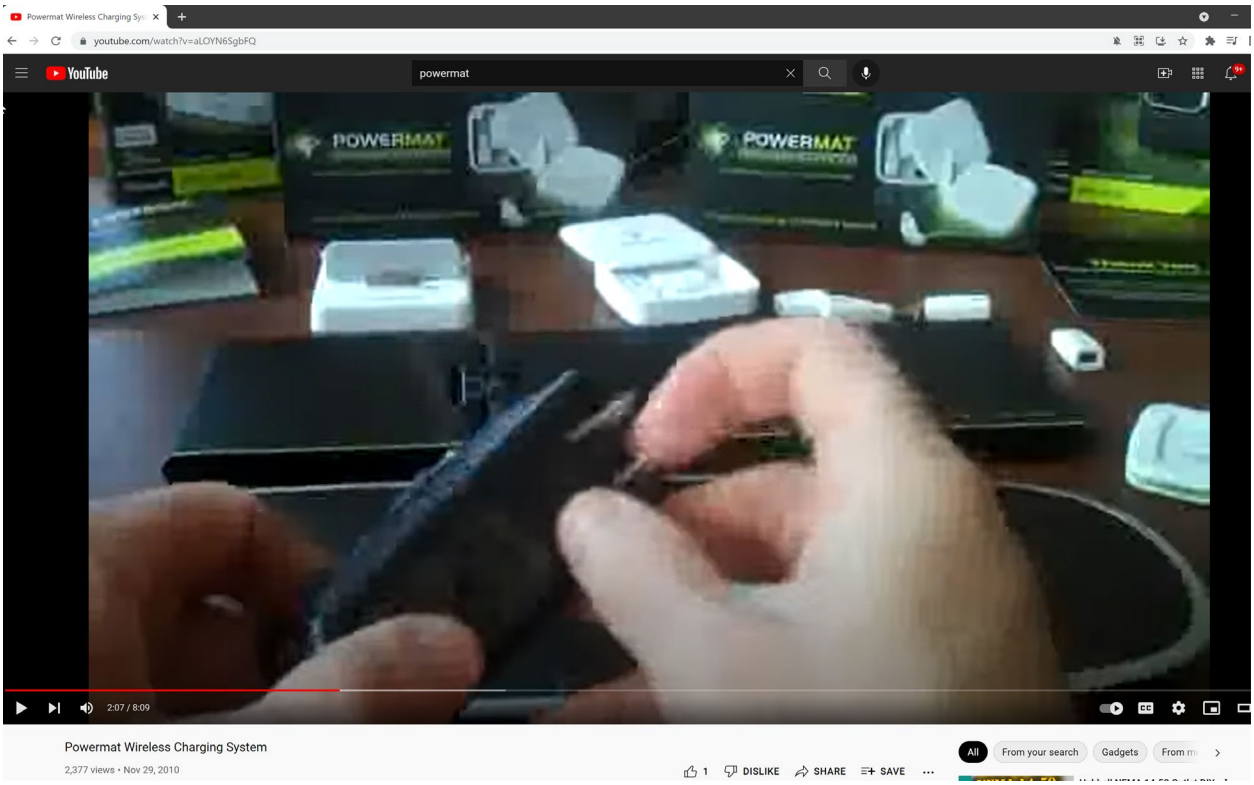
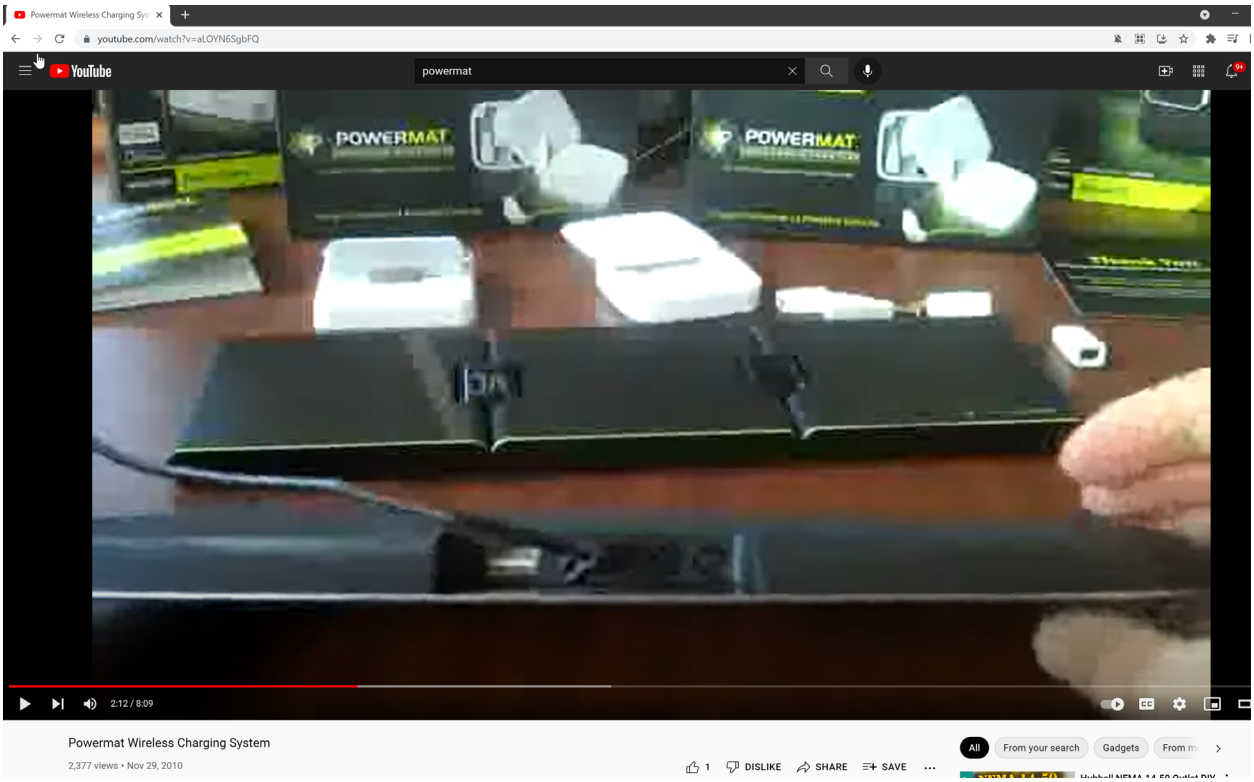
Exhibit 2024.[1] See also https://www.youtube.com/watch?v=aLOYN6SgbFQ:



and

[1] Exhibit 2024 has true and correct screen shots from a YouTube video bearing a date of December 28, 2020 and accessible at https://www.youtube.com/watch?v=_SyU_eKd3pE.



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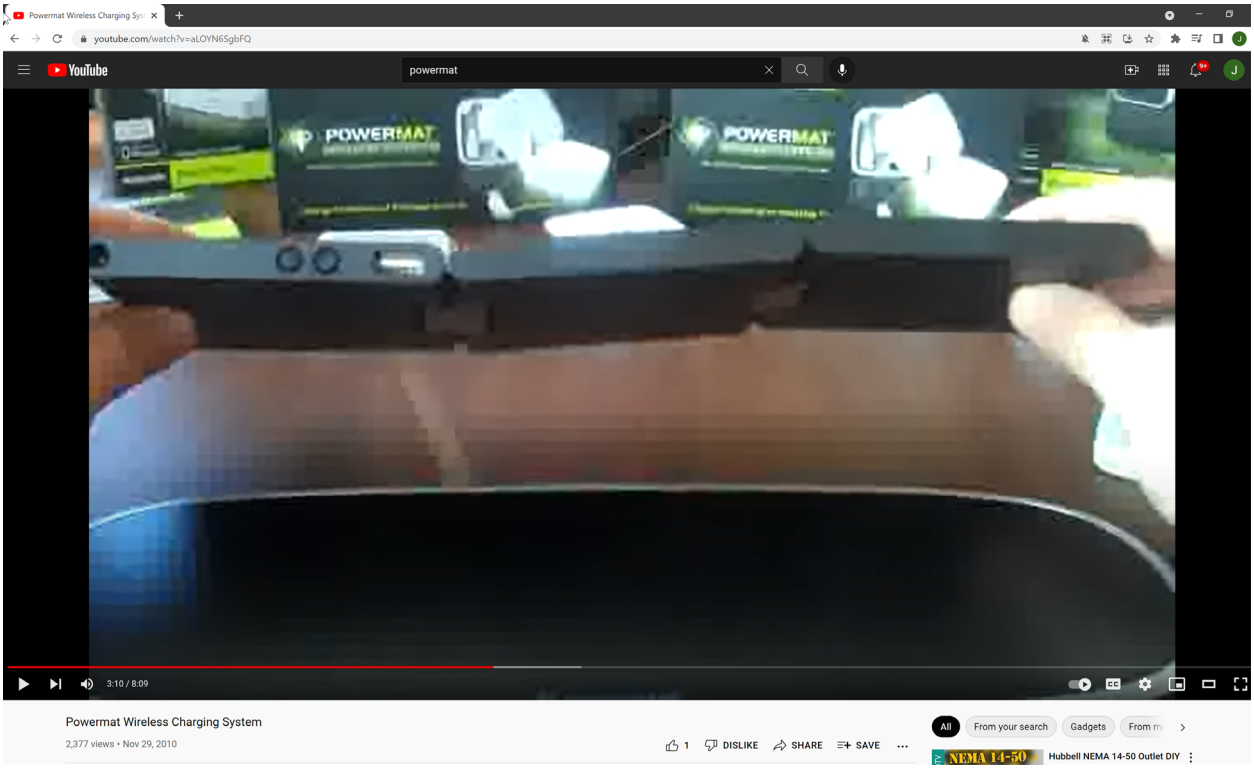
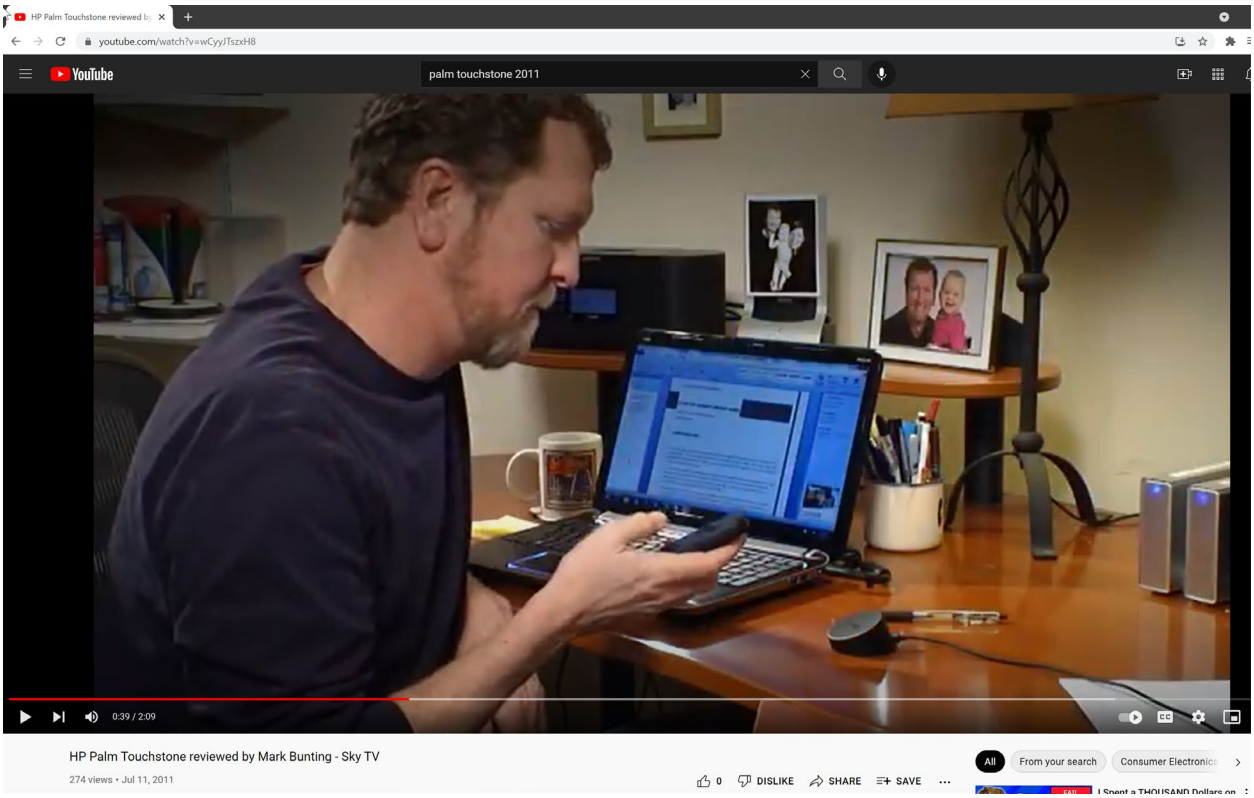


Exhibit 2025.[2]

94. A POSITA would also understand that the Palm Touchstone charger was a corded solution that was a conduit for power supplied from wall outlet or USB port of a larger device, i.e., a laptop or desktop computer. See e, g., https://www.youtube.com/watch?v=wCyyJTszxH8:



Ex. 2026.[3]

[2] Exhibit 2025 has true and correct screen shots from a YouTube video bearing a date of November 29, 2010 and accessible at https://www.youtube.com/watch?v=aLOYN6SgbFQ.

[3] Exhibit 2026 has a true and correct screen shot from a YouTube video bearing a date of July 11, 2011 and accessible at https://www.youtube.com/watch?v=wCyyJTszxH8.

95. A POSITA would understand that the Powermat and Palm Touchstone had essentially limitless power sources for their inductive charging, as opposed to Dr. Cooperstock's proposed Gundlach-Lee combination, which would have, as noted below, a highly inefficient charging system powered by a small battery in a portable clamshell case.

96. Consumer products such as earphones would be considered low power devices, and in 2011 they would have typically charged at 5V or less. A POSITA would not have been aware of any portable, especially hand-held, consumer electronic products that inductively charged directly from a portable battery powered device to portable battery powered device in 2011. In fact, I am not aware of there ever having been such a device sold to consumers. The power loss and charging inefficiencies and serious design challenges of such a product, discussed below, compared against the efficiencies and easy design of conductive charging, is the most likely explanation for there never having been such a product.

97. Dr. Cooperstock writes that, "Lee recognized that conventional conductive charging techniques (such as described by Gundlach) "add size [to the wireless headset] by way of the necessity of connectors and increase the risk of failure via failure of mechanical components caused by fatigue and corrosion of contact elements." Ex. 1003, 31 (citing Ex. 1006, 1:62-2:2. However, Gundlach's headsets are preferably "24 mmx 60 mm x 5 mm when folded for storage purposes." Ex.

1005, [0057]. A POSITA would appreciate that an electrical contact for charging a low power device such as a Gundlach headset is typically only a couple of millimeters. The 24 mmx 60 mm surface area of Gundlach's headsets has ample space for a positive and negative charging contact. See Gundlach Fig. 3b, contacts 326, which are for charging.

98. Further, a POSITA would appreciate that electrical contacts are highly reliable, and present in any system in which a transfer of electricity occurs. Specific examples these common and ubiquitous apparatuses include circuit breakers, relays, switches, and charging systems.

99. I am unaware of any hand-held, consumer, portable earpiece charging systems – prior to, during or since 2011 – that did not use conductive charging to charge an earpiece from a portable, battery powered case. All systems that I have ever seen that charge an earpiece from a portable, battery powered case have used electrical, i.e., conductive, contacts for the connection from the case to the earpiece. If corrosion of such electrical contacts was actually and issue, and/or if it was not heavily outweighed by the wireless charging efficiency issues noted here, one would have expected there would have been such products advocated by Dr. Cooperstock on the market by 2021. However, to my knowledge, there remain none.

100. Lee's suggestion of a risk of failure from fatigue and corrosion is a minimal design consideration, especially for a product that is intended to be worn on the ear and otherwise kept inside a case. Fatigue might be a design consideration for something like overhead transmission lines that undergo wind and weather stresses, but not for Gundlach's encased headsets. Corrosion might be a design consideration for something like connectors in a highly salty or acidic environment, but not for Gundlach's encase headsets. For such a product, copper, a widely used and highly conductive metal could be used for connectors. Further, if a POSITA was actually concerned with potential corrosion from a hostile environment, a design consideration not applicable to Gundlach's headsets, the POSITA could use other commonly used and highly conductive metals such as gold, silver, platinum, and palladium, and alloys of same, which resist corrosion, making them an excellent choice for contacts that will be installed in hot or hostile environments. Unless a POSITA designing connectors for an unusual environment totally inapplicable to Gundlach's headsets, fatigue and corrosion would not be meaningful design considerations weighing against use of conductive charging contacts. Thus, Dr. Cooperstock's suggestion of the most "compelling advantage of inductive charging" being "reliability," see Ex. 1003, 42 (citing Ex. 1006, 3:17-20), is a fiction because contacts would have more than ample reliability for Gundlach's applications, especially the encased Fig. 18 application relied upon by

Dr. Cooperstock. A POSITA would not agree with Dr. Cooperstock's assertion that conductive contacts are "failure-prone." See, Ex. Ex. 1003, 42. A POSITA would have known that in 2011 electrically conductive contacts had been used in millions of consumer electronic products and that such contacts were not deemed failure prone.

101. Further, a POSITA would understand that inductive charging solutions have countervailing reliability issues of their own – namely mis-alignment of the charging coils, which can dramatically decrease charging efficiency.

102. A POSITA would have understood in 2011 that the most common consumer device that was inductively charged was the electric toothbrush. The length of time that it typically takes to charge an electric toothbrush, which is charged from a wall outlet, exemplifies the inefficiencies of inductive charging for consumer products. The reason that inefficient conductive charging has commonly been used for electric toothbrushes is their proximity to water, which would not have been a meaningful consideration for Gundlach's case and headset system.

103. Dr. Cooperstock writes that a "POSITA would have appreciated that Lee's approach was consistent with the expressly stated design goal of Gundlach to provide a compact form factor." Ex. 1003, 44, (citing Ex. 1005, [0056-0057]. However, a POSITA would understand that both conductive charging, as

specifically taught by Gundlach, was consistent with Gundlach's provision of a compact form factor.

104. Further, a POSITA would have understood that a Gundlach earpiece with inductive charging would have a larger form factor and more weight because inductive charging would require additional circuitry, in particular, such a system would require a DC to AC converter (i.e. an inverter) in the clamshell, an AC to DC converter (i.e., a rectifier) in the earpiece, a voltage regulator in earpiece, a radio transmitter or transceiver in the earpiece, a radio receiver or transceiver for the clamshell, a resonance circuit in both the clamshell and earpiece, and a charging coil in the clamshell. In contrast, conductive charging has a voltage regulator in the clamshell and a charging feedback circuit (that could send signals over the wire) in the earpiece. Further, as explained in more detail below, a POSITA would understand that s Gundlach-Lee charging system proposed by Dr. Cooperstock would be highly inefficient and would require a larger battery for the clamshell, which would add significant size and weight.

105. Dr. Cooperstock misses the point of Gundlach's compact form factor. Gundlach requires a compact form factor, preferably 34 mm by 75 mm by 5 mm, Gundlach, [0056], [0057], because it wants to charge and provide data the headset from a slot in a PC or phone. As stated in Gundlach,

[I]t may be inconvenient for laptop or mobile phone users to carry extra equipment like corded or even wireless headsets to gain privacy during calls. Keeping track of the headsets and other peripherals and keeping them charged and ready to use becomes a burden…

Most portable and handheld computers have expansion slots built-in such as the ExpressCard™ or PC Card slots. The slots may conform to form and protocol standards that may allow third party vendors to create interchangeable accessory devices. Expansion cards may allow the user to increase a device's memory or add different types of communication interfaces. Due to the rise in popularity of the USB interface and the subsequent migration of the accessory market to that interface, most PC card slots sit empty in laptops.

Many slots have power that can be used to charge battery operated devices as well as high speed communications buses to interchange data.

…

The present invention relates to a device that when in a first configuration, such as when expanded, becomes a wireless mono or stereo headset and when in a second configuration, such as when collapsed, may be stored and charged.

> When collapsed the earpiece may be situated in a plane with the housing of the headset creating a product thickness of, e.g., about 5 mm or less. The allows the headset to be stored and charged in a portable cradle or with a mini USB charger. The portable cradle may be a holder, clip, case or card that may fit inside a standard expansion slot conforming to any expansion slot standard including, for example, PCMCIA, ExpressCard54 and ExpressCard34, etc. Additionally, a unique slot or cavity may be designed into a laptop or cell phone or any other communication device that may utilize a speaker and microphone to accommodate such as a wireless headset.
>
> …
>
> In another example, the wireless headset may be stored and charged in a cradle that may have attributes, such as a form factor or configuration that may allow the cradle to be inserted into a slot in a host device. Or, the wireless headset itself may take on a form factor of a slot in a host device.

Ex. 1005, [005], [006], [0055], [0057], [0070].

106. Thus, a POSITA would have understood that Gundlach's earpiece is designed and intended to be charged, and to receive data, via electric contacts either directly from a slot in a PC or phone or indirectly via such a slot and cradle or case inserted into the slot.

107. Such a cradle capable of being inserted in a PC or phone charging slot is depicted in Gundlach's Fig. 10, as follows:

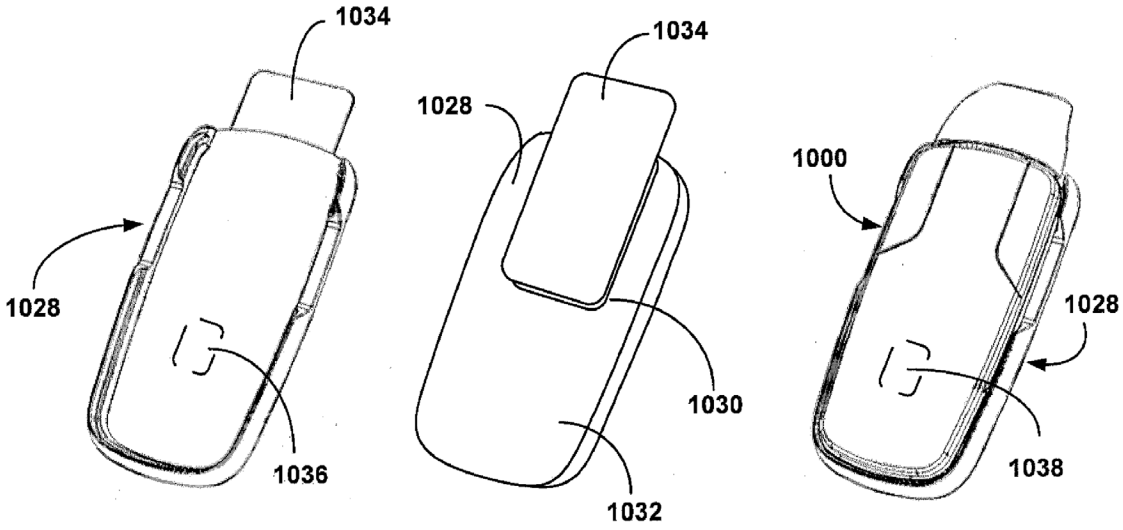


FIG. 10a FIG.10b FIG. 10c

108. In this embodiment, the earpiece (depicted as inserted into the cradle in Fig. 10(C), would connect directly with the contacts in the slot. A POSITA would have understood that the purpose of such a cradle is merely to position Gundlach's earpiece to be conductively charged in a slot of a laptop, cell phone or other communication device.

109. A POSITA would thus understand that Gundlach requires its headsets to be conductively charged inside a laptop or cell phone expansion slot. A POSITA would understand that Dr. Cooperstock's argument for replacing Gundlach's conductive charging with inductive charging violates the primary benefit and

principle of Gundlach's design, because Gundlach's headsets could not be charged inductively inside an expansion slot. Further, a POSITA would not be motivated to add inductive charging to the already present conductive charging capability of Gundlach's headsets. This would add unnecessary weight, cost and size from using significantly larger batteries, in addition to a POSITA's appreciation that inductive charging is less efficient, and thus slower, than conductive charging, as further described below.

110. Further, a POSITA would have understood that the clamshell case of Fig. 18 relied upon by Dr. Cooperstock is stated by Gundlach as being capable of insertion into a laptop or phone slot or capable of receiving USB connector, including USB connectors of mini or micro format, or other connector capable of supplying "power or data." Ex. 1005, [0057], [0080]. "Thus, the wireless headset and case may be charged together and the wireless headset may receive data from a host device." Ex. 1005, [0080].

111. Dr. Cooperstock argues that without wireless "interoperability," a user "would be unable to recharge in a situation where the case and headset became separated from one another (e.g., the user inevitably misplaces the case)." Ex. 1003, 45. A POSITA would not see this as a need or a benefit, because Gundlach's earpieces already have micro or mini-USB connections, compatible charges for which were ubiquitous in 2011, and, as noted above, the intent of the

slim Gundlach devices, which is already achieved with conductive connections, is to have them charge and receive data from a laptop or phone slot. Thus, a POSITA would appreciate that if a Gundlach headset was separated from its case, it could still be charged as intended via a mini or micro USB connection or other connection within a laptop or phone slot. A POSITA would appreciate that in 2011, as today, there are many more options for charging a device from mini or micro USB – for example, charging from a wall, a portable battery device, a PC or laptop, or from a cellular phone – than there are wireless charging options. A POSITA would further appreciate that, as discussed below, the Lee embodiment comprising a dual role speaker transducer coil would not be used with a charging pad, and at minimum, if it would charge inductively, it would need a specifically designed inductive charging device.

112. Based on the foregoing, a POSITA would appreciate that replacing Gundlach's conductive charging with Lee's inductive charging, especially the dual-use transducer coil charging advocated by Dr. Cooperstock, would reduce charging interoperability for Gundlach's headsets, not increase it.

113. Moreover, a POSITA would appreciate that replacing the conductive connections from Gundlach's earpieces with an inductive charging arrangement would make the earpieces more difficult to charge if separated from their case, because one could no longer directly charge the earpieces with a micro or mini

USB cord or charge them from a laptop or phone slot as intended. Thus, a POSITA would understand that having to use a specially designed inductive charging system for the asserted Gundlach-Lee combination utilizing the transducer coil as the charging coil would limit charging options substantially from those already existing via expansion slot or USB.

114. Dr. Cooperstock suggests an undesirability of micro or mini-USB connections for Gundlach earpieces because they "may increase the size of the design." Ex. 1003, 45. A POSITA would not agree with this suggestion, especially since Gundlach itself dispels such a notion. Rather, a POSITA would appreciate that the stated size of Gundlach's earpieces leaves ample room for micro and mini-USB connections, as illustrated by Gundlach's drawings and descriptions of such devices meeting its size requirements. Also as noted above, a POSITA would understand that the asserted Gundlach-Lee combination would require a larger and heavier form factor due to the additional circuitry and larger clamshell battery. It appears that Dr. Cooperstock deliberately ignores these teachings of Gundlach in order to propose a drawback that clearly does not exist.

115. Dr. Cooperstock writes that, "Lee's approach for implementing inductive charging with a single dual-purpose charging/audio coil would enable the wireless headset to be recharged using various types of inductive chargers (e.g., a charging pad)." Ex. 1003, 45. A POSITA would not agree with this statement. Because of

the need for precise alignment of charging and receiving coils in any inductive charging solution, employing a single dual-purpose charging/audio coil in a wireless headset would dramatically limit the available options for charging the headset. This issue is addressed in more detail below.

116. Dr. Cooperstock writes that, "Lee's figures illustrate this benefit by depicting the same set of earbuds being charged by multiple different types of chargers." Ex. 1003, 45. However, Lee makes no statement that its depicted chargers, e.g., those in Lee Figs. 16-24, are for its embodiment that uses the transducer coil for the wireless power receiving coil. As addressed in more detail below, a POSITA would not understand the depicted chargers to be for Lee's Fig. 12 embodiment because the charge pad would be out of alignment and oriented perpendicular to the earpiece transducer coil with an air gap that would be exceedingly large, which would not allow the earpiece to charge. Instead, a POSITA would understand those chargers would be used with the devices depicted in Lee Figs. 5, 6, 7, 10 and 15, which have inductive coils separate from the speaker transducer coil, which allows those inductive coils to be placed in a geometry wherein Lee's depicted charging devices might work.

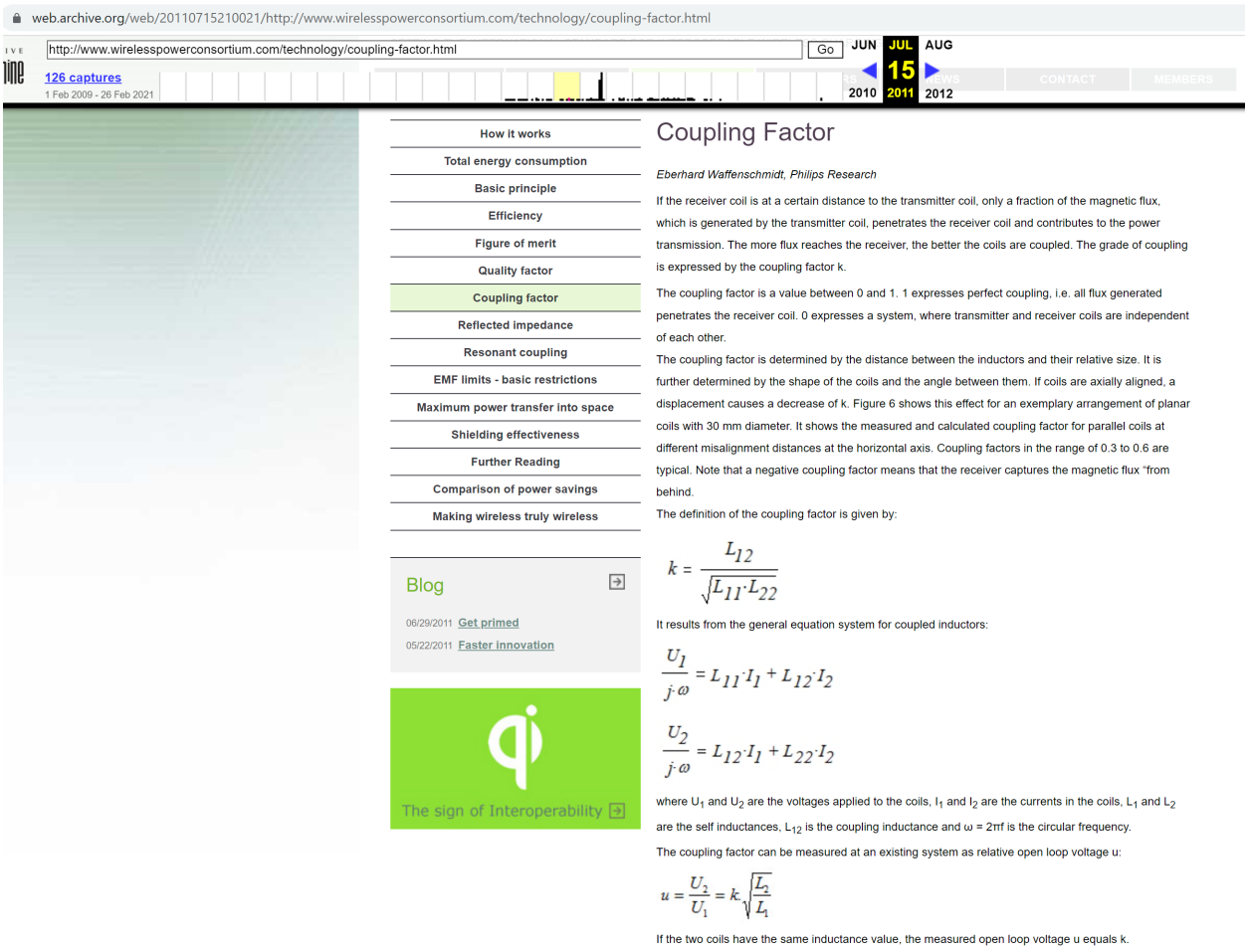
117. Here it should be noted that if Lee's Fig. 12 speaker transducer coil was not used as the inductive coil, then there would be no need for switch 470 relied upon

by Dr. Cooperstock, as evidenced by Lee's other embodiments not needing or having switch 470.

D. A POSITA would not have been motivated to replace Gundlach's efficient conductive charging with far less efficient inductive charging. Any alleged benefits from wireless charging would have been greatly outweighed by the inefficiencies and additional cost, size and weight from needing a larger battery in the clamshell case. Further a POSITA would have been even less motivated to use Lee's even more inefficient dual purpose transducer coil design.

118. A POSITA in 2011 would have also been aware that coupling factor k is an important consideration for wireless power transfer ("WPT") systems. In 2011 the

WPC published a standard definition of this k factor, as follows:



web.archive.org/web/20110715210021/http://www.wirelesspowerconsortium.com/technology/coupling-factor.html

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CONTACT MEMBERS

How it works
Total energy consumption
Basic principle
Efficiency
Figure of merit
Quality factor
Coupling factor
Reflected impedance
Resonant coupling
EMF limits - basic restrictions
Maximum power transfer into space
Shielding effectiveness
Further Reading
Comparison of power savings
Making wireless truly wireless

Blog

06/29/2011 Get primed
05/22/2011 Faster innovation

The sign of Interoperability

Coupling Factor

Eberhard Waffenschmidt, Philips Research

If the receiver coil is at a certain distance to the transmitter coil, only a fraction of the magnetic flux, which is generated by the transmitter coil, penetrates the receiver coil and contributes to the power transmission. The more flux reaches the receiver, the better the coils are coupled. The grade of coupling is expressed by the coupling factor k.

The coupling factor is a value between 0 and 1. 1 expresses perfect coupling, i.e. all flux generated penetrates the receiver coil. 0 expresses a system, where transmitter and receiver coils are independent of each other.

The coupling factor is determined by the distance between the inductors and their relative size. It is further determined by the shape of the coils and the angle between them. If coils are axially aligned, a displacement causes a decrease of k. Figure 6 shows this effect for an exemplary arrangement of planar coils with 30 mm diameter. It shows the measured and calculated coupling factor for parallel coils at different misalignment distances at the horizontal axis. Coupling factors in the range of 0.3 to 0.6 are typical. Note that a negative coupling factor means that the receiver captures the magnetic flux "from behind.

The definition of the coupling factor is given by:

$$k = \frac{L_{12}}{\sqrt{L_{11} \cdot L_{22}}}$$

It results from the general equation system for coupled inductors:

$$\frac{U_1}{j \cdot \omega} = L_{11} \cdot I_1 + L_{12} \cdot I_2$$

$$\frac{U_2}{j \cdot \omega} = L_{12} \cdot I_1 + L_{22} \cdot I_2$$

where U_1 and U_2 are the voltages applied to the coils, I_1 and I_2 are the currents in the coils, L_1 and L_2 are the self inductances, L_{12} is the coupling inductance and $\omega = 2\pi f$ is the circular frequency.

The coupling factor can be measured at an existing system as relative open loop voltage u:

$$u = \frac{U_2}{U_1} = k \sqrt{\frac{L_2}{L_1}}$$

If the two coils have the same inductance value, the measured open loop voltage u equals k.

Exhibit 2027.[4] See also Exhibit 2028.[5] A POSITA would have been familiar with this coupling factor k in and before 2011.

[4] Exhibit 2027 has a true and correct screenshot from the Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110715210021/http://www.wirelesspowerconsortium.com/technology/coupling-factor.html

[5] Exhibit 2028 has a true and correct copy of Li and Mi, WPT for EV Applications, IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 3, No. 1.

119. A POSITA would understand that the aforementioned distance between a transmitter coil and receiver coil is commonly referred to as "air gap," that the k factor tends to decrease substantially as air gap increases from its desired minimum, and that any good WPT design minimizes air gap. A POSITA would also be highly motivated to have coils in alignment oriented "planar" to each other, as indicated by WPC above, to achieve an acceptable k value.

120. Further, a POSITA would understand that, with other things being equal, larger size coils result in a higher k value compared to smaller size coils. A POSITA attempting to implement Lee's dual purpose coil in a Gundlach headset would be seriously constrained by the 5 mm height of the headsets noted above. This would seriously constrain the size of the receiving coil to about 3-4 mm. A POSITA would understand that such small coils would, if induction could be achieved, charge very slowly, which is undesirable.

121. A POSITA considering inductive charging for a low power, portable device in 2011 would have been aware of the Wireless Power Consortium. In mid-2011 the Wireless Power Consortium had members including Belkin, Energizer, Haier, HTC, LG, Motorola Mobility, National Semiconductor, NEC, Nokia, Panasonic, Phillips Electronics, Powermat, Samsung, Sanyo, and Texas Instruments. Exhibit

2029.[6] This consortium of well-known companies, including leaders in wireless charging for consumer electronics, was working on an international standard to make wireless charging stations compatible. Exhibit 2030.[7]

122. The Wireless Power Consortium was aware in mid-2011, and a POSITA would have been aware in mid-2011, that wireless charging was substantially less efficient than conductive charging. The respected and well known Wireless Power Consortium had published on its website that "careful design" made it possible to achieve at least 70% transfer efficiency," and that percentage can go up "a bit" if a manufacturer is willing to spend more on high quality components:

[6] Exhibit 2029 has a true and correct screenshot from the Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110729035955/http://www.wirelesspowerconsortium.com/member-list.

[7] Exhibit 2030 has a true and correct screenshot from the Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110821093859/http://www.wirelesspowerconsortium.com/about/our-vision.html.

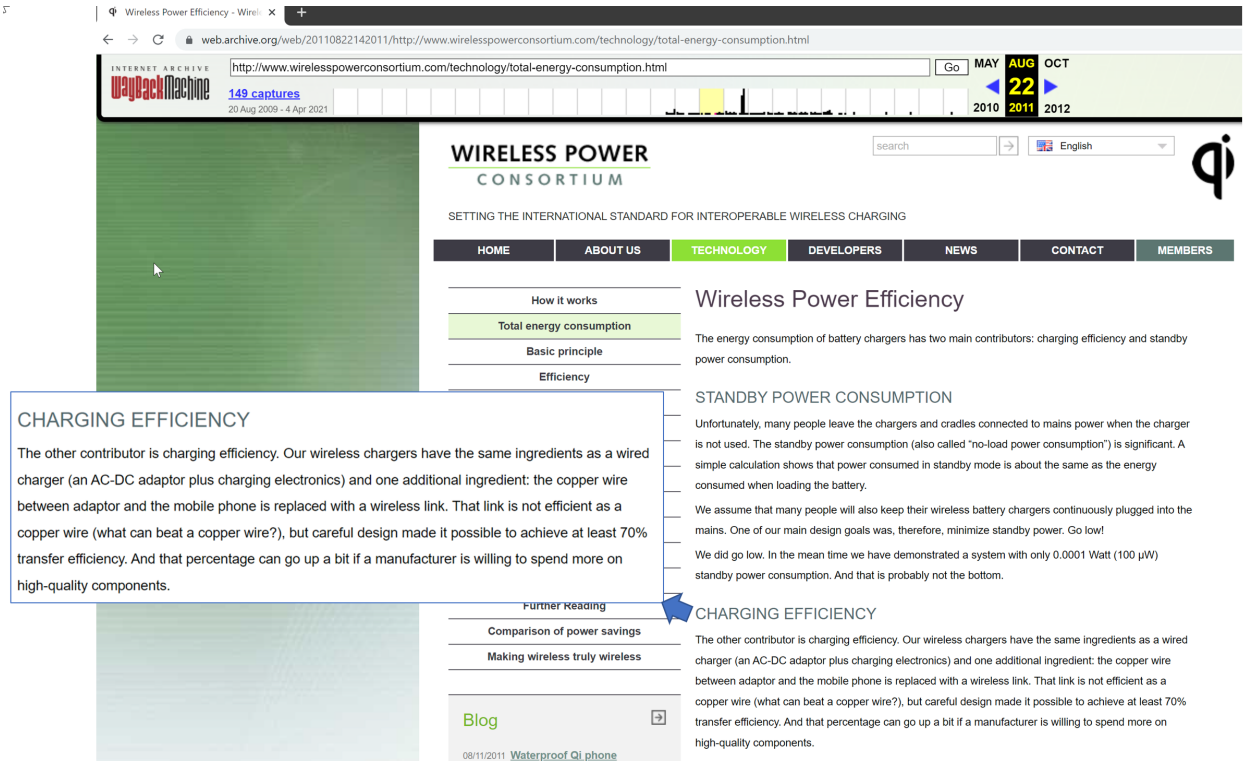


Exhibit 2031.[8] In other words, a POSITA would understand that well designed WPT systems from WPS compliant devices using optimized components such as relatively large, parallel coils and minimized air gaps would likely have an approximate 30% inefficiency.

123. The reasons for such inefficiency in WPT systems would have been well known to a POSITA in 2011. A POSITA would know that a typical WPC system would have two coupler coils (a primary coupler (or transfer coil) and pickup

[8] Exhibit 2031 has a true and correct screenshot from the Wireless Power Consortium site on the Wayback Machine at https://web.archive.org/web/20110822142011/http://www.wirelesspowerconsortium.com/technology/total-energy-consumption.html.

coupler (or receiving coil), two converters (one for the device with the primary coupler and one in the device with the pickup coupler), two resonance circuits (one for the device with the primary coupler and one in the device with the pickup coupler), a DC to AC inverter in the device with the primary coupler, and a AC to DC rectifier in the device with the pickup coupler. See Exhibit 2028, p. 11 (Li and Mi, WPT for EV Applications, IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 3, No. 1). A POSITA would understand a typical WPT circuit schematic to be as follows:

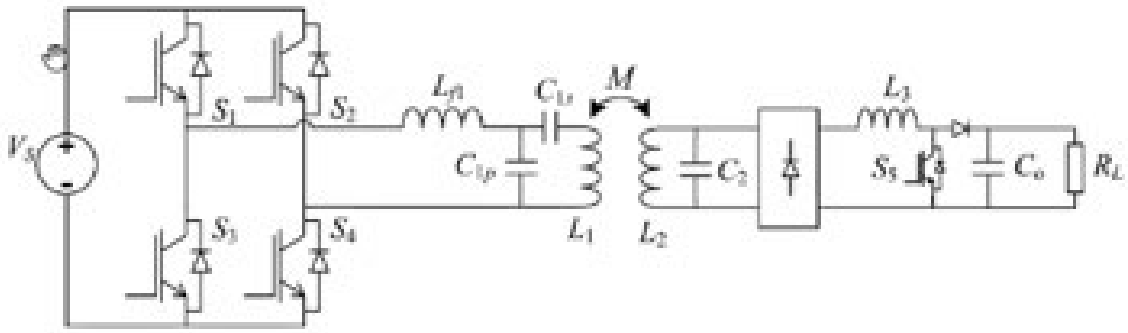


Fig. 8. Circuit schematic of a typical WPT configuration.

Exhibit 2028, p. 11 (Li and Mi, WPT for EV Applications, IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 3, No. 1). A POSITA understands that at each such component of this system, energy is lost in the form of heat.

124. Thus, a POSITA would understand there are losses at each step in the power conversion of a WPT system, and that that WPT systems have multiple steps of power conversion, as noted above.

125. This approximate 30% inefficiency known to POSITAS in 2011 for portable, consumer electronic WPT devices from WPC published numbers and from general knowledge about inefficiencies in such systems would have been compared by a POSITA against the likely minimal energy losses of a much more efficient, simpler, more compact, lighter weight and faster charging conductive charging system. Conductive charging systems such as Gundlach's would only need two converters (one for each device), and those converters would not to be as large or robust as converters used for WPT system. A POSITA in 2011 would have appreciated that Gundlach's devices as designed by Gundlach would likely have near 95% or higher charging efficiency (with inefficiency attributable primarily to a single, generally highly efficient DC-DC converter), as compared an approximate 30% inefficiency for WPC compliant devices noted above. A POSITA in 2011 would know that conductive charging is clearly and substantially more efficient than WPT.

126. In fact, a POSITA in 2011 would have been suspicious of the WPC's claim to up to at least 70% efficiency. Four years later the WPC published information noting an approximate 60% efficiency. Exhibit 2034, pp. 21-22

(https://www.wirelesspowerconsortium.com/data/downloadables/1/4/8/1/measuring-wireless-charging-efficiency-in-the-real-world-wpc-michigan-sept-2015.pdf),[9] which would have been in line with the expectations of a POSITA back in 2011 as well.

127. A POSITA would also understand that substantially less efficient inductive charging for Gundlach would have the following negative consequences:

- Inefficient charging drains the battery of the charging device more rapidly;
- Inefficient charging is slow due to poor coupling and energy loss; and
- A larger charging (i.e., clamshell) battery required to make up for inefficient charging would undesirably increase charging device cost, weight and size; and
- Lost heat inside of an enclosed clamshell would be problematic.

128. A POSITA would understand that the high WPT charging inefficiency would require the Gundlach devices to have larger batteries, and that for earpiece devices of this type and geometry, the battery is likely the largest contributor to

[9] Exhibit 2034 is a Wireless Power Consulting document entitled "Measuring Wireless Charging Efficiency In the Real World" which is available on its website at https://www.wirelesspowerconsortium.com/data/downloadables/1/4/8/1/measuring-wireless-charging-efficiency-in-the-real-world-wpc-michigan-sept-2015.pdf.

size and weight. Having a 33% larger battery in Gundlach (at the at least 70% charging efficiency, i.e., 1/.7) would be highly undesirable to a POSITA given the size constraints of the earpiece and because a POSITA would want to minimize weight for a Gundlach earpiece, especially one that is mounted in the ear canal. Further, having a 33% longer charge time for Gundlach's earpieces would be highly undesirable for a POSITA.

129. In addition, Dr. Cooperstock advocates a modified Gundlach system with two earpieces in the clamshell charger. A POSITA would want to charge each earpiece separately since one may have a lower battery charge level than the other and for safety reasons. One at the skill level of a POSITA would lack skill to do more than duplicate the charging system for a first earpiece for a second earpiece. A POSITA would understand that this repeat the approximate 30% inefficiency of the first earpiece for the second earpiece, thus draining the battery approximately 30% faster when the second earpiece is added.

130. The approximate 30% charging inefficiency number noted above would have been understood by a POSITA to be generally applicable to the devices depicted in Lee's Figs. 6, 7, and 10, in which the earpiece has a pickup coupler coil separate from the transducer coil.

131. A POSITA would have understood Lee's proposed "dual role" transducer coil, depicted in Fig. 12 relied upon by Dr. Cooperstock, would be much less

efficient than a conventional WPC. Per Lee, for this Fig. "[t]he energy collection element 465 has a dual role and is also used as the transducer coil of a headphone/headset/audio speaker." A transducer is a device that converts energy from one form to another. A sound transducer in a speaker is an electroacoustic transducer that generates sound waves from electrical energy. Thus, electrical energy is transformed from an electric current to wave-shaped changes in air pressure (i.e., sound). For this purpose, the speaker membrane is induced to vibrate with a specific deflection and frequency. Such a diaphragm is usually manufactured with a cone- or dome-shaped profile.

132. The diaphragm in speakers or headphones is usually connected to a moving coil. This coil is made to oscillate within a magnetic field by the alternating current in the coil. The alternating current comes from a converter that "translates" the audio signals into electrical pulses.

133. A POSITA would understand that air gap exists between inductive charging coils, that air gaps reduce charging efficiency, and that large air gaps reduce charging efficiency significantly. *See, e.g.,* Exhibit 2033 (H. Shen, J. Lee and T. Chang, "Study of contactless inductive charging platform with core array structure for portable products," 2011 International Conference on Consumer Electronics,

Communications and Networks, 2011, pp. 756-759).[10] A POSITA would also understand that the presence of a speaker diaphragm between an inductive charging coil embedded in Gundlach's case and the transducer coil in Gundlach's wireless headset would cause an air gap that would result in additional charging inefficiency.

134. As noted above, a POSITA would not have been aware of any portable consumer electronic products that inductively charged directly from a portable, hand-held battery powered device to portable battery powered device in 2011.

135. A POSITA would also appreciate that the energy loss of an inefficient Lee WPC system would translate into heat loss. A POSITA would understand that significant heat is typically emitted from WPT systems for this reason. A POSITA would not be motivated to have a WPT system with the wireless charging occurring inside Gundlach's closed clamshell case, because the closed clamshell case would be very inefficient at dissipating heat, especially if the closed case was put inside a purse, pocket, or other closed space while charging of the earpiece was occurring, which would be an expected usage model if such a system was actually implemented.

[10] Exhibit 2033 is a true and correct copy of H. Shen, J. Lee and T. Chang, "Study of contactless inductive charging platform with core array structure for portable products," 2011 International Conference on Consumer Electronics, Communications and Networks, 2011, pp. 756-759.

136. A POSITA would have been even less motivated to use the dual purpose coil relied upon by Dr. Cooperstock and depicted in Lee's Fig. 12 due to additional energy loss at the speaker magnet, which would capture eddy currents from the inductive charging field, further lowering charge efficiency of the asserted Gundlach-Lee combination. A POSITA would understand that energy accumulating in the magnet would translate into undesirable heat, and it could possibly vibrate the magnet as well, which could result in undesirable noise.

137. A POSITA would understand that Lee's reference to inductive coil 457 of transducer 455 is referring to a coil of wire suspended within the magnetic field of a permanent magnet, depicted in red below.

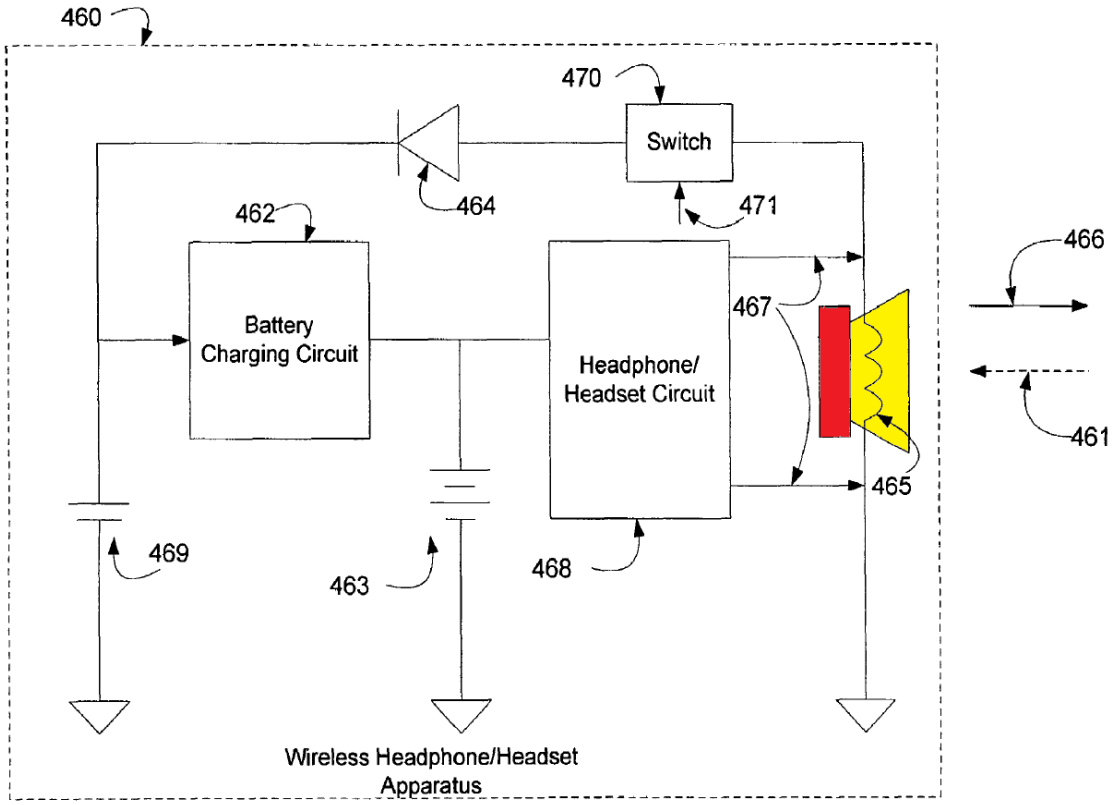


FIG. 12

138. A POSITA would further understand that this coil vibrates when it receives alternating current, and that the coil is connected to a speaker membrane (depicted in yellow above) that is induced to vibrate with a specific deflection and frequency which translates into airborne audio signals.

139. From the straightforward understanding of the use of speaker transducer coils, a POSITA would understand that the coil of a Lee Fig. 12 transducer coil would have a diameter of less than 5 mm and likely about 3-4 mm (when one accounts for case materials protecting and allowing movement of the coil), as depicted by the following:

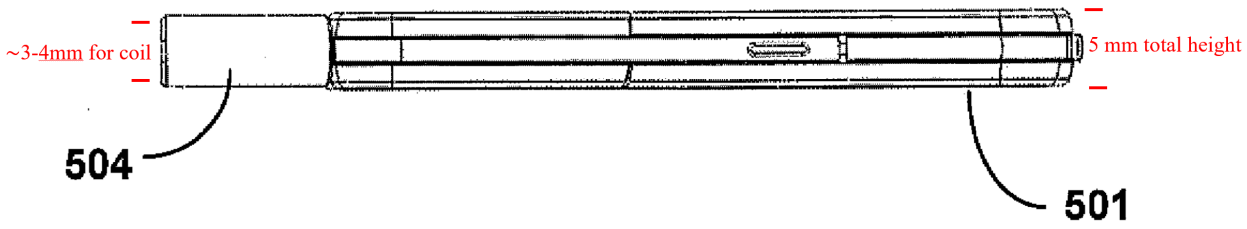


FIG. 5b

140. A POSITA would further understand primary coupler in Gundlach's clamshell case would have a similar approximately 3-4 mm constraint in the diameter constraint in the corresponding primary coupling coil.

141. My experience, especially in inductive charging, far exceeds that of a POSITA, and I have never seen a portable consumer product with an inductive charging coil with a diameter as small at 3-4 mm.

142. A POSITA, especially in 2011, would see approximately 3-4 mm as a significant constraint on the diameter, and thus the charging ability of WPT coils. A POSITA would understand that such small coils, if they could be induced to carry a charge in view of the air gap versus diameter, would charge very slowly compared to conductive contacts, which are known to be highly efficient in conducting current.

143. A POSITA would understand that "[t]he flux path height of a circular pad is about one-fourth of the pad's diameter." Exhibit 2028 (IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 3, No. 1, March 2015). Further, a

POSITA would understand the air gap caused by case materials, the lack of perfect fitment between Gundlach's clamshell case and an earpiece that drops in, the presence of the diaphragm, and the cylindrical geometry of the transducer coil would be significant and approaching the magnitude of the 3-4 mm available for the diameter of the charging coils. A POSITA would understand that such a large air gap in relation to coil diameter would result in a very low k coefficient and a very inefficient WPC, if such a system could charge in any meaningful way when one compares flux path height with air gap. A POSITA would understand that the relatively large air gap noted above combined with a very small coil diameter noted above would make any such inductive charging system highly inefficient, assuming it could be implemented at all, which would be highly questionable.

144. A POSITA would also appreciate that Lee's inductive charging system using a transducer coil would be additionally inefficient due to the frequency limitations of an audio transducer circuit. A POSITA would appreciate transducer and inductive charging coils are designed for different purposes. The voice coil is designed to operate below 20 kHz and is not used to transfer electric energy across the airgap whereas the inductive coil is designed to operate at much higher frequency and is designed to transfer electric energy. Efficiency is not that crucial in the design of voice coil and sound quality is important (in otherwards frequency bandwidth is the primary target), whereas in design of the inductive coil efficiency

is very important. A POSITA would appreciate that power to an audio transducer would not exceed a 20 kHz frequency because the human ear could not hear sound at over a 20 kHz frequency. However, a POSITA would expect to send a much higher frequency for inductive AC, more likely well over 100 kHz for low power devices such as Lee earpieces. See, e.g., Exhibit 2032 (""If more or less power is needed at the power receiver, the frequency in the coil changes but stays between 110 and 205 kHz, depending on power demands.").[11] For example, A POSITA would understand that inductive AC power sent at a 20 kHz frequency would be weak and would make charging very slow. A POSITA would not be motivated to have such slow charging, especially in view of the slow charging already occasioned in any alleged Gundlach-Lee combination by the coil size limitation and charging inefficiency issues noted above.

145. Nor would a POSITA be motivated to increase the frequency of Lee's inductive charging beyond the maximum 20 kHz at which Lee would have been designed for audio functionality. This is because a POSITA would be concerned

[11] Ex. 2032 is a true and correct copy of an article entitled "An introduction to the Wireless Power Consortium standard and TI's compliant solutions" from the 1Q 2011 Texas Instruments Analog Applications Journal, accessible at https://www.mouser.com/pdfDocs/An-introduction-to-the-Wireless-Power-Consortium.pdf.

that using a higher frequency for Lee's inductive charging would rapidly heat and vibrate Lee's speaker magnet and would likely damage Lee's internal components.

146. Further, a POSITA would appreciate that in an inductive charging system the energy inefficiency translates into heat loss. A POSITA would be concerned about heat loss from any alleged Gundlach-Lee inductive charging taking placed in closed clamshell case, because the devices would both likely get very warm from the heat retained in the clamshell case. Although Dr. Cooperstock has not suggested increasing the size of Gundlach's case to dissipate this undesirable and potentially damaging heat, a POSITA would not want to increase the size of Gundlach's case for heat dissipation due to Gundlach's strict size constraints noted above (for purposes of fitment in an expansion slot), and because a Gundlach clamshell case that did not have a secure it on the earpiece would likely be unsuitable for WPT due to coil misalignment caused by the earpiece shifting in a larger clamshell designed for heat dissipation. Such coil misalignment would further decrease the k coefficient and make it more unlikely that the asserted Gundlach-Lee combination would actually charge the earpiece inductively to any meaningful degree.

147. A POSITA would be highly motivated to keep Gundlach's original, highly efficient, conductive charging design rather than switch to a highly inefficient Lee

conductive charging system. Further, a POSITA would be even more highly motivated not to modify Gundlach using Lee's "dual role" transducer coil design.

148. Further, a POSITA would have to spend a significant amount of time and money on experimentation to try to make Lee's Fig. 12 device work, especially with any meaningful level of efficiency. Among other engineering challenges would be to find a type and gauge wire suitable for a transducer coil and also suitable for resonating in synch with a corresponding charging coil in an inductive charging system. A POSITA would have never seen a wire coil capable of both acting as a transducer and an inductive charging coil, and Lee provides no guidance on what type of wire might accomplish this. Even if a POSITA might find a suitable wire to use, he would expect additional energy loss due to limitations on the number of coils and decreased resonance caused by utilization of a dual-use transducer coil.

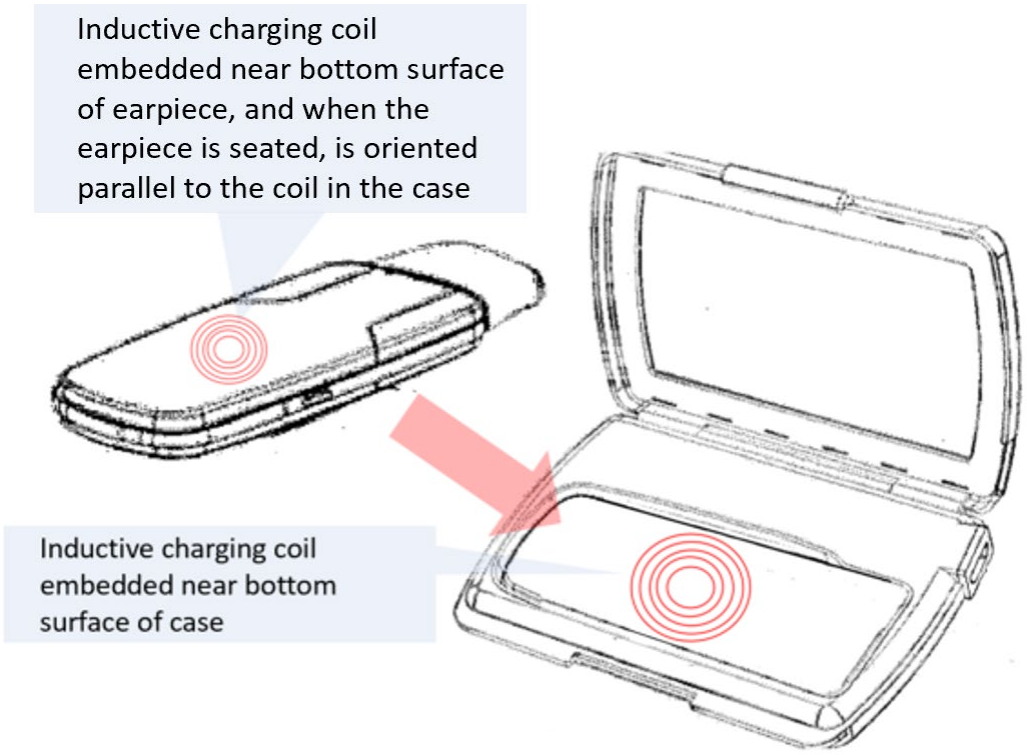
149. To a POSITA, it seems clear that Dr. Cooperstock is merely using hindsight reconstruction to advocate Lee's Fig. 12 solution because the "dual role" transducer coil design incorporates switch 470.

150. For the foregoing reasons, a POSITA, if able to get WPT to work given the extreme physical constraints of Dr. Cooperstock's proposed Gundlach-Lee combination, would deem Dr. Cooperstock's stated rationales for substituting Lee's inductive charging for Gundlach's conductive charging to be heavily

outweighed by the inefficiency of inductive charging for a device desired to charge quickly and to lack the added weight of a larger battery required for such inductive charging.

151. Further, all of Dr. Cooperstock's stated rationales for modifying Gundlach to use inductive charging would be applicable to Gundlach's conventional, i.e., non-dual role coil, devices, which are depicted in Lee's Figs. 6, 7 and 10. The only advantage proffered by Dr. Cooperstock for using the "dual role" transducer coil design depicted in Lee's Fig. 12 is Dr. Cooperstock's argument that Lee's dual role coil "avoids a dedicated inductive charging coil that might introduce unnecessary bulk to the 'relatively thin shape' desired by Gundlach." Ex. 1003, 45. To a POSITA, this argument lacks persuasiveness or merit. As indicated above, a POSITA would understand that the drawbacks in terms of charging inefficiency, heat loss, and a larger battery would heavily outweigh any marginal "bulk" benefit from a dual use coil.

152. If a POSITA was going to design an inductive charging system for Gundlach, which he would not do for the reasons stated above, at bare minimum he would do so by placing a large receiving coil on the 34 mm by 75 mm surface of Gundlach's earpiece, as illustrated by the following:



153. However, a POSITA would still appreciate that all the above-noted inefficiencies would still make inductive charging far inferior to conductive charging for Gundlach's clamshell/earpiece application.

154. In addition, POSITA implementing inductive charging for Gundlach's clamshell case configuration would be highly motivated to use flat coils to maximize coupling, facilitate resonance, and minimize air gap, and thus increase charging efficiency to nearer the approximate 30% inefficiency published by the WPC, and not to use a barrel shaped transducer coil. Thus, if a POSITA was to use inductive charging for Gundlach, which as explained below would still not be the case, a conventional inductive charging solution with large, parallel coils and

minimal air gap would be the only viable and sensible solution. A POSITA would have no motivation to follow the teachings of Lee's Fig. 12 device, which would make coupling difficult at best, make resonance difficult at best, and have a large air gap and introduce significant inefficiencies.

155. A POSITA would appreciate that the above design would lack Lee's switch 470 because the only purpose of switch 470 is to isolate a dual use transducer coil also usable for inductive charging. As noted below, Dr. Cooperstock relies upon Lee's switch 470 for Gundlach being a switching device of independent claim 1.

156. Further, POSITA would appreciate that inductor coils are made of thin wire, typically copper, and that such a coil, as depicted above, would have had no meaningful effect on the size or weight of Gundlach's earpiece or clamshell case. Further, a POSITA would understand that the larger battery required for highly inefficient inductive charging using a 4 mm dual role transducer coil would add more weight and bulk to Gundlach's clamshell case than the sensible solution of using larger coils and less air gap – due to the lack of constraints imposed by Lee's dual role transducer coil design.

E. A POSITA would not have understood Lee's charging pad to be applicable to its dual purpose wireless charging solution.

157. Dr. Cooperstock's "interoperability" argument depends upon being able to use a flat charging pad for Gundlach headsets modified with Lee's dual role

transducer coil design from Lee's Fig. 12. Dr. Cooperstock assumes that Lee's charging pad at Fig. 16 depicts charging with Lee's dual role transducer coil design from Fig. 12 rather than Lee's conventional inductive charging designs depicted at Figs. 6, 7 and 10. To a POSITA, Dr. Cooperstock's assumption is incorrect.

158. A POSITA would understand that this Lee Fig. 16 charging pad, i.e.,

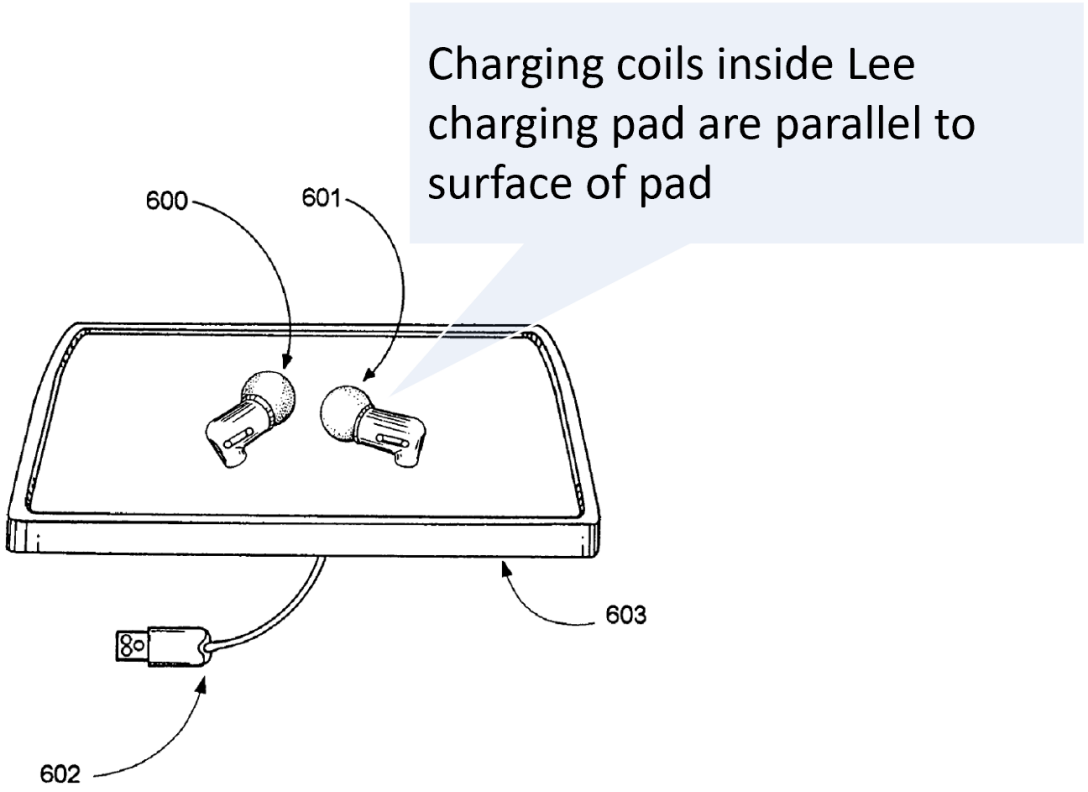


FIG. 16

is not charging the Lee embodiment with the dual role transducer coil, because such a dual role coil would be perpendicular to the charge coils in the charging pad. A POSITA would understand that with this perpendicular coil geometry, the small transducer coil, and the air gap between most of the transducer coil and the

pad, that a dual role coil would not charge, or if it did somehow charge, it would be so slow and inefficient that no one would use it.

159. A POSITA would understand that the charging coils in earpieces 600, 601 in Fig. 6 would have to be located within the long axis of the earpieces so they could be as parallel as possible with the charging pad.

F. A POSITA would not be motivated to make the proposed Gundlach-Lee combination because it would drain the clamshell case battery, resulting in a highly undesirable charging system.

160. A POSITA would understand that the charging system taught by Lee's Fig. 12 embodiment has no disclosed means of communication between the charger and earpiece. Ex. 1006, Fig. 12. Thus, a POSITA would understand that Lee's inductive charger would continue emitting its charging field irrespective of whether the earpiece battery is full.

161. A POSITA would not find this highly inefficient aspect of Lee problematic for Gundlach's small, portable, battery powered invention because Lee teaches that input power source 300 is "DC voltage… provided by Universal Serial Bus terminals," which may be sourced from AC line voltage, or that input power source 320 is simply "AC line voltage." Ex. 1006, 3:65-67; Ex. 1006, 4:6-7. A POSITA would understand that AC line voltage would essentially be an unlimited power source for Lee's disclosed devices, without the efficiency concerns of the battery

powered device to battery powered device inductive charging advocated by Dr. Cooperstock.

162. A POSITA would understand that Gundlach's clamshell case 1860 relies upon its own "reserve battery" during its intended use and when the clamshell case 1860 battery is not itself being recharged via USB power supply adapter 1843. Ex. 1005, [0080]. A POSITA would also understand that the reserve battery of Gundlach's clamshell case would have serious size limitations due to Gundlach's size constraints noted above, which would be necessary for the case to fit into an expansion slot as required by Gundlach.

163. A POSITA would also understand that, if the electrical contacts in the Gundlach system were replaced by inductive coils as proposed by Dr. Cooperstock's importation of Lee's Figure 12 device into the Gundlach Figure 18b system, then the proposed Gundlach-Lee combination would drain the clamshell case battery, resulting in a highly undesirable charging system. Without communication for cessation of wireless charging between clamshell case 1860 and wireless device 1800, clamshell case would lack the means to cease charging when the battery in wireless device 1800 was full. Instead, the Gundlach-Lee clamshell case would continuously energize its inductive coil and the reserve of the clamshell case reserve battery would continue to drain from energy losses (in the form of heat) at the converter, resonance circuit, rectifier and coil. Further, a

POSITA would understand from Lee's disclosure that Lee's switch 470 relied upon by Dr. Cooperstock would remain open for as long as the earpiece was in proximity of the charging coils. Thus, there would be additional energy loss (in the form of heat) at the earpiece as well.

164. Gundlach teaches that led light goes on when battery is full. However, a POSITA would not expect a user to monitor this, especially if the clamshell case was out of sight, for example in a pocket, purse or laptop case.

165. To the extent that Dr. Cooperstock might belatedly contend that Lee might use radio, e.g., Bluetooth, signals for its Fig. 12 embodiment to signal cessation of charging from the transfer device, a POSITA would still not be motivated to make the combination because there would be significant additional energy loss from any such additional radio functionality that would continuously drain battery of both the earpiece and clamshell even when the earpiece is removed from the clamshell. Especially in view of the very low efficiency of an alleged Gundlach-Lee device, a POSITA would not be motivated to use more power on such a communication system, especially when the highly efficient conductive charging system already present in Gundlach could conduct such communications without using power consuming radio components by sending signals, for example in the form of certain voltages, across the conducting contacts.

G. Analysis of Claims 1, 2, 8, 9, and 11

1. Claim 1

[1a] a portable switching device coupled to a portable electronic device;

166. Dr. Cooperstock's description of the Gundlach-Lee clamshell case as a switching device depends upon the combination using switch 470 depicted in Fig. 12. Ex. 1003, 50. As noted above, a POSITA would not combine Lee's Fig. 12 embodiment comprising dual role transducer coil 465 and switch 470. Without transducer coil 465 being used as an inductive charging receiver coil, there would be no reason to use switch 470.

167. Thus, based upon the discussion in C – F above, a POSITA would not make Dr. Cooperstock's argued combination using switch 470, and thus element [1a] would not be met.

168. Even if a POSITA did ill-advisedly decide to replace Gundlach's highly efficient inductive charging consistent with Gundlach's design goal of expansion slot charged headsets with a highly inefficient inductive charging system, for the reasoned in C – F above, a POSITA still would not use Lee's even more inefficient Fig. 12 system making use of a dual role transducer coil and further making use of switch 470.

169. Accordingly, to a POSITA, element [1a] would not be met or rendered obvious by the alleged Gundlach-Lee combination.

[1b] wherein: the switching device and the electronic device are configured to selectively couple to each other employing magnetic force;

170. As a threshold matter, Dr. Cooperstock's argument for element [1b] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with inefficient inductive charging. As noted above, a POSITA would not be motivated to make the alleged Gundlach-Lee combination advocated by Dr. Cooperstock.

171. Moreover, Dr. Cooperstock has two arguments for element [1b] being met: (1) adding embedded magnets to Lee's closed clamshell case; and (2) his suggested inductive charging would constitute coupling by employing magnetic force. Ex. 1002, 52-54.

172. To a POSITA, Dr. Cooperstock's first argument is unpersuasive hindsight reconstruction. A POSITA would appreciate that Gundlach's clamshell case has a secure clasp, that it is shaped for the earpiece to fit inside:

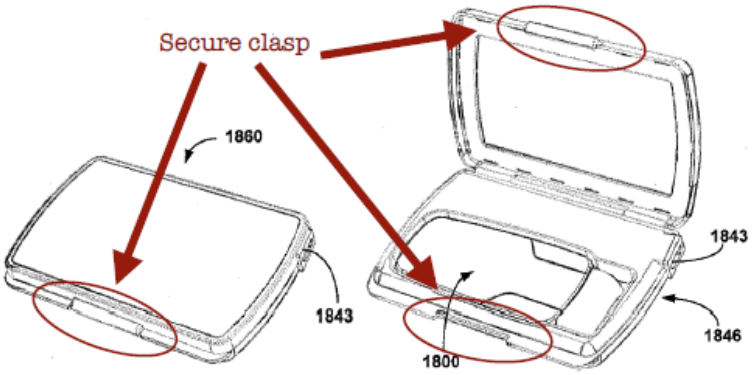


FIG. 18a FIG. 18b

173. To a POSITA, Dr. Cooperstock's genus/species argument, Ex. 1003, 55, is unpersuasive and incorrect. Gundlach does not state that a clamshell case 1860 is a species of cradle, nor would a POSITA understand something with a lid to be a cradle. Thus, a POSITA would not deem Gundlach's disclosure that "device 1000 may be held to the cradle by a magnet 1036, which may be embedded in the cradle 1028. The wireless device 1000 may also include a ferromagnetic portion 1038, such as another magnet …" to be applicable to clamshell case 1860.

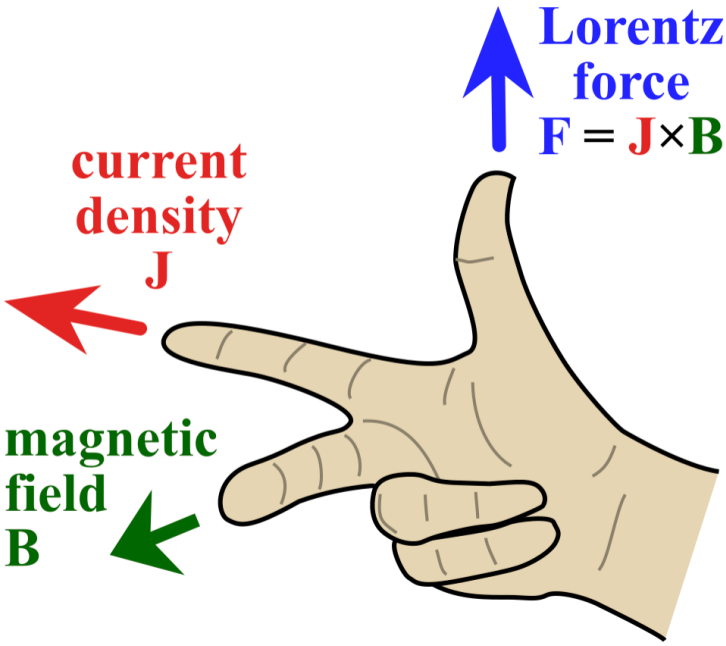
174. Thus, a POSITA would have no motivation to add an unnecessary magnet to further secure an already well secured earpiece in a clamshell case that is designed to be securely closed when the earpiece is present.

175. A POSITA would also appreciate that if Gundlach's clamshell case was dropped with enough force to eject the earpiece, then adding an extra magnet would add no additional protection.

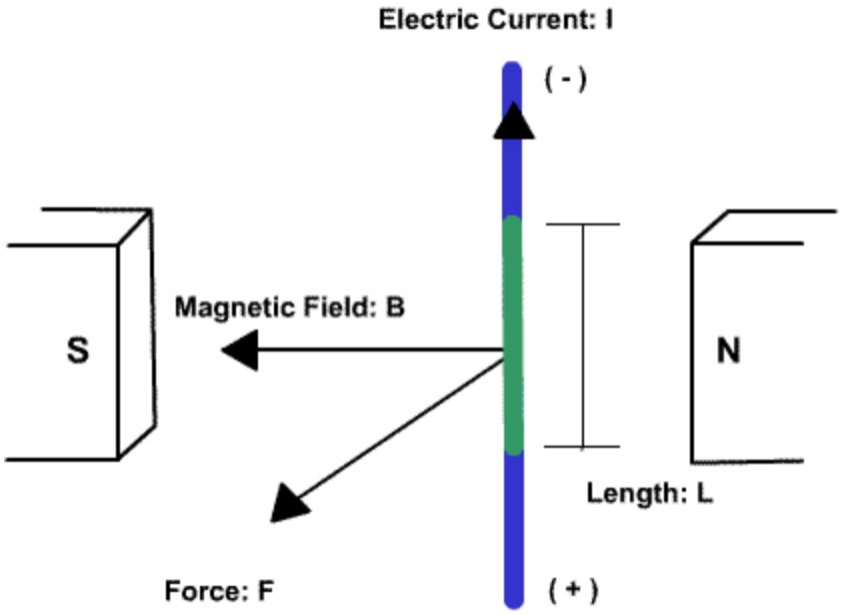
176. Further, a POSITA would appreciate that adding magnets would increase the weight and potentially increase the size of Gundlach's earpieces, which is undesirable in view of their use and desired form factor, plus the desire for Gundlach (and Lee's) earpieces to hang in the ear.

177. Further, a POSITA would appreciate that Gundlach's earpieces and case are designed to be inserted into the expansion slot of a laptop of phone. Placing a magnet on either or both would risk getting the device stuck in the expansion slot.

178. To a POSITA, Dr. Cooperstock's second argument is simply wrong. A POSITA would be aware of Lorenz forces, which are fundamental to the field of electromagnetics. In particular, a POSITA would understand that Lorenz forces follow the "right hand rule," as follows:



179. Another way of explaining this is with the following Lorenz Force diagram:



180. A POSITA would readily understand that Lorenz forces result in transfer and receiver inductive coils repelling, not attracting, each other.

181. A POSITA would understand that the requirement to "selectively couple to each other employing magnetic force" requires, at a minimum, a magnetic attraction, for example the attraction of the north and south poles of a magnet. A POSITA would understand that there is no such magnetic attraction in the Gundlach-Lee combination proposed by Dr. Cooperstock. When an electromagnetic field is induced by applying AC current to the transmitter coil, a repulsive force, not an attractive force, results.

[1c] the switching device comprises a first case;

182. Dr. Cooperstock's argument for element [1c] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

[1d] the electronic device comprises a second case and an electronic circuit that is responsive to the switching device;

183. Dr. Cooperstock's argument for element [1d] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

184. Further, Dr. Dr. Cooperstock's theory for the alleged Gundlach-Lee combination satisfying element [1d] is that:

> As taught by Lee, the wireless headset includes an electronic "battery charging circuit" that "manages charging of the battery by taking the raw energy received by the [energy collecting] coil and providing the proper voltage to the battery based on its type." (Lee, 4:62-66 (reference numbers omitted).) In Gundlach-Lee, the battery charging circuit is responsive to the clamshell charging case (switching device, per analysis at Element [1a]),

which provides "[t]he energy received by the coil [and] transferred via the battery charging circuit to the battery." (Lee, 4:57-59 (reference numbers omitted).) In short, the battery charging circuit of the wireless headset (electronic device) responds to energy received from the charging case (switching device) by transferring the energy to the battery at an appropriate voltage. And to state the point even more plainly, the battery charging circuit only transfers energy to the battery when the charging case (switching device) provides that energy through the inductive coupling, meaning that the battery charging circuit's function is triggered by—i.e., responsive to—the charging case.

185. A POSITA would not agree. To a POSITA, the portion of Lee relied upon by Dr. Cooperstock is not disclosed by Lee to involve anything more than the passive receipt of a charge by a battery charging circuit. In other words, electrons are flowing through Lee's Fig. 12 earpiece (incorporated by Dr. Cooperstock to the positively charged pole of its embedded battery.

186. Without more details of what might constitute the switching aspect of this alleged "switching device," a POSITA would not understand such passive receipt of electric current flowing automatically from negative to positive to be switching.

[1e] a first magnet is fully disposed within the electronic device;

187. Relying upon his arguments at Element [1b], Dr. Cooperstock argues that "a POSITA would have been motivated to incorporate the embedded magnets of Gundlach's cradle embodiment (Figures 10a-10c) into the clamshell case embodiment (Figures 18a-18b)." Ex. 1003, 67. As noted above at element [1b], a POSITA would have no such motivation, and such a combination would not have been needed, wanted or obvious to a POSITA.

[1f] the electronic device comprises at least one element selected from the group consisting of beveled edges, ridges, recessed areas, grooves, slots, indented shapes, bumps, raised shapes, and combinations thereof; configured to correspond to complimentary surface elements on the switching device;

188. Dr. Cooperstock's argument for element [1f] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

[1g] wherein the second case is decoupled from the first case by overcoming magnetic force;

189. Dr. Cooperstock relies upon the embedded magnets allegedly added from Gundlach's cradle embodiment at elements [1b] and [1e] to satisfy this element. Ex. 1003, 67. This argument is already addressed at element [1b] above.

[1h] the portable switching device is configured to activate, deactivate, or send into hibernation the portable electronic device;

190. As a threshold matter, Dr. Cooperstock's argument for element [1h] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

191. Dr. Cooperstock argues that his suggested Gundlach-Lee combination satisfies element [1h] in "four different ways." Ex. 1003, 75.

192. Dr. Cooperstock's first argument is that "[t]he energy received by the coil [and] transferred via the battery charging circuit to the battery" (Ex. 1006, 4:57-59), "suggests that the battery charging circuit of the headset (electronic device) is activated to an operative state—i.e., transferring energy to the battery—from an inoperative state—i.e., not transferring energy to the battery—in response to receiving energy from the clamshell case (switching device)." Ex. 1003, 76.

193. A POSITA would not agree. To a POSITA, the portions of Lee relied upon by Dr. Cooperstock do not disclose more than passive receipt of a charge by the

headset battery. In other words, electrons are flowing through Lee's earpiece to the positively charged pole of its embedded battery.

194. Without more details of what might constitute activation, a POSITA would not understand such passive receipt of electric current flowing automatically from negative to positive to be activating the headset designated by Dr. Cooperstock as the electronic device. Further, to the extent that Dr. Cooperstock is arguing for deactivation of the earpiece based upon this disclosure, without more details of what might constitute deactivation, a POSITA would not understand the non-receipt of current to constitute de-activating a battery powered headset.

195. Dr. Cooperstock's second argument that Lee's switch 470 is opened, thus allowing the earpiece to go into a "charging mode," which Dr. Cooperstock characterizes as activating the earpiece, and that Lee's switch 470 is closed, thus allowing the earpiece to go into a "non-charging mode," which Dr. Cooperstock characterizes as deactivating the earpiece. Ex. 1003, 77.

196. A POSITA would not agree. To a POSITA, the portion of Lee relied upon by Dr. Cooperstock again discloses nothing more than the passive receipt (or non-receipt) of a charge by the headset battery. In other words, electrons are flowing through Lee's earpiece to the positively charged pole of its embedded battery.

197. Without more details of what might constitute activation, a POSITA would not understand such passive receipt of electric current flowing automatically from

negative to positive to be activating the headset designated by Dr. Cooperstock as the electronic device. Further, without more details of what might constitute deactivation, a POSITA would not understand the non-receipt of current to constitute de-activating a battery powered headset.

198. Dr. Cooperstock's third argument is that "the entire Gundlach-Lee headset (electronic device) would transition from a deactivated state to an activated state when inserted into the charging case (switching device) with a fully depleted battery." Ex. 1003, 79.

199. A POSITA would not agree. To a POSITA, Dr. Cooperstock is again relying upon the passive receipt of a charge by the headset. In other words, electrons are flowing through Lee's earpiece to the positively charged pole of its embedded battery.

200. Neither Gundlach nor Lee disclose that a headset with a dead battery would activate when the battery was charged. Thus, Dr. Cooperstock has no basis to assert that "the entire Gundlach-Lee headset (electronic device) would transition from a deactivated state to an activated state when inserted into the charging case (switching device) with a fully depleted battery." See Ex. 1003, 79.

201. Without more details of what might constitute such activation, a POSITA would not understand such passive receipt of electric current flowing automatically from negative to positive to be activating the headset designated by Dr.

Cooperstock as the electronic device. Further, to the extent that Dr. Cooperstock is arguing for deactivation of the earpiece based upon this disclosure, without more details of what might constitute deactivation, a POSITA would not understand the non-receipt of current to constitute de-activating a battery powered headset.

202. Dr. Cooperstock's fourth argument is that a "POSITA would have been motivated to configure the clamshell charging case (switching device) of Gundlach-Lee to deactivate at least the battery-powered 'headset circuit' of the wireless headset (electronic device) when stored and charging." Ex. 1003, 80.

203. A POSITA would understand this fourth argument to be unpersuasive hindsight reconstruction. To a POSITA, headphone/headset circuit 468 in Fig. 12 would control power to the headphone consistent with whether the headset itself is powered on or off using its own on/off controls. Further, Lee's Fig. 12 embodiment relied upon by Dr. Cooperstock lacks any disclosed means for such control signals to be sent or received. The only external control signal is shown in a Fig. 14 device, not the Fig. 12 device. Ex. 1006, 5:56-6:4. Further, there is no teaching or suggestion of even those control signals being used to power or depower the headphone.

204. Without more details of what might constitute activation, deactivation or hibernation, a POSITA would not understand that merely turning on power to an earphone would constitute activating a Gundlach earpiece, or that merely turning

off power to an earphone would constitute deactivating or hibernating a Gundlach earpiece.

[1i] the electronic device plays or pauses a remote device;

205. Dr. Cooperstock's argument for element [1i] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

[1j] the switching device includes a lid and hinge attaching the lid to the switching device;

206. Dr. Cooperstock's argument for element [1j] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

[1k] the lid is recessed to configure to the electronic device;

207. Dr. Cooperstock's argument for element [1k] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging

with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

208. Further, Gundlach has a beveled earpiece (see, e.g., figures at Ex. 1003, ¶73) and a flat/planar interior lid, as follows:

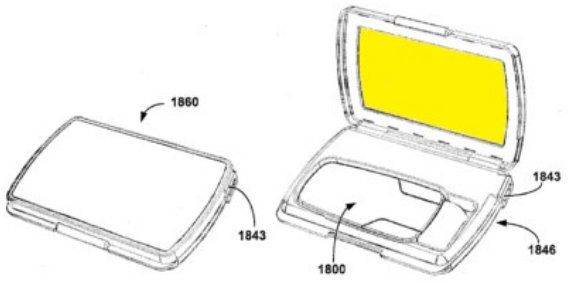


FIG. 18a FIG. 18b

Thus, a POSITA would not understand the flat clamshell case lid to be configured to the beveled earpiece. Dr. Cooperstock's apparent alternative argument is that the base of Gundlach's clamshell is its lid. Ex. 1003, 91. A POSITA would disagree that the base is the lid. Moreover, if the clamshell base was deemed its lid, then all of Dr. Cooperstock's analysis of dependent claims based upon the lid highlighted above being the lid would be invalid and further lacking in merit. Thus, a POSITA would not understand the Gundlach clamshell case lid to be recessed to configure to Gundlach's earpiece.

[1l] when coupled, the first case functions to protect the second case.

209. Dr. Cooperstock's argument for element [1l] being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient

conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. As noted above, a POSITA would not be motivated to make such a modification.

2. Claim 2

[2] The system of claim 1 wherein the switching device has a first lens.

In accordance with the above analysis, a POSITA would have not been motivated to make the alleged Gundlach-Lee combination. In any event, to a POSITA, Dr. Cooperstock's proposed Gundlach-Lee combination does not render dependent claim 2 obvious, at least because, as described above, it does not render independent claim 1 obvious.

3. Claim 8

[8] The system of claim 2 wherein the second case is configured to be nonabrasive to the first lens.

In accordance with the above analysis, a POSITA would have not been motivated to make the alleged Gundlach-Lee combination. In any event, to a POSITA, Dr. Cooperstock's proposed Gundlach-Lee combination does not render dependent claim 8 obvious, at least because, as described above, it does not render independent claim 1 or dependent claim 2 obvious.

4. Claim 9

[9] The system of claim 1 wherein the first magnet is employed in actuating the electronic circuit.

210. Dr. Cooperstock's argument for claim 9 being met assumes that Gundlach would be modified per Lee's Fig. 12 embodiment to replace efficient conductive charging with highly questionable and inefficient inductive charging with a dual role transducer coil. Dr. Cooperstock also assumes that a POSITA would be motivated to embed a magnet in the Gundlach earpiece that fits within the clamshell case, which is refuted at elements [1b] and [1e].

211. Thus, as noted above, a POSITA would not be motivated to make the modifications to Gundlach's clamshell case combination to meet the elements of claim 9, and claim 9, like claim 1 from which it depends, would not have been obvious to a POSITA.

5. Claim 11

[11] The system of claim 1 wherein the electronic device is wireless earplugs.

212. In accordance with the above analysis, a POSITA would have not been motivated to make the alleged Gundlach-Lee combination. In any event, to a POSITA, Dr. Cooperstock's proposed Gundlach-Lee combination does not render dependent claim 11 obvious, at least because, as described above, it does not render independent claim 1 obvious.

213. Further, as noted above, Gundlach's clamshell case is intended to fit in an expansion slot so it can be stored and charged in the slot. Gundlach's Fig. 18b above indicates that two earpieces would not fit in the clamshell case. Expanding the size to the Gundlach clamshell case design to accommodate a second earpiece would make it impossible to then fit this significantly larger clamshell case, now holding two earpieces, into an expansion slot.

214. Further, as noted above, if the Gundlach-Lee combination was able to be implemented, it would have an approximate 30% power loss, and adding a second earpiece to charge from the clamshell battery would deplete the clamshell battery 30% faster. Thus, a POSITA would not be motivated to add a second earpiece to an already highly inefficient Gundlach-Lee inductive charging system using highly questionable and inefficient transducer coils as the earpiece inductive charging coils.

215. Further, I am not aware there has ever been portable, especially hand-held, consumer electronic product, including an earpiece or earplug, that inductively charged directly from a battery powered clamshell case to a battery powered device. The clear reasons for this not having been implemented, namely the energy/heat loss considerations noted above, would be apparent to a POSITA. As I am not aware of any such product with a single earpiece or earplug, I also am not aware of any with two.

X. GROUND 1B: Claims 2 and 8 are not obvious in view of Gundlach, Lee, and Nishikawa

A. Overview of Nishikawa

216. Nishikawa discloses "a lens-equipped light-emitting diode device which extracts light from a light-emitting diode through a lens." Ex. 1059, [0003].

B. The Alleged Gundlach-Lee-Nishikawa Combination

217. Dr. Cooperstock contends that "[a] POSITA would have been motivated to use Nishikawa's design to leverage the stated benefits of 'excellent [] light extraction efficiency and reliability' with 'production cost[s] [that] can be reduced.'" Ex. 1003, 110.

C. Analysis of Claims 2 and 8

1. Claim 2

[2] The system of claim 1 wherein the switching device has a first lens.

218. As already noted above at claim 1, to a POSITA, the Gundlach-Lee combination does not disclose or render obvious Gundlach's clamshell case being a switching device. Dr. Cooperstock does not seek to use Nishikawa to supply any other elements for claim 2 besides Gundlach's alleged switching device, i.e., its clamshell case, being having a first lens. To a POSITA, the Gundlach-Lee-Nishikawa combination does not render dependent claim 2 obvious, at least

because, as described above, the Gundlach-Lee combination does not render independent claim 1 obvious.

2. Claim 8

[8] The system of claim 2 wherein the second case is configured to be nonabrasive to the first lens.

219. As already noted above at claim 1, to a POSITA, the Gundlach-Lee combination does not disclose or render obvious Gundlach's clamshell case being a switching device. Dr. Cooperstock does not seek to use Nishikawa to supply any other elements for claim 8 besides the second case being configured to be nonabrasive to the first lens. To a POSITA, the Gundlach-Lee-Nishikawa combination does not render dependent claim 8 obvious, at least because, as described above, the Gundlach-Lee combination does not render independent claim 1 obvious.

XI. GROUND 1C: Claim 11 is not obvious in view of Gundlach, Lee, and Rosener

A. Overview of Rosener

220. Rosener describes "a wireless headset comprising first and second wireless earphones 502, 504." Ex. 1050, [0030]; Fig. 5.

B. The Alleged Gundlach-Lee-Rosener Combination

221. Dr. Cooperstock contends that "a POSITA would have been motivated and found it obvious to combine Gundlach-Lee with Rosener's teachings to provide a Bluetooth stereo headset having two wireless earpieces that are also not wired together.

C. Analysis of Claim 11

[11] The system of claim 1 wherein the electronic device is wireless earplugs.

222. Dr. Cooperstock does not seek to use Rosener to supply any other elements for claim 11 besides Gundlach's wireless earplug being duplicated into two "wireless earplugs." To a POSITA, the Gundlach-Lee combination does not render dependent claim 11 obvious, at least because, as described above, the Gundlach-Lee combination does not render independent claim 1 obvious. Further, the above Gundlach-Lee analysis of claim 11 is incorporated here, namely, that Gundlach's clamshell case could not fit a second headset, that a POSITA would not be motivated to expand the size of the Gundlach clamshell case design to accommodate a second headset (because it would not fit an expansion slot as intended), and a POSITA would not be motivated use such an inefficient Lee Fig. 12 inductive charging system for charging two headsets, which would duplicate the inefficiency of the first earpiece. Accordingly, the alleged Gundlach-Lee-Rosener combination would not render claim 11 obvious.

XII. GROUND 1D: Claims 3 and 7 are not obvious in view of Gundlach, Lee, and Brown.

A. Overview of Brown

223. Brown's is entitled "OPTICAL HEADSET USER INTERFACE." It makes certain disclosures of headset user interfaces, specifically headset user input mechanisms, including an "optical line scanner on a lightweight headset, where the optical line scanner detects finger movements, such as tapping, sliding forward and sliding backward to be translated into various inputs, such as volume up and down, menu scrolling, and other headset user interface." Ex. 1008, 2:1-9. Brown's headset 2 comprises narrow finger pad 4 serving as a scanning surface on which a user finger is placed and scanned by the user wiping his finger across the scanning surface. Ex. 1008, 3:14-18. Light from light source 22 from within the headset housing is reflected from the optically transparent finger pad 4 and focused by lens 24 on an optical sensor 26. Ex. 1008, 4:18-23. Such light forms an image of a finger which is captured by optical sensor 26. Ex. 1008, 4:35-37. Other such images of fingers are used to determine the user's gesture, for example double tapping, which is "translated" into a predefined input or command. Ex. 1008, 4:49-51.

B. The Alleged Gundlach-Lee-Brown Combination

224. As a threshold matter, a POSITA would not see Brown as analogous art to that disclosed in the '320 patent. The only apparent analogy is that the electronic device of the '320 patent can be wireless earplugs and Brown pertains to a specific variety of wireless earbuds with optical user interfaces. The field of endeavor of the '320 patent is, broadly, speaking, magnetic switching devices that activate, deactivate or hibernate an electronic device. The field of endeavor for Brown is a very specific, optical user interface for headsets. Nor would a POSITA understand Brown's disclosure to be reasonably pertinent to problems encountered by the '320 inventor. The type of interface for wireless earbuds and/or an optical interface for same was not a problem with the '320 inventor was involved.

225. To a POSITA, Dr. Cooperstock is merely using hindsight reconstruction to advocate drastically modifying Gundlach's headset with Brown's optical headset user interface, merely for the reason of supplying a lens on the headset.

226. A POSITA as defined by Dr. Cooperstock or me would not have the knowledge, experience, or expertise to implement Brown's highly complex optical scanning system.

227. Further, a POSITA would not be motivated to dramatically increase the cost and complexity of Gundlach's headsets to add Brown's optical user interface.

C. Analysis of Claims 3 and 7

[3] The system of claim 1 wherein the electronic device has a second lens.

[7] The system of claim 3 wherein the first case is configured to be nonabrasive to the second lens.

228. As noted in the above discussion of Brown, (1) a POSITA as defined by Dr. Cooperstock or me would not have the knowledge, experience, or expertise to implement Brown's highly complex optical scanning system; (2) a POSITA would not be motivated to dramatically increase the cost and complexity of Gundlach's headsets to add Brown's optical user interface; and (3) Dr. Cooperstock is merely relying upon hindsight reconstruction. Further, as noted above, to a POSITA, the Gundlach-Lee combination would not render claim 1 obvious.

229. For these reasons, a POSITA would not deem either of claims 3 of 7 obvious in view of the alleged Gundlach-Lee-Brown combination.

XIII. GROUND 1E: Claims 4, 5, 10, 12, and 13 are not obvious in view of Gundlach, Lee, and Mak-Fan.

A. Overview of Mak-Fan

230. Mak-Fan is entitled "HOLSTER FOR HAND HELD ELECTRONIC DEVICE." Dr. Cooperstock relies upon Mak-Fan's Fig. 4 embodiment comprising electronic device 2 held in holster 1 with a fold-over flap 10. Ex. 1010, [0014], [0019]. The fold-over flap 10 includes a metal element 11 engaging a magnet 4 on

the body of the case to hold the holster 1 closed. Ex. 1010, [0014], [0019], Fig. 1; Fig. 4. Electronic device 2 comprises a Hall effect sensor, which is not shown, and electronic device 2 is "programmed so that when the Hall effect sensor detects the magnet, the device is disabled." Ex. 1010, [0014]. This is depicted in Mac-Fan (except for the Hall sensor, not shown), as follows:

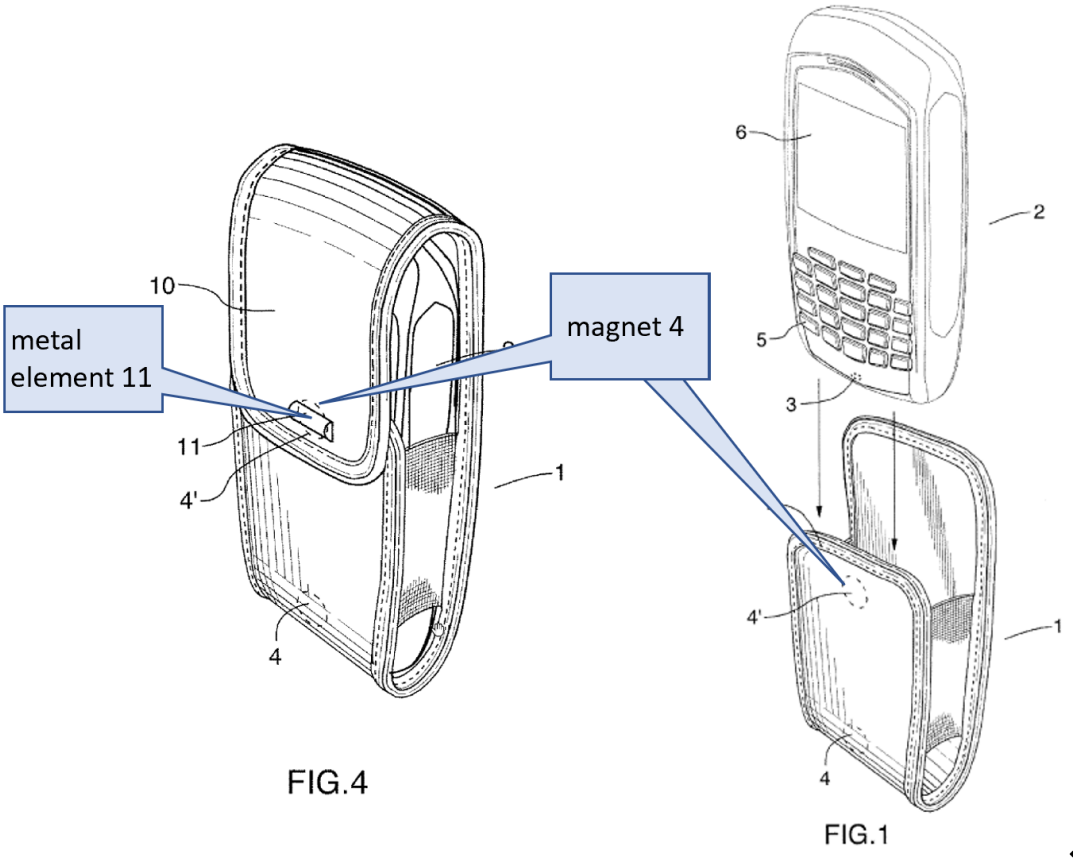


FIG.4

FIG.1

B. The Alleged Gundlach-Lee-Mak-Fan Combination

231. To a POSITA, Dr. Cooperstock is merely using hindsight reconstruction to significantly modify both Gundlach and the alleged Gundlach-Lee combination with Mak-Fan.

232. Contrary to Dr. Cooperstock's assertion, a POSITA contemplating the alleged Gundlach-Lee combination comprising a clamshell case would not have been motivated to integrate Mak-Fan's above-discussed teaching of a magnet closure element. A POSITA would readily understand, including based upon size limitations inherent in the lip of the clamshell case, that Mac-Fan's magnetic closure with metal element 11 with magnet 4 would be significantly less secure than Gundlach's mechanical snap fastener:

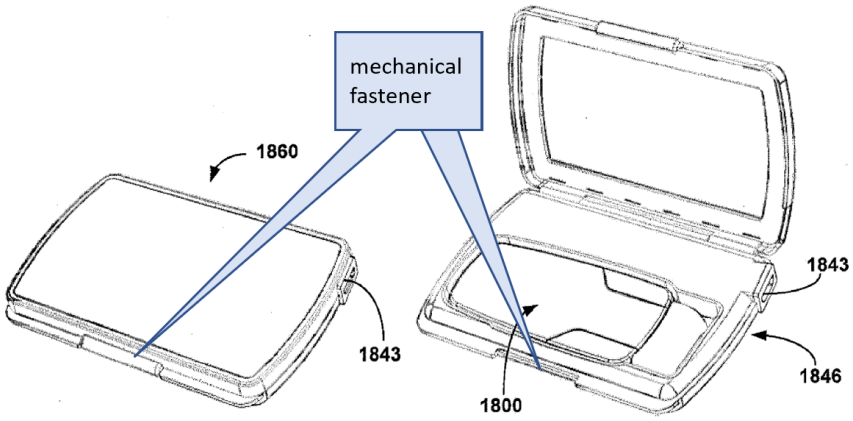


FIG. 18a *FIG. 18b*

233. Dr. Cooperstock acknowledges that a magnetic fastener would have a "lesser closure force." Ex. 1003, 134. Although a POSITA might be aware of magnetic fasteners, a POSITA would have no motivation to replace a secure mechanical fastener for Gundlach's case with a less secure magnetic one. Such a change, besides coming only from Dr. Cooperstock's hindsight, would result in a less secure clamshell, and make it more likely that Gundlach's headset would be

damaged if the clamshell case was dropped. This consideration would outweigh Dr. Cooperstock's stated considerations, including fatigue. A POSITA would understand that snap closures are commonplace and that one would very likely outlast the useful life of a Gundlach-Lee device by a significant degree.

234. A POSITA would view Mak-Fan's less secure magnetic fastener as being potentially appropriate for Mak-Fan's case because Mak-Fan's holster-type case would be mounted on a belt, oriented vertically, and it has a frictional, elastic hold on an inserted phone. None of these considerations would apply to Gundlach's solid clamshell case, thus weighing heavily in favor of Gundlach's more secure mechanical snap closure.

235. Thus, a POSITA would not have been motivated to replace Gundlach's secure mechanical fastener with a less secure magnetic fastener, nor (as explained below at claim 10), would a POSITA been motivated to re-engineer Gundlach or Gundlach-Lee to make the closing of the clamshell the case the causal event for charging. It would not have been obvious for a POSITA to make the substantial and unwarranted hindsight modifications suggested by Dr. Cooperstock's alleged Gundlach-Lee-Mak-Fan combination.

C. Analysis of Claims 4, 5, 10, 12, and 13

1. Claim 4

[4] The system of claim 1 wherein the lid has a second magnet disposed within it.

236. Dr. Cooperstock does not seek to use Mak-Fan to supply any other elements for claim 4 besides a second magnet disposed in the lid of Gundlach's clamshell case. Dr. Cooperstock alleges that this additional element is met by combining Mak-Fan, not that it would be obvious in view of Mak-Fan's teachings. Ex. 1003, 135-136.

237. As noted above, a POSITA would not have been motivated to replace Gundlach's secure mechanical fastener with a less secure magnetic fastening system, and it would not have been obvious for a POSITA to make such an unwarranted modification, via combining Mak-Fan, to the alleged Gundlach-Lee combination.

238. Moreover, even if the teachings of Mak-Fan were applied to the alleged Gundlach-Lee combination, Dr. Cooperstock's analysis, see Ex. 1003, 135-136, is premised upon his mistaken belief that Mak-Fan discloses a magnet in its lid flap. However, to a POSITA, Mak-Fan clearly does not disclose a magnet in its lid flap. Rather, as depicted above, Mak-Fan discloses a magnet 4 in the main body of its case and metal element 11 in the flap or lid. Ex. 1010, [0014], [0019], Fig. 1; Fig. 4.

239. Dr. Cooperstock writes that "Mak-Fan makes clear that '[i]t is known to have a magnet in the holster.'" Ex. 1003, 136 (quoting Ex. 1010, [0002]. Indeed, as noted above, Mak-Fan discloses a magnet in its holster, not in the alleged lid to the holster.

240. To a POSITA, the asserted Gundlach-Lee-Mak-Fan combination does not render dependent claim 4 obvious, at least because, as described above, the Gundlach-Lee combination does not render independent claim 1 obvious, and the alleged Gundlach-Lee-Mak-Fan combination does not render dependent claim 4 obvious. Moreover, contrary to Dr. Cooperstock's misunderstanding of Mak-Fan, it does not disclose a magnet in the lid of the phone case, and thus Mak-Fan does not supply the claim 4 element that Dr. Cooperstock seeks to supply to the Gundlach-Lee combination.

2. Claim 5

[5] The system of claim 4 wherein the lid is configured to employ the second magnet to secure the lid in a closed position by magnetically coupling to the first case.

241. Dr. Cooperstock does not seek to use Mak-Fan to supply any other elements for claim 5 besides the lid being configured to employ the allegedly present second magnet to secure the lid in a closed position by magnetically coupling to the first case. Dr. Cooperstock alleges that this additional element is met by combining

Mak-Fan, not that it would be obvious in view of Mak-Fan's teachings. Ex. 1003, 138-140.

242. As noted above, a POSITA would not have been motivated to replace Gundlach's secure mechanical fastener with a less secure magnetic fastening system, and it would not have been obvious for a POSITA to make such an unwarranted modification, via combining Mak-Fan, to the alleged Gundlach-Lee combination.

243. As further noted above, even if the teachings of Mak-Fan were applied to the alleged Gundlach-Lee combination, Dr. Cooperstock's analysis, see Ex. 1003, 135-136, is premised upon his mistaken belief that Mak-Fan discloses a magnet in its lid flap. However, to a POSITA, Mak-Fan clearly does not disclose a magnet in its lid flap. Rather, as depicted above, Mak-Fan discloses a magnet 4 in the main body of its case and metal element 11 in the lid. Ex. 1010, [0014], [0019], Fig. 1; Fig. 4. Mak-Fan's stated purpose in having magnet 4 in the main body or holster of its case is so that magnet 4 can interact with the Hall effect sensor in Mak-Fan's phone, to turn off the phone's screen when the phone is being inserted into the case.

244. Dr. Cooperstock writes that "Mak-Fan makes clear that '[i]t is known to have a magnet in the holster.'" Ex. 1003, 136 (quoting Ex. 1010, [0002]. Indeed,

as noted above, Mak-Fan discloses a magnet in its holster, not in the alleged lid to the holster.

245. To a POSITA, the asserted Gundlach-Lee-Mak-Fan combination does not render dependent claim 4 obvious, at least because, as described above, the Gundlach-Lee combination does not render independent claim 1 obvious, and the alleged Gundlach-Lee-Mak-Fan combination does not render dependent claim 4 obvious. Moreover, contrary to Dr. Cooperstock's misunderstanding of Mak-Fan, it does not disclose a magnet in the lid of the phone case, and thus Mak-Fan does not supply the claim 4 element that Dr. Cooperstock seeks to supply to the Gundlach-Lee combination.

3. Claim 10

[10] The system of claim 4 wherein the second or a third magnet is employed in the lid to actuate the electronic circuit.

246. Dr. Cooperstock does not seek to use Mak-Fan to supply any other elements for claim 10 besides an alleged second or a third magnet being employed in the lid of Gundlach's clamshell case to actuate an electronic circuit. As noted at claim 4 above, the alleged Gundlach-Lee-Mak-Fan combination does not render claim 4 (from which claim 10 depends) obvious, including because Mak-Fin does not teach a lid having a second magnet disposed within it.

247. To a POSITA, the alleged Gundlach-Lee-Mak-Fan combination does not render dependent claim 10 obvious, at least because, as described above, the alleged Gundlach-Lee-Mak-Fan combination does not render independent claim 1 or dependent claim 4 obvious.

248. Dr. Cooperstock's theory for claim 10 here is that "Mak-Fan teaches a mobile device with a Hall effect sensor responsive to a magnet disposed in the holster-style case." Ex. 1003, 138-139 (citing Ex. 1010, [0014], [0019]). His theory is further that "…when the Hall effect sensor detects the magnet, the device is disabled, or at least certain elements thereof are disabled." Ex. 1003, 139 (quoting Ex. 1010, [0014]).

249. As a threshold matter, as noted above, Mak-Fin does not teach a lid having a second magnet disposed within it. Thus, Mak-Fan does not teach that its Hall sensor is actuated by a magnet in Mak-Fan's alleged lid.

250. Moreover, pertinent to claim 10, Mak-Fan teaches that its Hall sensor is actuated by magnet 4 in the body of Mak-Fan's holster. Mak-Fan states that, "[The device has a Hall effect sensor 3 embodied therein and the holster has a first magnet 4 positioned to align with the sensor when the device is fully holstered. The device is programmed so that when the Hall effect sensor detects the magnet, the device is disabled, or at least certain elements thereof are disabled…" Ex. 1001, [0014].

251. Dr. Cooperstock's' analysis at Ex. 1003, 138-139 is premised upon his mistaken belief that Mak-Fan discloses a magnet in its alleged lid actuating a Hall sensor. However, to a POSITA, Mak-Fan clearly does not. Rather, as noted above, Mak-Fan the Hall sensor 3 being actuated by magnet 4 in the body of the holster case.

252. Dr. Cooperstock's re-engineering of Mak-Fan's case would apparently switch magnet 4 and metal element 11 to have metal element 11 in the main body of its case and magnet 4 in the lid. A POSITA would appreciate that such a re-design would completely frustrate Mak-Fan's design and intention, because Mak-Fan's Hall sensor would not be actuated by metal element 11, and thus the Hall sensor would not perform its intended function, which Dr. Cooperstock appears to rely upon for activating and deactivating.

253. For a motivation to combine his mistaken understanding of Mak-Fan with Lee, Dr. Cooperstock writes that,

> In my previous analysis at Element [1h], I noted Lee's teaching that the wireless headset includes a "switch" that automatically closes to actuate the battery circuit when positioned "near" the clamshell case. (Lee, 5:30-40.) While Lee does not disclose the implementation details of the switch, a POSITA would have viewed the Hall effect sensor described by Mak-Fan as a suitable solution… And the POSITA would have been motivated to

employ a Hall effect sensor for this purpose based on [] Mak-Fan's disclosure of detecting magnets to determine when a device is holstered…

Ex. 1003, 140.

254. A POSITA would not agree that Lee does not disclose implementation details for switch 470 opening and closing. Lee teaches that switch 470 is opened or closed by switch control signal 471, and that, preferably, switch 470 can sense when the headphone/headset apparatus 460 is near the power adapter, so that it automatically closes when near the power adapter and automatically opens when away from the power adapter. Ex. 1006, 5:12-40.

255. Further, a POSITA would be aware that Gundlach's electrical contacts would automatically start charging the earpiece when contact was made, irrespective of whether Gundlach's clamshell lid was shut. Likewise, Lee's design and intent that Dr. Cooperstock seeks to incorporate into the alleged Gundlach-Lee combination is for the earpiece to charge automatically when put in proximity to a wireless coil. Ex. 1006, 5:12-40. A POSITA would favor these charging criteria rather than just the shutting of the Gundlach case with an earpiece inside, because they, unlike the alleged Gundlach-Lee-Mak-Fan combination, would allow a POSITA to charge the earpiece when the clamshell lid is open or when a foreign object is preventing it from fully closing.

256. A POSITA would further appreciate that a significant part of Dr. Cooperstock's theory for the alleged Gundlach-Lee combined clamshell case being a switching device of element [1a] is the automatic opening of switch 470 when the earpiece is in proximity to a wireless charging coil, and the automatic closing of switch 470 when the earpiece is in not in proximity to a wireless charging coil. Thus, this alleged new means for institution or cessation of charging by combining Mak-Fan with the alleged Gundlach-Lee combination in the manner alleged by Dr. Cooperstock would appear to negate much of his theory for elements [1a] - a portable switching device; and [1h] - the portable switching device is configured to activate, deactivate, or send into hibernation the portable electronic device. To a POSITA, Dr. Cooperstock's proposed Gundlach-Lee-Mak-Fan Combination for dependent claims 4, 5, 10, 12, and 13 is thus apparently opposed to his proposed Gundlach-Lee combination with respect to these two elements of independent claim 1.

257. A POSITA making the alleged Gundlach-Lee combination would not be motivated to contravene Lee's design and intent for the earpiece to charge when put in proximity to a wireless coil. As noted above, Dr. Cooperstock's contrary Gundlach-Lee-Mak-Fan combination would not allow the Gundlach earpiece to charge when not placed in a closed clamshell case. As noted above, this would

undesirably not allow a POSITA to charge the earpiece when the clamshell lid is open or when a foreign object is preventing it from fully closing.

258. Moreover, would also make Gundlach's earpieces incompatible with their intended design of being chargeable by micro or mini-USB and being chargeable inside an expansion slot for a laptop or phone. Ex. 1005, [0056]. A POSITA would not be motivated to change such fundamental, intended and desirable charging characteristics of Gundlach's earpieces merely for the sake of Dr. Cooperstock's hindsight reconstruction or for any other reasons advanced by Dr. Cooperstock.

259. Thus, a POSITA would not have been motivated to replace Gundlach's secure mechanical fastener with a less secure magnetic fastener, nor would a POSITA been motivated to re-engineer Gundlach or Gundlach-Lee by adding Mak-Fan's Hall sensor to the earpiece to make the closing of the clamshell the case the causal event for charging. It would not have been obvious for a POSITA to make the substantial and unwarranted hindsight modifications suggested by Dr. Cooperstock's alleged Gundlach-Lee-Mak-Fan combination

4. Claim 12

[12] The system of claim 1 wherein the system further comprises a sensor that can be activated using a magnet.

260. Dr. Cooperstock's analysis for claim 12 is to refer to his claim 10 analysis. Ex. 1003, 141. In response, see my claim 10 analysis above, and also my analysis above of the lack of motivation to make the alleged Gundlach-Lee-Mak-Fan combination.

5. Claim 13

[13] The system of claim 5 wherein the system further comprises a sensor that can be actuated using a magnet.

261. Dr. Cooperstock's analysis for claim 13 is to refer to his claim 10 analysis. Ex. 1003, 142. In response, see my claim 10 analysis above, and also my analysis above of the lack of motivation to make the alleged Gundlach-Lee-Mak-Fan combination.

262. Further, and including as noted above, if Dr. Cooperstock's theory of Mak-Fan's alleged teachings was applied to the alleged Gundlach-Lee combination, then magnet 4 would be on fold-over flap 10 and metal element 11 would be in the holster case. This would violate the intent and principle of design of Mak-Fan, which, as noted above, seeks to have magnet 4 in the holster to actuate the Hall sensor in the phone. If the magnet was moved to flap 10 as advocated for Dr. Cooperstock's hindsight re-construction, Mak-Fan's case would no longer actuate the Hall sensor. Instead, flap 10 would need to be opened in order to insert the

phone, and metal element 11 relocated to the holster case would have no effect on the Hall sensor in the phone.

XIV. Ground 2A: Claims 1, 2, 8, 9, and 11 are not obvious in view of Gundlach, Lee, and Kim.

A. Overview of Kim

263. U.S. Publication No. 2011/0117851 to Kim discloses an embodiment wherein a "conventional Bluetooth Stereo Headset is able to remotely control functions of a media player in a Bluetooth device using . . . an Audio Video Remote Control Profile (AVRCP)"). Ex. 1007, [0006] [0007]. In this embodiment, "an AVRCP control signal, generated by the Bluetooth stereo headset, may be transmitted to the Bluetooth device . . . it controls a media playing function"), Ex. 1007, [0036].

B. The Alleged Gundlach-Lee-Kim Combination

264. Dr. Cooperstock writes that "where Ground 1A relies on Gundlach's disclosure to reach the play/pause feature of Element [1i], Ground 2A relies on the additional disclosure of Kim to reach this feature." Ex. 1003, 143.

C. Analysis of Element [1i]

1. Claim 1

[1i] the electronic device plays or pauses a remote device;

265. Dr. Cooperstock does not seek to use Kim to supply any other elements for claim 1 besides Gundlach's element [1i] quoted above. To a POSITA, the alleged Gundlach-Lee-Kim combination does not render claim 1 obvious for at least the same reasons stated above with respect to the alleged Gundlach-Lee combination.

XV. GROUND 2B: Claims 2 and 8 are not obvious in view of Gundlach, Lee, Kim, and Nishikawa.

266. Dr. Cooperstock writes that his "Ground 2B is identical to, and incorporates the analysis of, Ground 1B," except that "[w]here Ground 1B relies on Gundlach's disclosure to reach the play/pause feature of Element [1i] in independent claim 1, from which claims 2 and 8 depend, Ground 2B relies on the additional disclosure of Kim to reach this feature. Ex. 1003, 150.

267. Dr. Cooperstock does not seek to use Kim to supply any other elements for dependent claims 2 or 8 besides Gundlach's element [1i] found in independent claim 1. To a POSITA, the alleged Gundlach-Lee-Kim combination does not render either claim 2 or claim 8 obvious for at least the same reasons stated above with respect to the alleged Gundlach-Lee combination not rendering independent claim 1 or dependent claims 2 or 8 obvious.

XVI. GROUND 2C: Claim 11 is not obvious in view of Gundlach, Lee, Kim, and Rosener.

268. Dr. Cooperstock writes that his "Ground 2C is identical to, and incorporates the analysis of, Ground 1C," except that Ground 2C relies on Lee's disclosure to reach the play/pause feature of element [1i] in independent claim 1, from which claim 11 depends. Ex. 1003, 151.

269. Dr. Cooperstock does not seek to use Kim to supply any other elements for dependent claim 11 besides Gundlach's element [1i] found in independent claim 1. To a POSITA, the alleged Gundlach-Lee-Kim combination does not render claim 11 obvious for at least the same reasons stated above with respect to the alleged Gundlach-Lee combination not rendering independent claim 1 or dependent claim 11 obvious.

XVII. GROUND 2D: Claims 3 and 7 are not obvious in view of Gundlach, Lee, Kim, and Brown.

270. Dr. Cooperstock writes that his "Ground 2D is identical to, and incorporates the analysis of, Ground 1D," except that Ground 2D relies on Kim's disclosure to reach the play/pause feature of element [1i] in independent claim 1, from which claims 3 and 7 depend. Ex. 1003, 152.

271. Dr. Cooperstock does not seek to use Kim to supply any other elements for the alleged Gundlach-Lee-Brown combination except to supply element [1i] found in independent claim 1 with respect to dependent claims 3 and 7. To a POSITA, the alleged Gundlach-Lee-Brown combination does not render claims 3 and 7

obvious for at least the same reasons stated above with respect to the alleged Gundlach-Lee-Brown combination not rendering independent claim 1 or dependent claims 3 and 7 obvious.

XVIII. GROUND 2E: Claims 4, 5, 10, 12, and 13 are not obvious in view of Gundlach, Lee, Kim, and Mak-Fan.

272. Dr. Cooperstock writes that his "Ground 2E is identical to, and incorporates the analysis of, Ground 1E," except that Ground 2E relies on Kim's disclosure to reach the play/pause feature of element [1i] in independent claim 1, from which claims 4, 5, 10, 12, and 13 depend. Ex. 1003, 153.

273. Dr. Cooperstock does not seek to use Kim to supply any other elements for the alleged Gundlach-Lee-Mak-Fan combination except to supply element [1i] found in independent claim 1 with respect to dependent claims 4, 5, 10, 12, and 13. To a POSITA, the alleged Gundlach-Lee-Mak-Fan-Kim combination does not render claim 11 obvious for at least the same reasons stated above with respect to the alleged Gundlach-Lee-Mak-Fan combination not rendering independent claim 1 or dependent claims 4, 5, 10, 12, and 13 obvious.

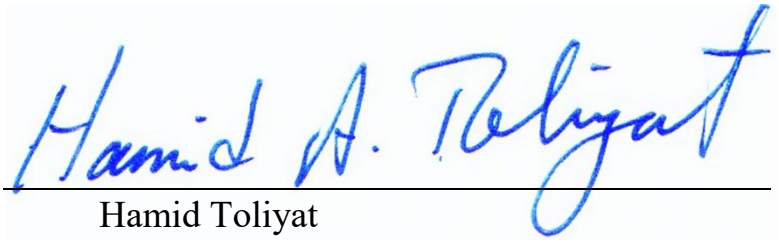
XIX. CONCLUSION

274. For the foregoing reasons, to a POSITA, Dr. Cooperstock's asserted grounds 1A-E and 2A-E lack merit or persuasiveness, and a POSITA would not deem the challenged claims, namely '320 claims 1-5 and 7-13 to be obvious in view of

Gundlach, Lee. and Dr. Cooperstock's other cited references in their asserted combinations. I reserve the right to amend my opinions as other or different information becomes available.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed in Florida on this 10th day of December, 2021.



Hamid Toliyat