

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner,

v.

INGENIOSPEC, LLC.
Patent Owner.

Patent No. 12,044,901

Inter Partes Review No. IPR2026-00253

DECLARATION OF JOSHUA R. SMITH

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Exhibit List

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U.S. Patent No. 12,044,901 to Howell et al.	EX1001
Prosecution History of U.S. Patent No. 12,044,901	EX1002
Declaration of Joshua R. Smith	EX1003
U.S. Patent No. 10,222,617 to Jannard	EX1004
U.S. Patent No. 7,046,230 to Zadesky et al.	EX1005
U.S. Patent No. 7,010,332 to Irvin et al.	EX1006
U.S. Patent No. 6,349,001 to Spitzer	EX1007
U.S. Patent No. 7,313,423 to Griffin et al.	EX1008
U.S. Patent No. 7,187,960 to Abreu	EX1009
U.S. Patent Appl. Pub. No. 2004/0209489 to Clapper	EX1010
U.S. Patent No. 6,433,760 to Vaissie et al.	EX1011
Curriculum Vitae of Joshua R. Smith	EX1012

I, Joshua R. Smith, make this declaration in connection with the proceeding identified above.

I. INTRODUCTION

1. I have been retained by counsel for Apple Inc. (“Petitioner” or “Apple”) in connection with the proceeding identified above. I submit this declaration in support of Apple’s Petition for *Inter Partes* Review of United States Patent No. 12,044,901 (EX1001, “the ’901 patent”).

2. I have reviewed and am familiar with the 901 patent, which issued on July 23, 2024. I understand that the Petition for *inter partes* review that accompanies this Declaration (the “Petition”) seeks to cancel claims 1-59 (the “challenged claims”) of the ’901 patent.

3. In preparation for this Declaration, I reviewed the exhibits provided by the Petitioner, including the ’901 patent. In addition to the above exhibits and other documents, my opinions herein are based upon my personal knowledge, professional judgment, education, and experience gained through my years as a computer scientist, professor, and consultant.

4. The ’901 patent is generally directed to wireless wearable devices. (EX1001, 5:62-7:22.) I am familiar with the technology described in the ’901 patent as of its earliest possible priority date of October 11, 2005, as well as its actual U.S. filing date of October 2, 2023.

5. I have been asked to consider how a person of ordinary skill in the art (“POSITA”) would have understood the challenged claims in light of the disclosure of the ’901 patent. I also have been asked to consider how a POSITA would have understood the following prior art references:

Prior Art Reference	Abbreviation
U.S. Patent No. 10,222,617 to Jannard	Jannard (EX1004)
U.S. Patent No. 7,046,230 to Zadesky et al.	Zadesky (EX1005)
U.S. Patent No. 7,010,332 to Irvin	Irvin (EX1006)
U.S. Patent Appl. Pub. No. 2004/0209489 to Clapper	Clapper (EX1010)
U.S. Patent No. 6,433,760 to Vaissie et al.	Vaissie (EX1011)

6. Further, I have been asked to consider and provide my technical review, analysis, insights, and opinions regarding whether a POSITA would have understood the disclosures of the above references to render obvious the challenged claims.

7. I am being paid \$650 per hour for my work on this matter. My compensation is not dependent on the outcome of this *inter partes* review and in no way affects the substance of my statements in this declaration.

8. I reside in Seattle, Washington, USA.

II. SUMMARY OF GROUNDS

9. I understand that the Petition for inter partes review of the '901 patent asserts the following grounds of unpatentability:

Ground	35 U.S.C. § ¹	Claim(s)	Prior Art References
1	103	1-4, 8, 10, 11, 16, 17	Jannard
2	103	5-7	Jannard, Zadesky
3	103	12-15, 18-27, 32-39, 41-45, 47-50, 59	Jannard, Irvin
4	103	28-31, 56-58	Jannard, Irvin, Zadesky
5	103	9	Jannard, Clapper
6	103	40, 46	Jannard, Irvin, Clapper
7	103	51-55	Jannard, Irvin, Vaissie

III. QUALIFICATIONS AND EXPERTISE

10. In formulating my opinions, I have relied upon my knowledge, training, and experience. My qualifications are stated more fully in my curriculum vitae, which has been provided as EX1012. Here, I provide a brief summary of my qualifications.

¹ Throughout this Declaration, all statutory citations are pre-AIA based on the earliest possible priority date of October 11, 2005.

11. I am the Milton and Delia Zeuschel Professor at the University of Washington, jointly appointed in the Department of Electrical and Computer Engineering and in the Allen School. I am providing this Declaration as an independent professional working through my consulting company, Sensor Expert LLC, not as a representative of the University of Washington or any other organization.

12. I have at least twenty years of experience with wireless communication, wireless sensing, and audio technology. I have worked on wireless systems as an engineer, in academic research, and as a supervisor of academic research. I am a Fellow of the National Academy of Inventors (NAI). According to the NAI, "Election to NAI Fellow status is the highest professional distinction accorded solely to academic inventors." I am also a Fellow of the Institute of Electrical and Electronic Engineers ("IEEE"). According to the IEEE, the "Grade of Fellow is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments." The specific citation in my elevation to Fellow was for "contributions to far- and near-field wireless power, backscatter communication and electric field sensing." At most one tenth of one percent of the worldwide membership can join the ranks of IEEE Fellow each year.

13. I received my Ph.D. and S.M. degrees in Media Arts and Sciences from the Massachusetts Institute of Technology. This was an interdisciplinary

program at the MIT Media Lab. As part of this program, my group, led by Neil Gershenfeld, engaged with the fields of Applied Physics, Electrical Engineering, and Computer Science. I also received a M.A. in Physics from Cambridge University, and dual B.A. degrees in Computer Science and Philosophy from Williams College. As a graduate student at the MIT Media Lab, I worked on numerous projects relating to proximity sensing, wearable technology and audio. I developed a prototype proximity sensor for a mobile phone that used capacitive sensing to detect proximity of the phone to a user's head. For the Brain Opera, which premiered in 1996 at Lincoln Center in New York City, I developed firmware for numerous custom digital musical instruments. For the 1997 Wearable Computing event at the Media Lab, I collaborated on two wearable audio projects: a musical dress which used capacitive sensing to convert body motion into sound, and a musical jacket with a conductive thread embroidered keypad. I designed a custom Midi synthesizer circuit board used in both of these projects. In addition to science/engineering publications like SIGGRAPH, both projects appeared in Vogue, the fashion magazine.

14. From 2004 to 2011, I worked at Intel Corporation, where I rose to the rank of Principal Engineer before leaving Intel to become a professor. At Intel, I started the Wireless Identification and Sensing Platform ("WISP") project, in which we designed and built wirelessly powered and wirelessly charged sensor

tags from the ground up. We demonstrated a number of firsts, such as the first wirelessly powered accelerometer sensor. In the area of audio, we developed a wirelessly powered speaker that produced sound with no wires or batteries, by directly converting strong electromagnetic signals into audio signals.

15. At Intel, I also served on a committee that made patent filing decisions about wireless technology for the entire company. I also served on Intel's Strategic Patent Team for wireless technology, which allocated patent filing budgets for each year for the company among various technical subjects within the wireless area. Prior to Intel, I was Chief Scientist at Escher Group and Director of Escher Labs, where I worked on a variety of sensor systems.

16. In 2011, I joined the University of Washington as an Associate Professor. I received tenure in 2014, and was promoted to Professor and awarded the Milton and Delia Zeuschel Professorship in 2017. At the University of Washington, I currently lead research in a number of areas including wireless sensing, wireless communication, and other topics. At UW, I have worked on projects at the intersection of wireless and audio, such as a battery-free wireless microphone, and a battery free phone, which uses ultra-low power methods to convert between radio waves and audio in both directions: phone to basestation and basestation to phone. My research in these areas has been funded by Federal agencies including the National Science Foundation (NSF), National Institutes for

Health (NIH), the Department of Defense (DoD), Defense Advanced Research Projects Agency (DARPA), the Advanced Research Projects Agency for Energy (ARPA-E), and the National Aeronautics and Space Administration (NASA). It has also been funded by corporations such as Intel, Google, Bosch, Microsoft, and Amazon. I teach or have taught wireless communication, wireless power, analog electronics, digital circuits and systems, and other topics. In my wireless communication class, I also cover selected topics in wireless transmission of audio signals, as well as synthesis of audio signals. I am also the Electrical and Computer Engineering Department's Associate Chair for Professional Programs. In this role, I make decisions about which courses are offered in the Department's Professional Masters Degree Program and often who will teach them. I recently added a course on synthesis and processing of digital audio. I have also co-founded three startup companies, each based on technology developed in my lab.

17. I am a named inventor on 58 U.S. patents and at least 16 foreign patents. At least 27 of my U.S. patents and 13 of my foreign patents have been licensed. I have published over 191 articles and edited one book, entitled "Wirelessly Powered Sensor Networks and Computational RFID." My work has been cited over 27,000 times, and my "H-index," which measures publication impact, is 80. My nine most cited works all relate to wireless technology.

IV. LEGAL UNDERSTANDING

A. My Understanding of Claim Construction

18. I have been advised and understand that claim construction is a matter of law and that the final claim construction will ultimately be determined by the Patent Trial and Appeal Board (the “Board”). I have been advised and understand that patent claims are construed from the perspective of one of ordinary skill in the art at the time the claimed invention was made. I have further been advised and understand that, in an *inter partes* review, patent claims are to be construed according to the methodology set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). In performing my analysis and rendering my opinions, I have interpreted claim terms by giving them the ordinary and customary meaning they would have to the POSITA reading the ’901 patent as of the earliest possible priority date of October 11, 2005, and in light of its specification and file history.

B. A Person Having Ordinary Skill in the Art

19. I have been advised and understand that a POSITA is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity, not an automaton. With this understanding, based on the disclosures of the ’901 patent and the assumed priority date of October 11, 2005, a POSITA would have had a Bachelor’s degree and a Master’s degree in Electrical Engineering, Computer Engineering, Physics, or a related field, as well

as one to two years of academic or industry experience in mobile devices, wireless communications, or audio electronics, or comparable industry experience.

C. My Understanding of Obviousness

20. I have been advised and understand that a claimed invention is unpatentable if the differences between the invention and the prior art are such that, at the time the invention was made, the subject matter as a whole would have been obvious at the time the invention was made to a POSITA to which the subject matter pertains. This means that even if all of the requirements of the claim cannot be found in a single prior art reference that would anticipate the claim, the claim can still be invalid.

21. It is my understanding that obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of skill in the art; and (4) objective considerations of non-obviousness. I understand that for a single reference or a combination of references to render the claimed invention obvious, a POSITA must have been able to arrive at the claims by altering or combining the applied references.

22. I also understand that prior art references can be combined under several different circumstances. For example, it is my understanding that one such circumstance is when a proposed combination of prior art references results in a

system that represents a predictable variation, which is achieved using prior art elements according to their established functions.

23. I also understand that when considering the obviousness of a patent claim, one should consider whether a teaching, suggestion, or motivation to combine the references exists so as to avoid impermissibly applying hindsight when considering the prior art. I understand this test should not be rigidly applied, but that the test can be important to avoiding such hindsight.

V. THE '901 PATENT

A. Background of the '901 Patent

24. The '901 patent relates to head-worn electronic devices, such as eyeglasses, with electrical components such as for audio output and/or audio pickup. (EX1001, 6:57-7:13.) As described by the patent, it can be cumbersome to integrate or attach electrical components to eyeglasses without comprising aesthetic design of the eyeglasses. (EX1001, 5:62-6:20, 6:57-63.) The patent purports to integrate electronic components into a head-worn electronic device to limit the extent to which integrated electronic components interfere with aesthetic design of eyeglasses. (EX1001, 6:57-67.) However, as set forth herein, it is my view that the claims of the '901 patent do not represent any patentable improvement over the prior art.

B. Priority Date

25. I understand that the application that became the '901 patent (Appl. No. 18/375,893) was filed on October 2, 2023, and claims priority to various patent filings. My analysis herein assumes a priority date of October 11, 2005, which is the date of the earliest document to which the '901 patent claims priority. I do not take a position here as to whether the '901 patent is actually entitled to that priority date. If the '901 patent were entitled only to a priority date later than October 11, 2005, it would not change any of my analysis or opinions herein.

C. Prosecution History of the '901 Patent

26. I understand that the prosecution of the '901 patent was not robust, and that the claims were indicated to be allowable in a first Office Action. (EX1002.) I understand that in the Notice of Allowance, the Examiner suggested that limitations of the claims were not met by the prior art. (EX1002, February 22, 2024, Notice of Allowance.) But as demonstrated herein, all limitations of the challenged claims were known in the prior art and thus cannot confer patentability.

D. Claim Construction

27. As discussed above, I understand that, during an *inter partes* review, words in a claim are given their ordinary and customary meaning, which is the meaning understood by a POSITA at the time of the alleged invention after reading the entire patent. In performing my analysis and rendering my opinions, I have

interpreted claim terms by giving them the ordinary and customary meaning they would have to the POSITA reading the '901 patent as of October 11, 2005, and in light of its specification and file history.

28. I do not believe any claim construction is necessary for the purposes of the Petition. I believe the challenged claims are unpatentable under any reasonable interpretation of the claim language.

VI. JANNARD RENDERS OBVIOUS CLAIMS 1-59

29. It is my view that Jannard, alone or in combination with one or more of Zadesky, Irvin, Clapper, and Vaissie, teaches each and every limitation of claims 1-59 of the '901 patent, for the reasons set forth below.

A. Ground 1: Claims 1-4, 8, 10, 11, 16, and 17 are Rendered Obvious by Jannard

30. It is my view that Jannard teaches each and every limitation of claims 1-4, 8, 10, 11, 16, and 17 of the '901 patent, for the reasons set forth below.

1. Summary of Jannard

31. I understand that Jannard is a U.S. Patent issued from a continuation of Appl. No. 11/022,367, which was filed on December 22, 2004. (EX1004, (63).) I understand Jannard is thus prior art to the '901 patent under at least 35 U.S.C. §§ 102(a) and (e).

32. Jannard discloses wearable electronic devices, and systems for managing their connection to data sources. (EX1004, 1:15-18.) For example, Jannard discloses eyeglasses that may include an audio device with speakers for presenting audio signals to the wearer of the eyeglasses. (EX1004, 5:13-6:46.) The audio signals may be provided by a remote device, such as a cell phone, that communicates wirelessly with the eyeglasses. (EX1004, 20:57-21:42.) FIG. 12 illustrates an embodiment:

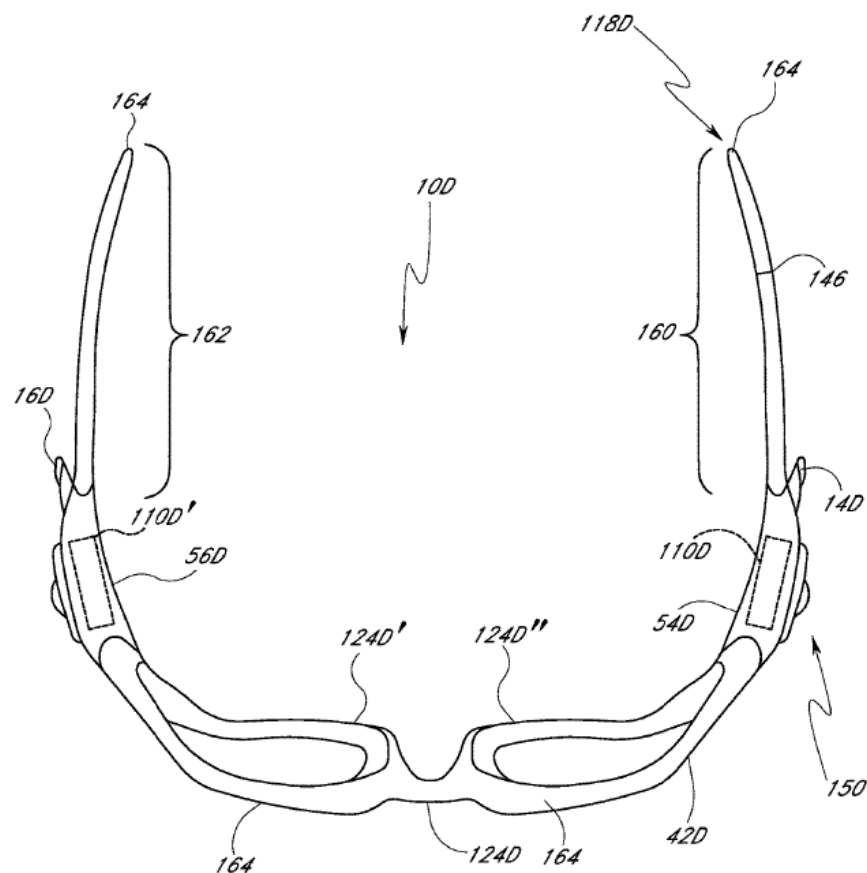


FIG. 12

(EX1004, 30:21-27, FIG. 12.)

33. Jannard is analogous art to the claimed invention at least because it is directed to the same field of endeavor— portable devices (*e.g.*, eyewear) with electronic components, *e.g.*, for audio or communications functionality. (*See, e.g.*, EX1001, 5:62-7:14; EX1004, 5:13-6:46.) By disclosing electronic eyewear systems that can interact with remote devices such as cell phones, Jannard is reasonably pertinent to a problem faced by the '901 patent inventors, *e.g.*, improving wireless communications for mobile device users. (EX1001, 6:21-53; EX1004, 20:57-21:42.)

34. Jannard incorporates various other documents by reference, including U.S. Patent No. 6,349,001 to Spitzer (EX1007). (EX1004, 27:39-42.)

2. Claim 1

a. [Preamble] *A system, comprising:*

35. Jannard discloses systems including a wearable audio device 10 that provides audio and/or video to a user wearing the device. (EX1004, 2:53-55.) For example, audio may be provided by an MP3 player or a cell phone and may be presented to the user via wearable speakers. (EX1004, 2:1-6, 5:13-6:29.)

36. Jannard discloses embodiments, including wearable audio devices 10A, 10A', 10A'', 10B, 10C, 10D, and 10E, that are “modifications” of audio device 10 and include components analogous to audio device 10. (EX1004, 3:12-

4:27, 6:30-34, 9:23-31, 18:35-43, 20:13-19, 20:51-56, 30:21-27, 35:33-39.) For example, audio device 10D can include eyewear with a rechargeable battery; the eyewear can connect to a recharging cradle for recharging the battery. (EX1004, 26:10-20, 33:16-32, 44:39-49.) FIG. 12 illustrates audio device 10D:

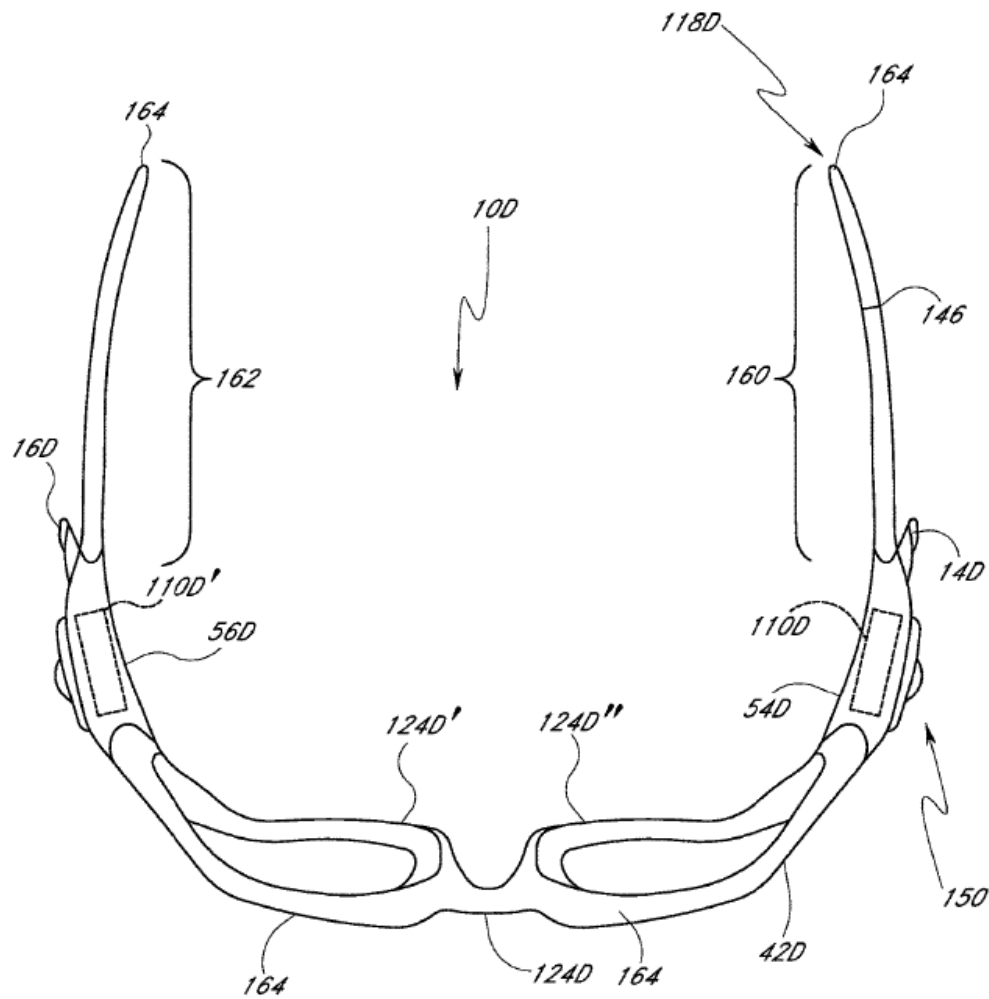


FIG. 12

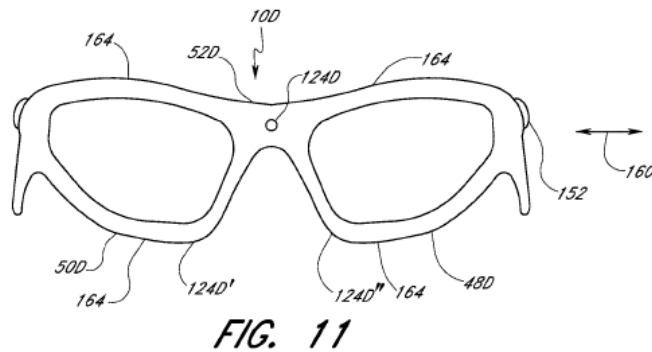
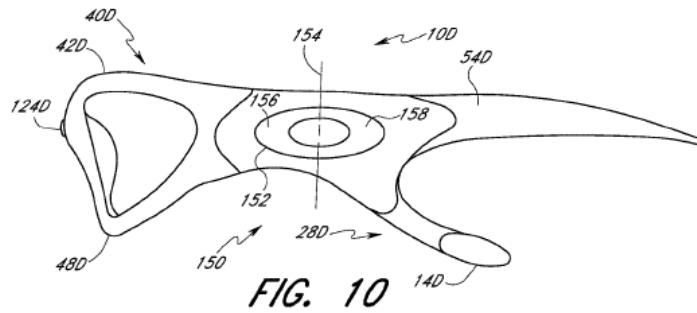
(EX1004, 4:11-17, 30:21-31:14.)

b. [A] *a head-worn personal electronic apparatus, including at least:*

37. Consistent with the '901 disclosure, the POSITA would understand eyewear (*e.g.*, eyeglasses), such as Jannard's audio device 10D, to be an example of a head-worn personal electronic apparatus. (*See* EX1001, 6:59-63 ("The electrical components can provide electrical technology to eyewear (*e.g.*, eyeglasses) *or other head-worn personal electronic apparatus*" (emphasis added)).)

c. [B] *a head-worn structure configured to be worn by a user;*

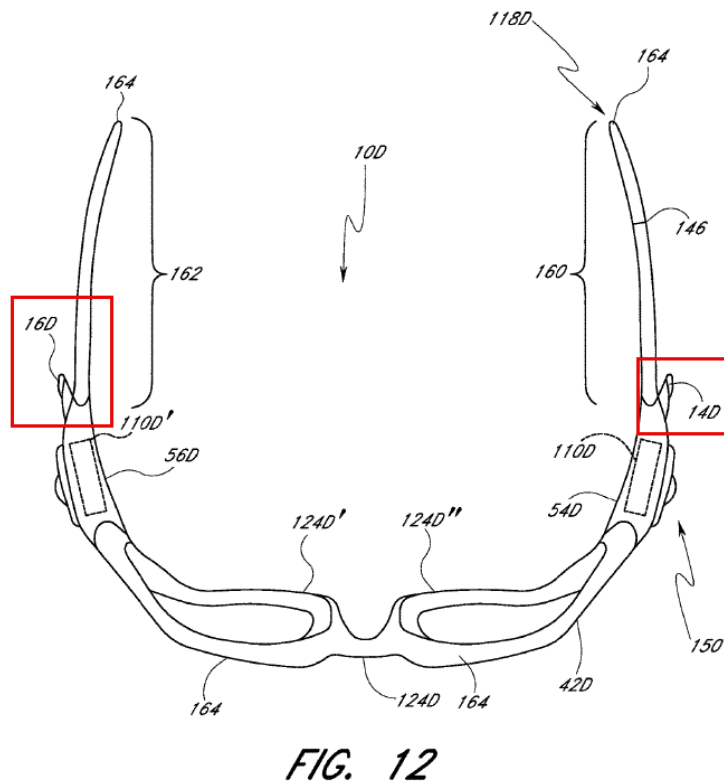
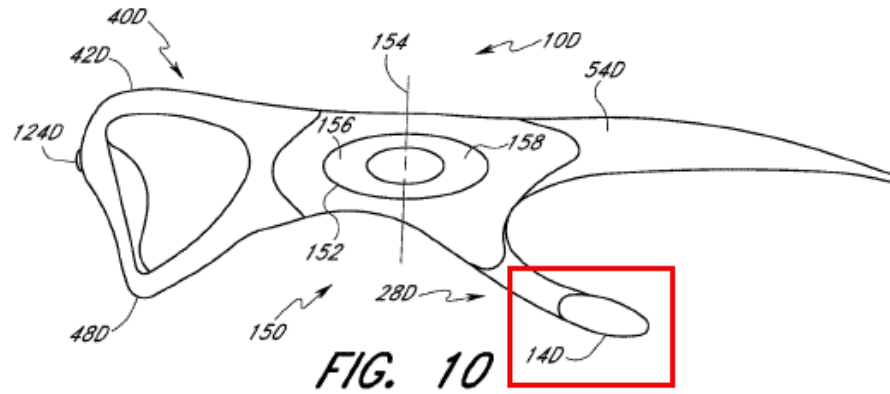
38. The POSITA would understand Jannard's audio device 10D to include a head-worn structure configured to be worn by the user, at least because audio device 10D is eyewear, and the POSITA would understand eyewear to comprise a support structure (*e.g.*, frame 42D) configured to be worn on the user's head. FIGS. 10-11 illustrate:



(EX1004, FIGS. 10-11, 5:13-22, 30:21-34; *see* EX1001, 6:59-63.)

- d. **[C] a speaker at least partially contained within the head-worn structure, the speaker being configured to be worn proximate to an ear of the user when the head-worn structure is being worn by the user;**

39. Jannard's audio device 10D includes left and right speakers 14D, 16D within the eyewear frame, and thus within the head-worn structure. (EX1004, 5:13-14, 32:45-52, FIGS. 10-12.) FIGS. 10 and 12 illustrate:



(EX1004, FIGS. 10, 12 (annotated).)

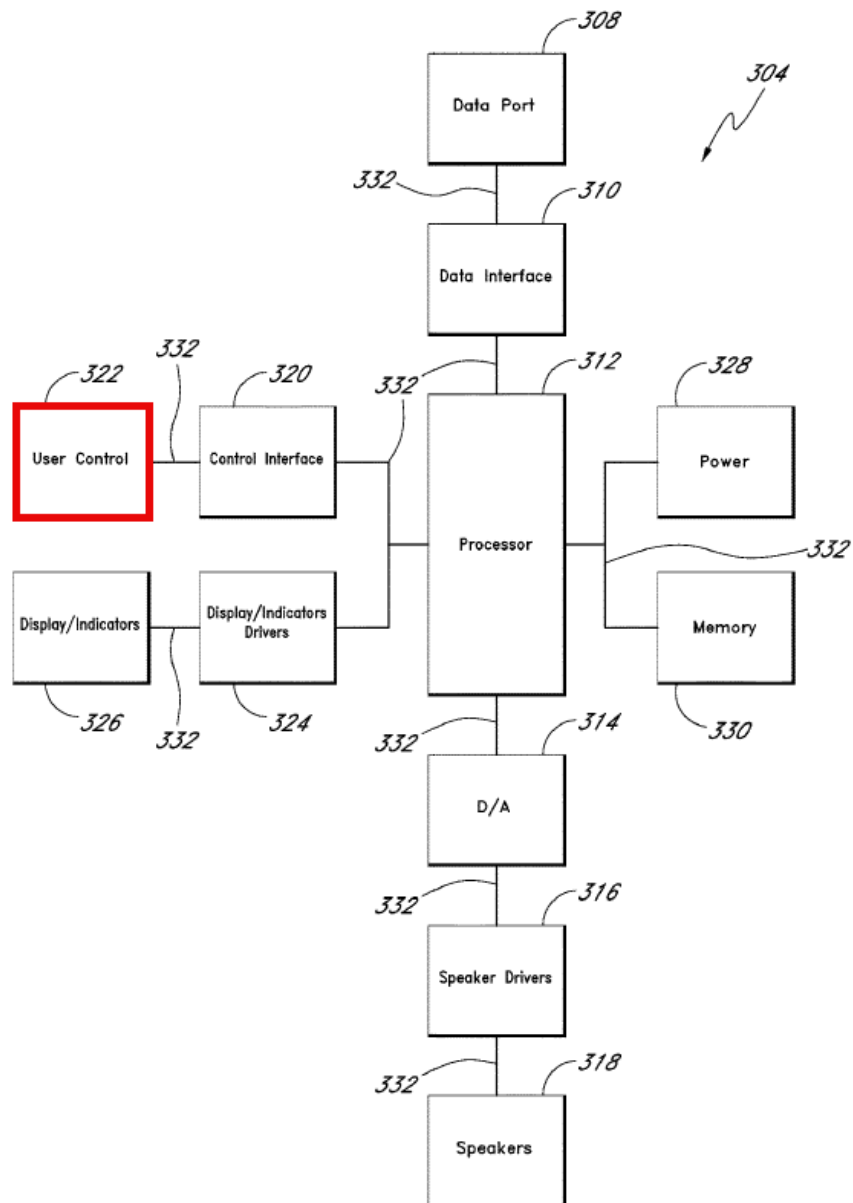
40. The POSITA would recognize that speakers 14D and 16D are configured to rest near the user's ears (*e.g.*, adjacent to the ears) when the eyewear audio device 10D is worn by the user. (See EX1004, 5:23-33 ("the support 12 is

configured to support the speakers 14, 16 at a position juxtaposed to the ears 20, 22, respectively”).) This is at least because, as evident from FIGS. 10 and 12, speakers 14D/16D are positioned near where the user’s ears would be when the user wears the device 10D. (See EX1004, FIGS. 10, 12.) The POSITA would understand speakers positioned near the ears, such as speakers 14D/16D, to be worn proximate to the ears.

- e. ***[D] a touch sensitive surface at least partially contained within the head-worn structure and configured to sense a touch input associated with the user;***

41. Jannard’s wearable audio device 304² includes user controls 322, which can include a “touchpad,” along with “any other input device that may be used by a user to control the audio device 304.” (EX1004, 41:22-24, 41:46-58, 44:4-23.) FIG. 22 illustrates user controls 322 within audio device 304:

² Jannard explains that “audio device 304 may be any of the audio devices described above with respect to FIGS. 1-19 ...”. (EX1004, 41:22-24.) Thus, audio device 304 may be audio device 10D, because audio device 10D is described in Jannard with respect to at least FIGS. 10-12. (EX1004, 30:21-27, FIGS. 10-12.) Accordingly, throughout this Declaration, references to audio device 304 should be understood to include a reference to audio device 10D.

**FIG. 22**

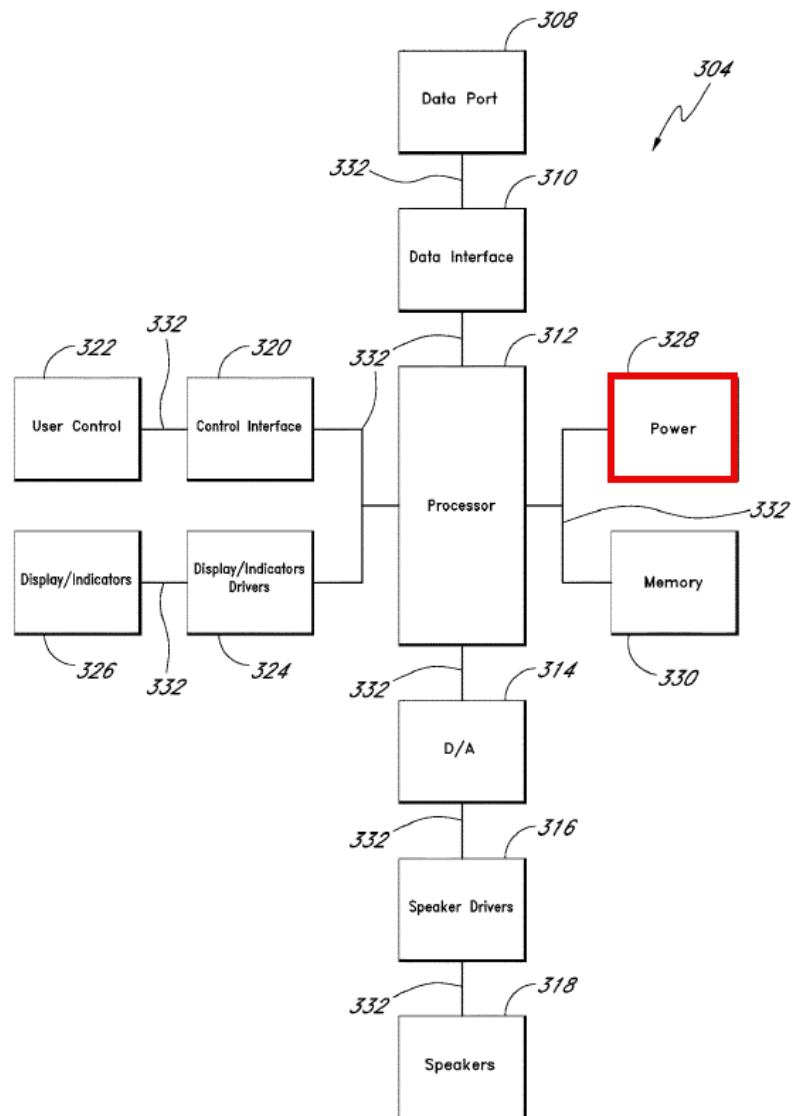
(EX1004, FIG. 22 (annotated).)

42. Similarly, Jannard’s eyewear can include a “touch pad located on an earstem, an orbital or the bridge.” (EX1004, 26:10-25, 27:12-19.) The POSITA

would have understood a touchpad, such as in Jannard, to include a touch-sensitive surface configured to sense a touch input, *i.e.*, to “control the audio device 304.” (EX1004, 44:4-7.) This is at least because touchpads were common and well-understood input devices for devices such as laptop computers. (*See* EX1005, 1:47-56.) The POSITA would have further understood Jannard’s touchpad to be within audio device 304, as shown in FIG. 22, and thus at least partially within the eyewear frame, *i.e.*, on an earstem, orbital, or bridge of the frame. (EX1004, 27:12-19, FIG. 22.)

f. [E] *a rechargeable battery contained within the head-worn structure;*

43. Jannard discloses that audio device 304 “includes a power module 328,” which provides power to audio device 304. (EX1004, 44:39-41.) Jannard further discloses that the power module 328 may be a rechargeable battery, such as a lithium-ion polymer battery. (EX1004, 44:47-48.) FIG. 22 illustrates power module 328 within audio device 304:

**FIG. 22**

(EX1004, FIG. 22 (annotated).)

- g. ***[F] electronic circuitry contained within the head-worn structure, the electronic circuitry being electrically connected to at least the rechargeable battery, and the electronic circuitry being electrically connected to the touch sensitive surface;***

44. Jannard's audio device 304 includes processor 312 and conductors 332, which are examples of the claimed electronic circuitry. (EX1004, 41:46-58, 42:18-32, 45:22-45, FIG. 22.) For example, processor 312 "controls the overall function and operation" of the audio device. (EX1004, 41:46-49, 42:21-32, FIG. 22.) Processor 312 can couple "directly or indirectly to the various electronic components" of the audio device, *i.e.*, via conductors 332, which is electronic circuitry that "provide[s] direct or indirect electrical communication between the various components of the audio device 304." (EX1004, 42:18-32, 45:22-26.) Conductors 332 may be "embedded within," and thus contained within, the frame of the audio device 304. (EX1004, 45:36-45, FIG. 22.)

45. Conductors 332 are used to distribute power from the power module 328 to the various components of the audio device 304, including processor 312 and user controls 322 (which may include the touchpad as described above). (EX1004, 44:39-47, FIG. 22.) The POSITA would thus understand conductors 332 to electrically connect the processor 312 to the rechargeable battery (*i.e.*,

power module 328); and further to connect the touch sensitive surface (*i.e.*, user controls 322) to the processor 312 and power module 328, as shown in FIG. 22:

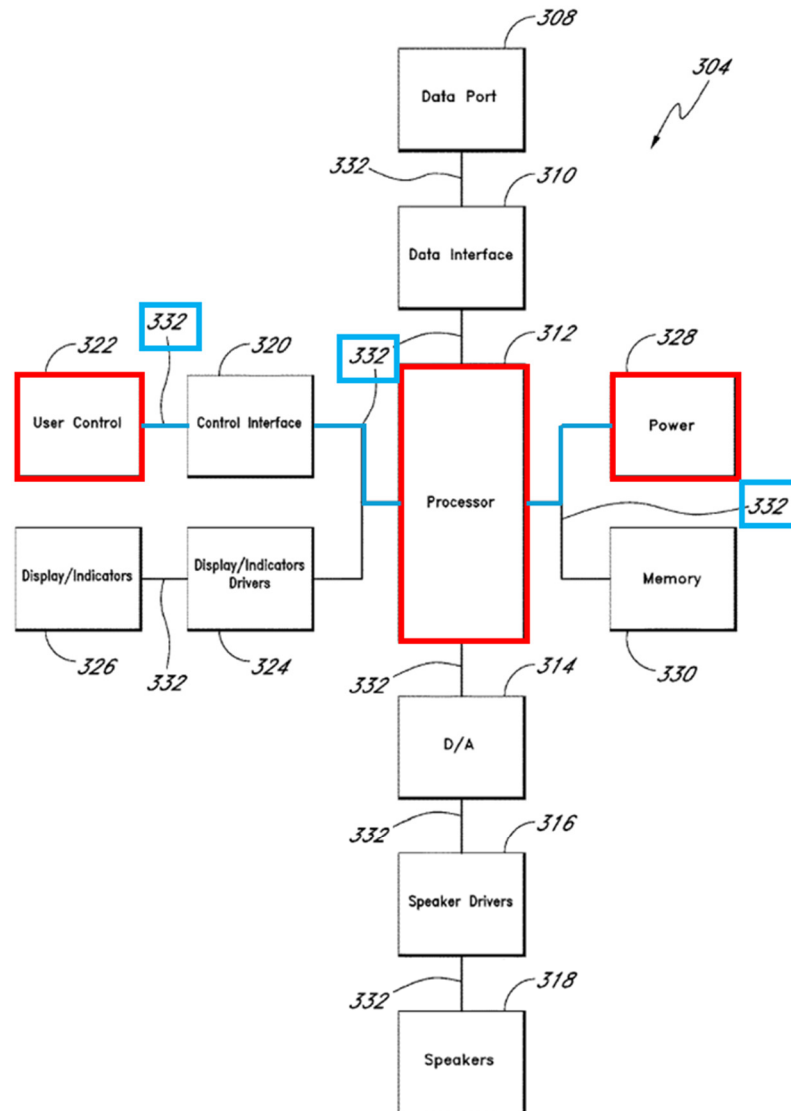


FIG. 22

(EX1004, 44:39-47, FIG. 22 (annotated).)

- h. [G] *wireless communication circuitry at least partially contained within the head-worn structure, the wireless communication circuitry being electrically connected to at least the rechargeable battery; and***

46. Jannard's audio device 304 includes a data port 308, which can include "a wireless receiver, a radio, an RF receiver, a BLUETOOTH receiver, or the like" for "coupling of audio device 304 with communications link 306."

(EX1004, 41:47-67.) The POSITA would thus understand data port 308 to include wireless communication circuitry. Conductors 332 electrically connect data port 308 to the rechargeable battery (*i.e.*, power module 328), as described above and illustrated by FIG. 22:

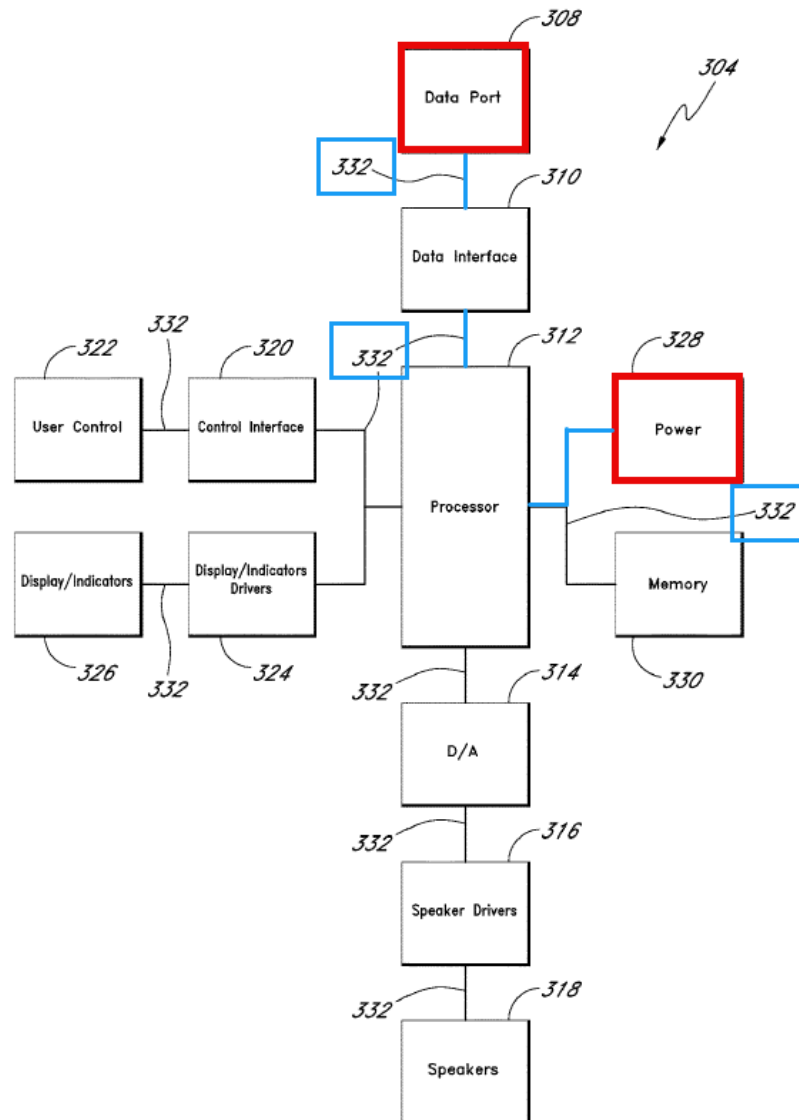


FIG. 22

(EX1004, FIG. 22 (annotated).)

- i. ***[H] at least one conductive element at least partially included within the head-worn structure, the at least one conductive element being at least partially exposed to enable interconnection therewith, the at least one conductive element being electrically connected to at least the rechargeable battery; and***

47. Jannard's audio device 10D can "include" power contacts 164 (a conductive element) for "recharging any rechargeable batteries connected thereto." (EX1004, 33:13-15.) Jannard explains that the audio device can interconnect with a recharging cradle: the audio device can be laid on or inserted into the cradle, "thereby making contact between the power contacts 164 and corresponding contacts in the cradle (not shown)." (EX1004, 33:13-27.) For example, Jannard discloses that "the power contacts 164 can be disposed at the ends of the ear stems 54D, 56D" and thus exposed for interconnection between the power contacts 164 and the corresponding contacts of the cradle. (EX1004, 33:13-27.) FIG. 12 illustrates:

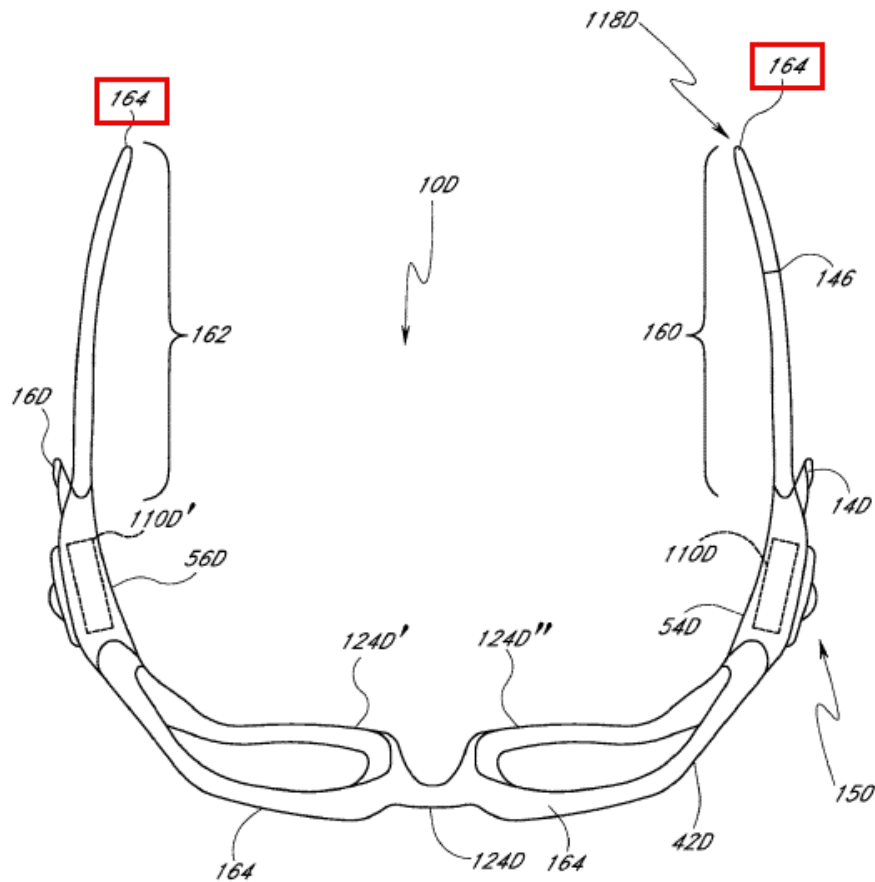


FIG. 12

(EX1004, FIG. 12 (annotated).)

48. The POSITA would further understand the power contacts 164 to be electrically connected to the audio device's rechargeable battery (*i.e.*, power module 328), so that the power contacts can deliver power from the recharging cradle to the battery. (EX1004, 33:13-15.)

- j. ***[I] a charging apparatus having at least a charging connector, wherein on placement of the head-worn personal electronic apparatus in the charging apparatus, electrical connection results at least from the at least one conductive element connecting with the charging connector, and thereby the rechargeable battery of the head-worn personal electronic apparatus is able to be recharged while the head-worn personal electronic apparatus is placed in the charging apparatus.***

49. As described for element [H], Jannard's system includes a recharging cradle (a charging apparatus) that connects to the head-worn audio device 10D to recharge its battery. (EX1004, 33:14-35.) For example, power contacts 164 may be located in the audio device's ear stems, which can be inserted into vertically oriented holes of the recharging cradle. (EX1004, 33:20-27.) The POSITA would understand that by inserting the ear stems into the cradle, power contacts 164 make an electrical connection with the cradle's corresponding contacts, such that the battery of the audio device (*i.e.*, power module 328) is recharged via the cradle. (EX1004, 33:14-35.)

3. Claim 2

- a. ***[Preamble] A system as recited in claim 1,***

50. *See* claim 1 analysis.

- b. [A] *wherein the sensed touch input by the touch sensitive surface operates to at least alter operation of the head-worn personal electronic apparatus.***

51. Jannard discloses that user controls 322 (including a touchpad surface, *see* claim 1[D]) are used by the user to perform various functions regarding an audio data file stored on the audio device 304. (EX1004, 44:14-23, 45:4-14.) For example, by providing touch input sensed by the user controls, the user can fast-forward, skip, cue, play, etc., thus altering the operation (*e.g.*, audio playback operation) of the audio device. (EX1004, 44:14-23.)

4. Claim 3

- a. [Preamble] *A system as recited in claim 2,***

52. *See* claim 2 analysis.

- b. [A] *wherein the head-worn personal electronic apparatus is configured to support voice calls to the user, and***

53. Jannard discloses that the user can participate in a voice phone call from a cell phone wirelessly connected to audio device 10D. (EX1004, 23:10-22, 23:37-40, 23:64-24:2, 25:4-9, *see* 30:21-27.) If the user wants to answer an incoming phone call on the cell phone, the user can accept the phone call via activating a selector 610. (EX1004, 28:5-30.) The phone call is then wirelessly transmitted to the audio output 612 *i.e.*, so the user can hear the phone call, and the

user can speak into audio input 616, *i.e.*, microphone, to respond. (EX1004, 27:3-11, 27:28-33, 28:5-36.) FIG. 8A illustrates:

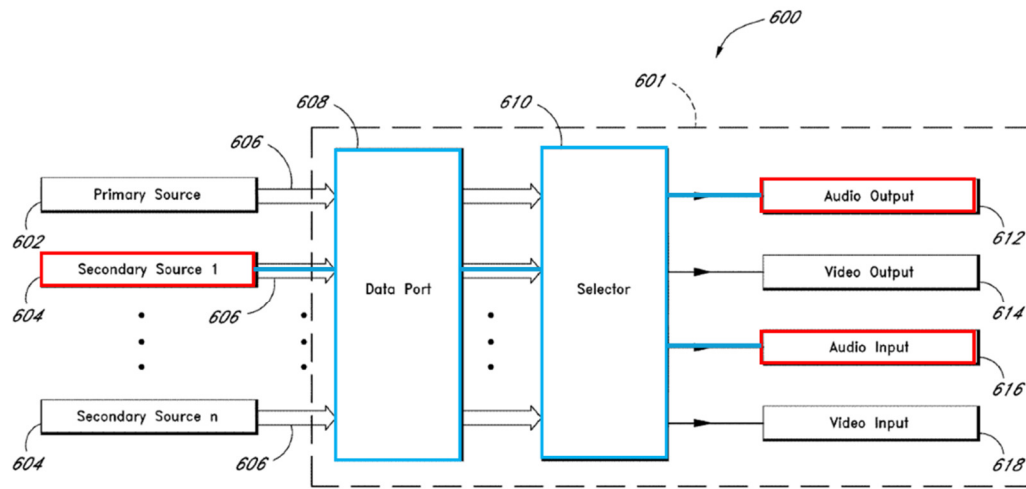


FIG. 8A

(EX1004, FIG. 8A (annotated).)

- c. **[B]** *wherein the at least one operation of the head-worn personal electronic apparatus being altered concerns at least accepting or declining a voice call to the user.*

54. Jannard discloses that the user can accept the phone call by activating the selector 610, which can be a touchpad located on the audio device. (EX1004, 27:12-20, 28:5-7.)

5. Claim 4

- a. **[Preamble]** *A system as recited in claim 2,*

55. *See claim 2 analysis.*

- b. [A] wherein the head-worn personal electronic apparatus is configured to support audio output to the user via the speaker, and

56. Jannard describes that audio device 304 includes audio components, such as speakers and speaker drivers, to present audio output to the user. (EX1004, 41:47-49.) FIG. 22 illustrates:

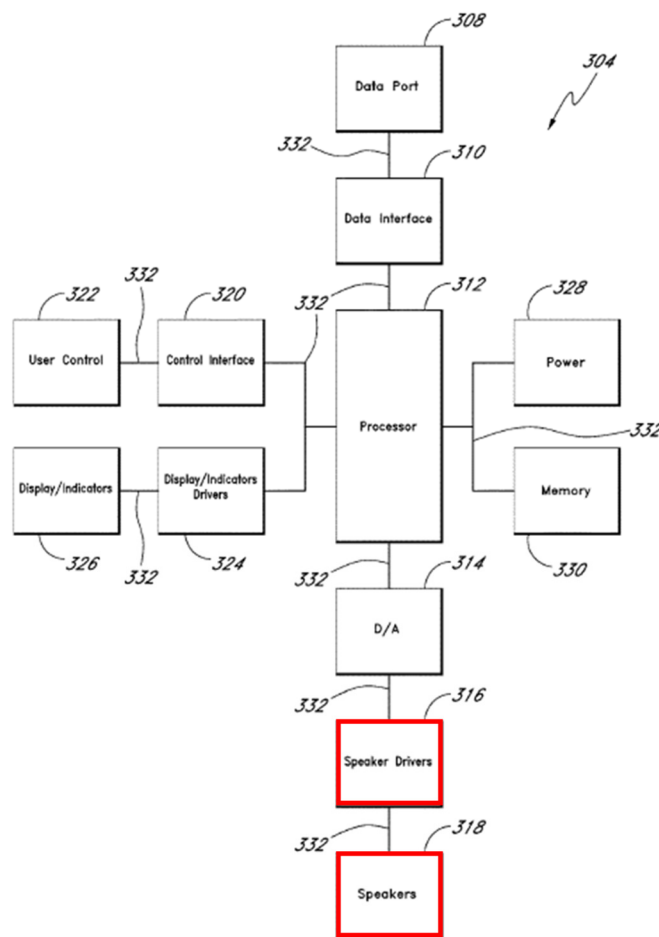


FIG. 22

(EX1004, FIG. 22 (annotated).)

- c. ***[B] wherein the at least one operation of the head-worn personal electronic apparatus being altered concerns control of the audio output being provided to the user.***

57. Jannard describes that user controls 322 (*i.e.*, touchpad) can perform various functions regarding an audio data file, such as adjust volume, fast-forward, skip, cue, play, etc. (EX1004, 44:14-22, 45:4-5.)

58. The POSITA would thus understand Jannard to disclose that the touch input provided by the user to the touch-sensitive surface (*i.e.*, the touchpad, *see* claim 1[D]) alters the audio output presented to the user, *i.e.*, by the speakers and speaker drivers, to at least enable the various functions that can be performed on the audio data file. (EX1004, 41:47-49.)

6. Claim 8

- a. ***[Preamble] A system as recited in claim 1,***

59. *See* claim 1 analysis.

- b. ***[A] wherein the head-worn structure comprises: a physical condition sensor at least partially contained within the head-worn structure and configured to acquire data pertaining to a physical condition of the user, the physical condition sensor being provided at least partially contained within the head-worn structure.***

60. Jannard describes that audio device 10D can “include ... a variety of sensors,” *i.e.*, that the audio device (a head-worn structure) at least partially

contains a sensor. (EX1004, 25:16-28, 35:4-10.) The sensor can be a medical monitoring sensor, which the POSITA would understand to acquire data about the physical condition of the user wearing the audio device. (EX1004, 35:4-10.) For example, sensors internal to the device can detect the user's physical conditions such as blood glucose level or blood pressure. (EX1004, 24:20-25, 25:16-28.)

7. Claim 10

a. [Preamble] *A system as recited in claim 1,*

61. *See* claim 1 analysis.

b. [A] *wherein the head-worn personal electronic apparatus comprises: a microphone at least partially contained within the head-worn structure,*

62. Jannard discloses that a wearable electronic interface 601 of audio device 10D includes audio input 616, which can be a microphone. (EX1004, 22:3-9, 23:10-22, 27:28-33.) FIG. 8A illustrates:

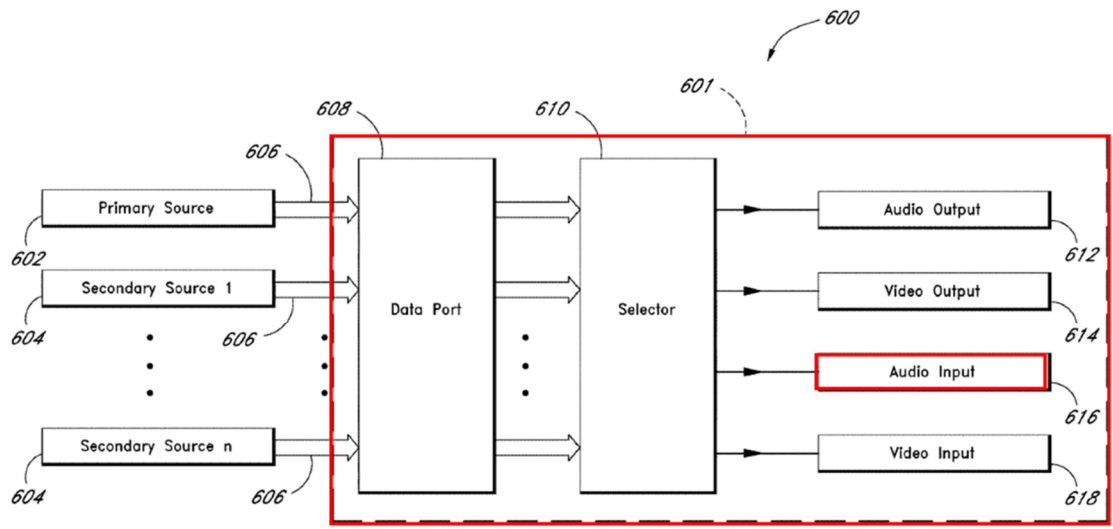


FIG. 8A

(EX1004, FIG. 8A (annotated).)

- c. ***[B] wherein the head-worn personal electronic apparatus is configured to receive a voice input via the microphone, determine or receive a determination of a requested operation from the voice input using voice recognition, and control an operation by the head-worn personable electronic apparatus based on the requested operation.***

63. Jannard discloses that the audio device's interface can include a speech recognition engine "that is properly trained to recognize the voice of the user," convert the speech to commands, and control a source device (*i.e.*, a mobile phone) based on the commands. (EX1004, 40:25-40.) The POSITA would understand controlling the source device, such as to make a call, necessarily

controls an operation of the audio device. (EX1004, 40:25-40.) Additionally, Jannard describes that user controls 322 of the audio device can include “a microphone that receives a voice command” from the user. (EX1004, 44:4-13.) The voice command is received by the processor 312 which “controls the overall function and operation” of the audio device. (EX1004, 42:21-25, 43:65-44:3.) Thus, the POSITA would understand that the audio device of the wearable electronic interface can receive voice inputs, determine a command from the voice inputs based on voice recognition, and then control the audio device using the determined command.

8. Claim 11

a. [Preamble] *A system as recited in claim 1,*

64. See claim 1 analysis.

b. [A] *wherein the head-worn structure comprises: a radiation sensor, operatively connected to the rechargeable battery, at least partially contained within the head-worn structure and configured to sense radiation.*

65. Jannard describes that audio device 10D can include a light sensor, which the POSITA would understand to describe a sensor in the audio device configured to detect light (*i.e.*, radiation). (EX1004, 35:4-10.) Additionally, power from a power source (*i.e.*, rechargeable battery) is distributed to the components of the audio device, which include the device’s sensors; the POSITA

would thus understand that the light sensor is operatively connected to the power source. (EX1004, 44:39-49, FIG. 22.)

9. Claim 16

a. [Preamble] *A system as recited in claim 1,*

66. *See* claim 1 analysis.

b. [A] *wherein the system comprises: a Hall effect detector configured to capture data associated with a magnetic characteristic.*

67. Jannard describes that audio device 10D can include a variety of sensors, such as proximity sensors, motion, distance, etc. (EX1004, 34:33-36, 35:4-12.)

68. Jannard incorporates by reference U.S. Patent No. 6,349,001 to Spitzer, which discloses that the eyeglasses (such as Jannard's audio device 10D) include a "magnetic sensor ... based on the Hall effect" to capture magnetic field strength and direction, *e.g.*, for improved tracking of the user's position. (EX1007, 11:24-41.) Jannard (via its incorporation of Spitzer) thus teaches that the sensors of its audio device can similarly include a Hall effect sensor to capture such magnetic characteristic data. To the extent not expressly disclosed in Jannard, the POSITA would have been motivated to include the Hall effect sensor in Jannard's audio device sensor at least by Jannard's express reference to (and incorporation of) Spitzer to describe Jannard's audio device; and to realize the tracking

advantages described in Spitzer to improve Jannard's ability to "sense the position ... of the head" of the user. (EX1004, 24:31-34.) The POSITA would have had a reasonable expectation of success at least because Jannard discloses that its audio device includes "a variety of sensors"; and expressly includes Spitzer in describing Jannard's audio device, indicating that Spitzer's teachings of additional sensors are compatible. (EX1004, 35:4-12.)

10. Claim 17

a. [Preamble] *A system as recited in claim 1,*

69. *See claim 1 analysis.*

b. [A] *wherein the head-worn personal electronic apparatus comprises: a bone conducting element at least partially contained within the head-worn structure and configured to operate in accordance with acoustic characteristics, the bone conducting element being operatively connected to the electronic circuitry.*

70. In Jannard, the user controls 322 of the audio device of the wearable electronic interface can include a microphone or "any other input device that may be used by a user to control the audio device." (EX1004, 44:4-13.) Jannard's device can include a "bone conduction microphone" that conducts vibrations generated from the user's voice (*i.e.*, in accordance with acoustic characteristics of the user's voice); the POSITA would understand this to be one of the microphones of user controls 322. (EX1004, 19:18-30.) FIG. 22 illustrates that the user

controls 322 are operatively connected to the processor 312 via the conductors

322:

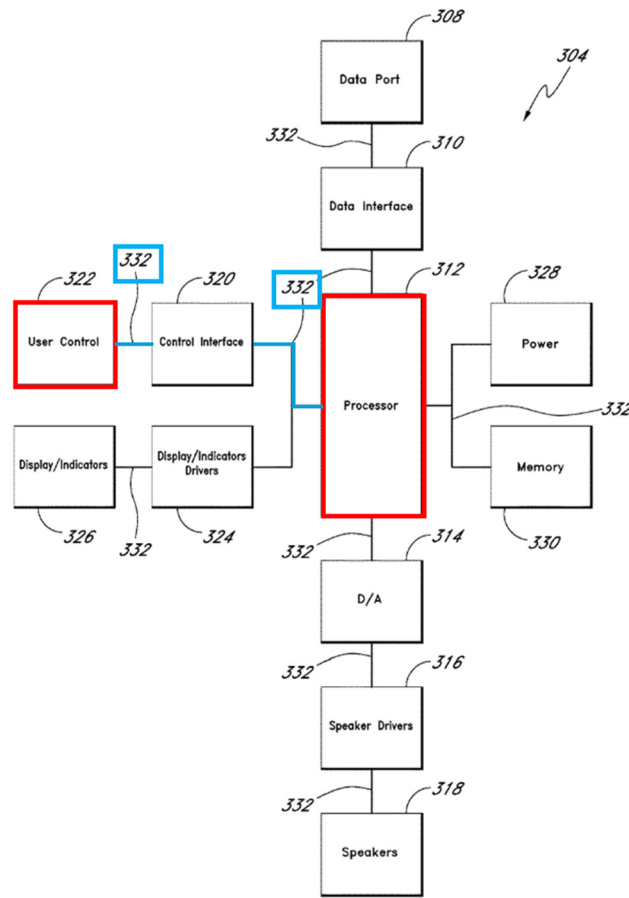


FIG. 22

(EX1004, FIG. 22 (annotated).)

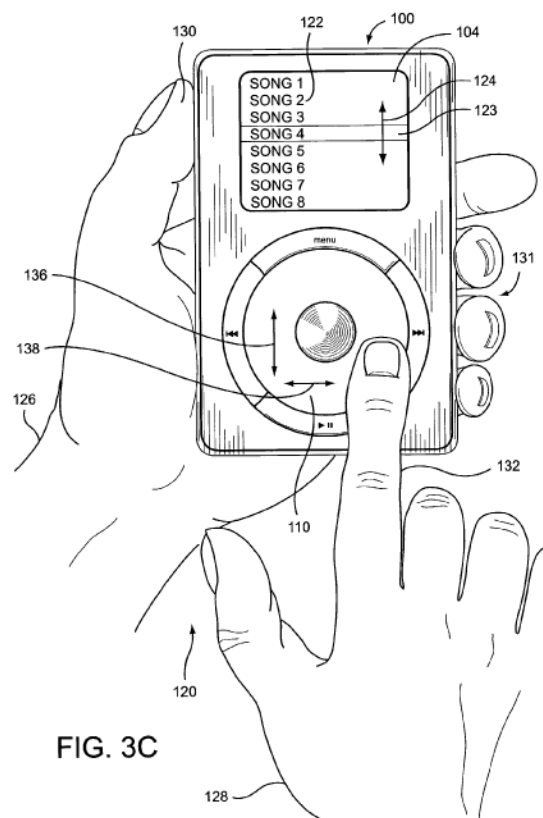
B. Ground 2: Claims 5-7 are Rendered Obvious by Jannard in view of Zadesky

71. It is my view that Jannard in view of Zadesky teaches each and every limitation of claims 5-7 of the '901 patent, for the reasons set forth below.

1. Summary of Zadesky

72. I understand that Zadesky is a U.S. Patent that was filed on July 1, 2002, published on April 24, 2003, and issued on May 16, 2006. (EX1005.) I understand that Zadesky is thus prior art to the '901 patent under at least 35 U.S.C. §§ 102(a), (b), and (e).

73. Zadesky relates generally to portable media players, and describes that a media player can include a touchpad for receiving touch input from a user and controlling the media player. (EX1005, 1:47-3:22.) The touchpad can control the media player based on a sliding input from the user, as shown in FIG. 3C:



(EX1005, FIG. 3C.)

74. Zadesky is analogous art to the claimed invention at least because it belongs to the same field of endeavor, *i.e.*, portable devices with electronic components, such as for audio functionality. (*See, e.g.*, EX1001, 5:62-7:14; EX1005, 3:26-4:3, 4:37-5:13.) For example, Zadesky describes techniques for “facilitat[ing] user interaction” with portable devices, *e.g.*, by using touchpad inputs to control audio functions. (EX1005, 3:38-46, 4:37-49.) Moreover, by describing technologies to improve the usability of portable electronic devices, such as by improving user interaction with such devices, Zadesky is reasonably pertinent to the problems faced by the ’901 patent inventors. (*See* EX1001, 6:21-7:14; EX1005, 4:37-45.)

75. I understand that Zadesky was not cited during prosecution of the ’901 patent.

2. Motivation to Combine Jannard and Zadesky with Reasonable Expectation of Success

76. The POSITA would have been motivated to combine the teachings of Jannard and Zadesky to meet the claim limitations. For example, Jannard discloses that audio device 304 can include a touchpad and a processor with executable software to at least control the audio device 304. (EX1004, 41:46-58, 42:21-32, 43:65-44:7.) However, the specific details of the functionality of the touchpad and

how it relates to the processor are not disclosed by Jannard. The POSITA thus would have been motivated to look to other references to supply these missing details from Jannard.

77. The POSITA would have looked to Zadesky because Zadesky describes touchpad input techniques that “facilitate user interaction” with media players such as Jannard’s wearable audio device; and explains the “numerous” advantages, including ease and speed of use, accessibility, and ergonomics. (EX1005, 3:26-37, 4:37-40, 5:61-6:8, 13:36-60.) Zadesky describes using sliding input on a touchpad to improve on audio device functions, such as volume adjustment, that are performed by Jannard’s touchpad. (EX1005, 10:40-51; EX1004, 44:15-23.) The POSITA would have combined the sliding input with Jannard in order to realize Zadesky’s advantages, such as faster, intuitive, and ergonomic user control. These advantages are especially significant for Jannard’s wearable glasses format, in which the user may not be able to see the touchpad (because it is worn on the user’s head), and may thus benefit from intuitive touch-based control techniques.

78. Additionally, Jannard and Zadesky describe analogous components (*e.g.*, portable devices, computer processors, touchpad input devices) that are common and well-understood. (EX1004, 41:46-42:32, 43:65-44:7; EX1005, 5:27-6:8.) And applying Zadesky’s teachings could be implemented using the

components of Jannard (*e.g.*, user controls 322, processor 312) to perform functions common to both Jannard and Zadesky (*e.g.*, volume control). The POSITA therefore would have had a reasonable expectation of success in making the combination.

3. Claim 5

a. [Preamble] *A system as recited in claim 2,*

79. See claim 2 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to distinguish at least a direction of the user input with respect to the touch sensitive surface.*

80. Zadesky teaches that a portable media player device includes a touchpad 110 that is configured to “receive input from a finger moving across the surface of the touch pad 110” and control the media player accordingly, *e.g.*, by scrolling through a list of media files on the player, or “vary[ing] a characteristic of the media player,” such as changing the volume. (EX1005, 5:61-6:8, 10:40-51.)

81. Zadesky teaches distinguishing a direction of the user input with respect to the touch-sensitive surface; for example, the “direction that the finger moves may be arranged to control the direction of scrolling,” *i.e.*, by moving “vertically up when the finger is moved in a first direction and vertically down when the finger is moved in a second direction.” (EX1005, 6:38-59.)

82. The POSITA would have combined the touchpad input teachings of Zadesky with the touchpad of Jannard to meet the claim limitation; for example, by configuring the touchpad to recognize sliding user input, as in Zadesky, to control Jannard’s audio device operations, *e.g.*, “adjust[ing] volume” or performing “function[s] related to an audio data file.”

4. Claim 6

a. [Preamble] *A system as recited in claim 2,*

83. *See* claim 2 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to detect at least a sliding of a finger action with respect to the touch sensitive surface.*

84. As described for claim 5[A], Jannard discloses the audio device of the wearable electronic interface can include a processor that can respond to commands from the user via the touchpad of the user controls.

85. Zadesky teaches that a portable media player device includes a touchpad 110 that is configured to “receive input from a finger moving across the surface of the touch pad 110” and control the media player accordingly, *e.g.*, by scrolling through a list of media files on the player, or “vary[ing] a characteristic of the media player,” such as changing the volume. (EX1005, 5:61-6:8, 10:40-51.) The POSITA would understand such input to include a sliding user input, *e.g.*,

from a “linear finger motion.” (EX1005, 6:9-11.) FIG. 3C illustrates the sliding input (136, 138) controlling the media player (scroll operation 124):

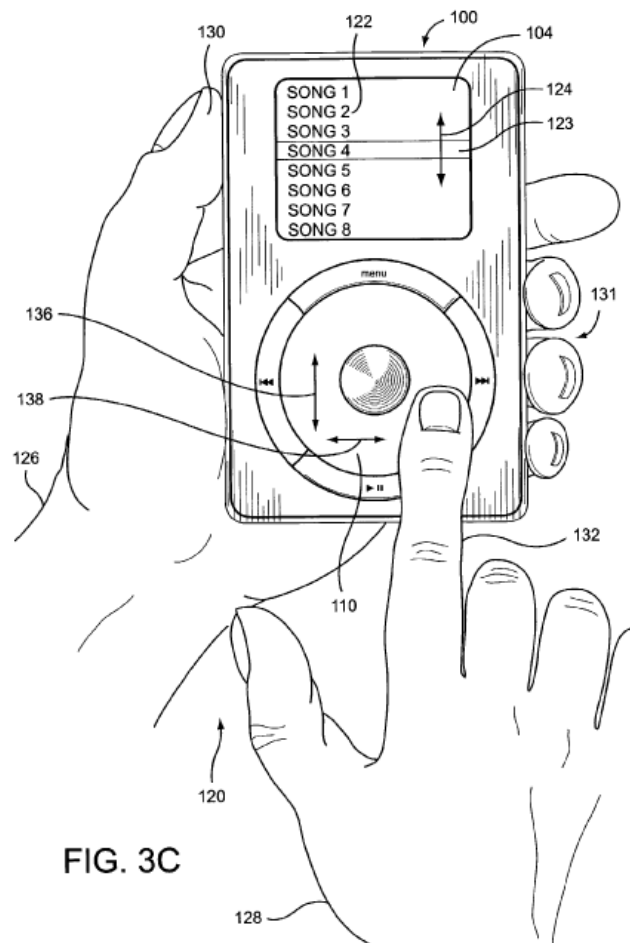


FIG. 3C

(EX1005, 8:52-9:21, FIG. 3C.)

86. The POSITA would have combined the sliding input teachings of Zadesky with the touchpad of Jannard: for example, by configuring the touchpad to recognize sliding user input, as in Zadesky, to control Jannard’s audio device

operations, *e.g.*, “adjust[ing] volume” or performing “function[s] related to an audio data file.”

5. Claim 7

a. [Preamble] *A system as recited in claim 2,*

87. *See* claim 2 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to facilitate determination at least whether the user input pertains to a forward sliding action or a backward sliding action with respect to the touch sensitive surface.*

88. Jannard in view of Zadesky teaches a sliding finger input on a touchpad as described above for claim 6[A]. In Zadesky, “the user 120 can slide his or her finger 132” across the touchpad, such that it “may be actuated forwards and backwards” by the sliding input; Zadesky thus teaches determining whether the input is a forward sliding action or a backward sliding action. (EX1005, 9:16-21, FIG. 3C.)

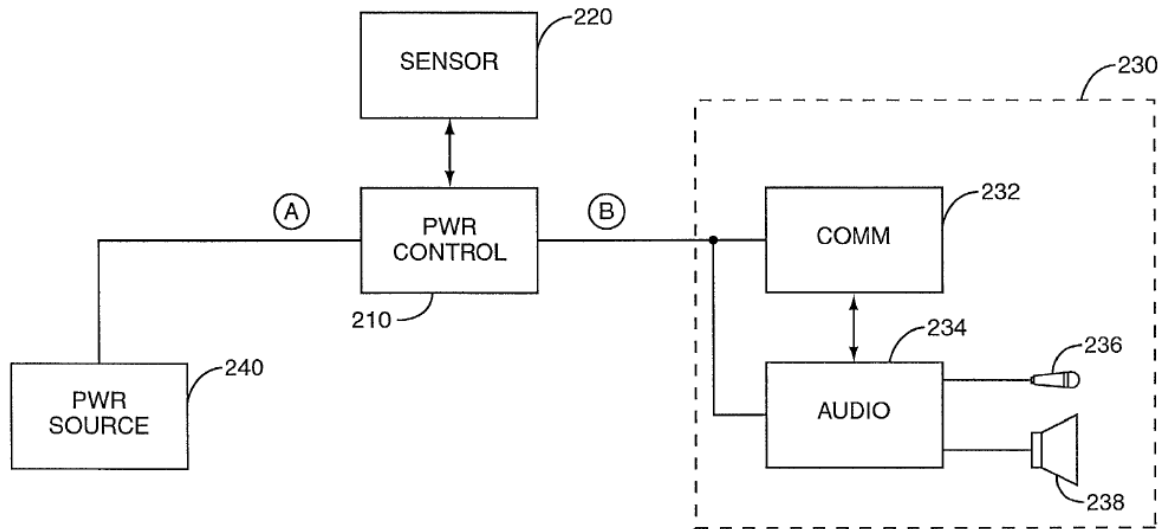
C. Ground 3: Claims 12-15, 18-27, 32-39, 41-45, 47-50, and 59 are Rendered Obvious by Jannard in view of Irvin

89. It is my view that Jannard in view of Irvin teaches each and every limitation of claims 12-15, 18-27, 32-39, 41-45, 47-50, and 59 of the '901 patent, for the reasons set forth below.

1. Summary of Irvin

90. I understand that Irvin is a U.S. patent that was filed on Feb. 21, 2000, and issued on March 7, 2006. (EX1006.) I understand that Irvin is thus prior art to the '901 patent under at least 35 U.S.C. §§102(a) and (e).

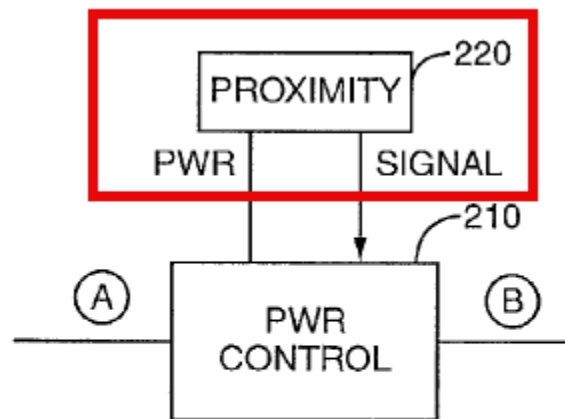
91. Irvin discloses wireless headsets with “automatic on/off capabilities to maximize battery life.” (EX1006, Abstract, 1:13-51.) For example, a headset automatically transitions from an inactive state (*e.g.*, a non-functional state), or a sleep state, to an active state (*e.g.*, a fully functional state) when mounted on the user’s head, and vice versa. (EX1006, Abstract, 2:16-51, 8:11-50, 9:40-43.) In embodiments, a communications circuit 230 of the wireless headset provides a wireless communications interface 232 and an audio interface 234; these elements can be enabled by a power control circuit 210 in the active state, and disabled by the power control circuit in the inactive state (in which the entire communications circuit 230 is disconnected) or the sleep state (in which the wireless communications interface 232 portion remains enabled). (EX1006, 3:28-4:10, 8:11-9:39, FIG. 2A.) FIG. 2A illustrates:

**FIG. 2A**

(EX1006, FIG. 2A.)

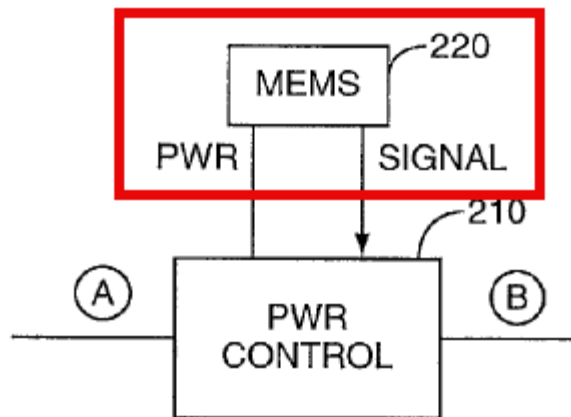
92. A sensor 220, such as a motion sensor or a proximity sensor, can be used to determine when to transition from an inactive state to an active state.

(EX1006, Abstract, 2:16-51, 5:1-6:67.) As one example, a proximity sensor 220 is used by the power control circuit 210 to detect when the headset is mounted on the user's head. (EX1006, Abstract, 2:16-51, 6:3-19.) FIG. 4D illustrates:

**FIG. 4D**

(EX1006, FIG. 4D (annotated).)

93. Similarly, as another example, a motion sensor 220 (*e.g.*, a MEMS device) can be used by the power control circuit 210 to detect when the headset is moving or vibrating. (EX1006, Abstract, 2:16-51, 5:1-52.) FIG. 4A illustrates:

**FIG. 4A**

(EX1006, FIG. 4A (annotated).)

94. The device transitions between the inactive state 610 and the active state 620 based on a stimulus signal provided by the sensor (*e.g.*, indicating the device is worn), as shown in FIG. 6:

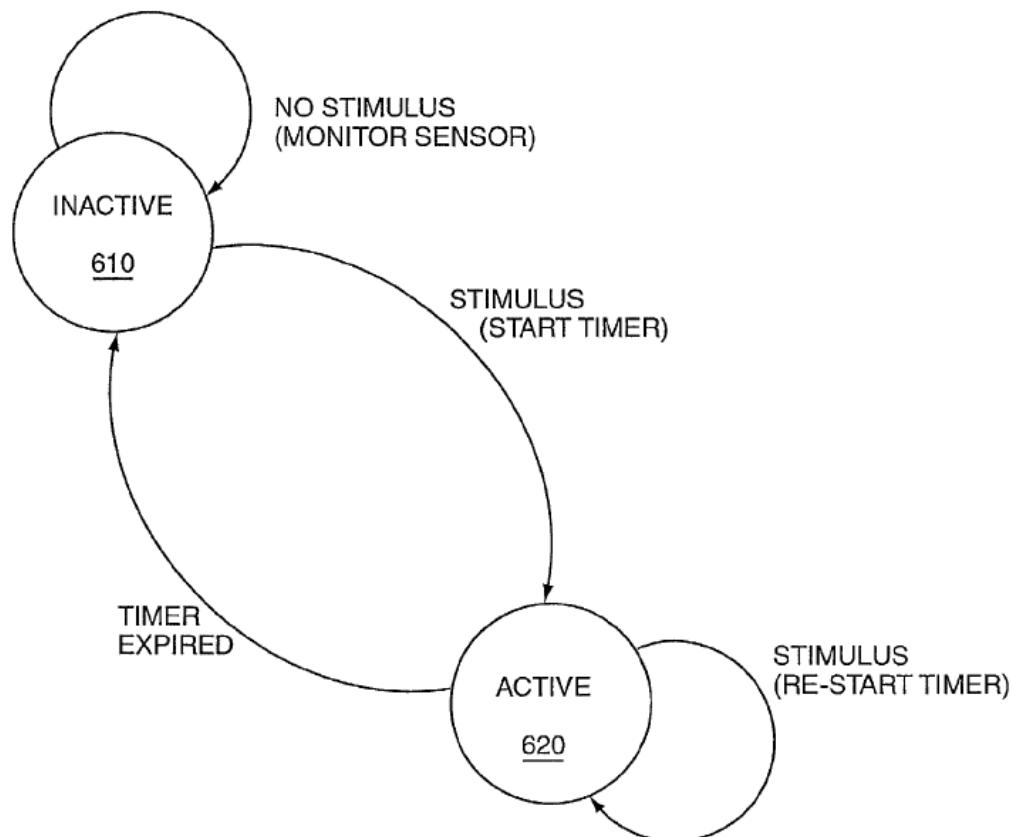


FIG. 6

(EX1006, 8:11-50, FIG. 6.)

95. Irvin is analogous art to the claimed invention at least because it is directed to the same field of endeavor—portable devices equipped with electronic

components, *e.g.*, to support audio or communications functionality. (EX1001, 8:40-9:20; EX1006, 3:28-45.) Irvin is reasonably pertinent to the problems faced by the '901 patent inventors, because Irvin and the '901 patent both relate to how to determine when a wearable device is being used or worn by the user, so that the device can be controlled accordingly. (EX1001, 35:9-36:27; EX1006, 2:16-51.) Additionally, both Irvin and the '901 patent strive to maximize the battery life of the wearable device. (EX1001, 35:9-38; EX1006, 2:16-51.)

96. I understand that Irvin was not cited during prosecution of the '901 patent.

2. Motivation to Combine Jannard and Irvin with Reasonable Expectation of Success

97. A POSITA would have been motivated to combine the teachings of Jannard and Irvin to meet the claim limitations. Jannard describes a head-worn personal electronic device (eyewear, such as audio device 10D), and the POSITA would have recognized that battery life (and thus power consumption) is a concern for such devices. For example, minimizing power consumption improves usability by permitting longer periods of use without having to replace or recharge the battery; and can permit smaller and lighter batteries to be used, enhancing ergonomics and safety for head-worn devices. As Irvin notes, “battery life is a key

component of operator convenience,” and “it is important that wireless headset design incorporates provisions maximizing battery life.” (EX1006, 2:1-5.)

98. Consistent with this goal, Jannard describes a “power save function to conserve power consumption,” in which the device automatically enters a sleep state, or turns itself off, if it has not been “activated by the user” within a fixed period of “non-use” (*e.g.*, 5, 10, 20, or 40 minutes). (EX1004, 44:63-45:3.)

However, Jannard does not explain how to implement its power save function, and in particular, how to reliably determine when the device has been activated by the user. Nor does Jannard provide for automatically exiting the sleep state, or turning the device back on, other than via a manual switch 73c. (EX1004, 17:60-18:13; *see* EX1006, 1:29-2:13.) The POSITA would have understood manual switches to be inconvenient, unreliable, prone to mechanical failure, and physically inaccessible for some users (such as those with impaired fine motor skills). The POSITA thus would have found Jannard’s power save function to be vague and suboptimal, and would have sought out teachings of how to improve the power consumption of audio device 10D beyond the methods taught by Jannard.

99. The POSITA would have looked to Irvin, which teaches reducing the power consumption of a wireless head-worn device by automatically transitioning to and from an inactive state, or a low-power sleep state, based on user activity. (EX1006, 2:8-51.) For example, Irvin discloses that a wireless headset includes a

sensor “responsive to a natural stimulus associated with a person preparing to use the wireless headset.” (EX1006, 2:16-28.) The sensor can sense, *e.g.*, motion, physical orientation, or user proximity. (EX1006, 2:27-28.) The POSITA would have been motivated to combine Jannard’s head-worn device, with Irvin’s teachings of using a sensor to detect user activity, in order to realize improvements in usability, reliability, and power consumption promised by Irvin. (EX1006, 1:13-2:51.) For example, Irvin’s sensor eliminates the need for mechanical switching, instead automatically transitioning to a fully active state only when needed (*e.g.*, when the user is using or wearing the device), and transitioning to an inactive state or sleep state when not in use (*e.g.*, after the device is removed). (EX1006, 1:13-2:51.) By using a sensor to determine when the device is in use (*e.g.*, in motion, and/or being worn), Irvin teaches implementing a power save function in a way that is reliable, convenient, hands-free, and requires minimal user intervention. (EX1006, 1:13-2:51.)

100. Irvin discloses that the sensor 220 can be, *e.g.*, a motion sensor (such as an accelerometer) or a proximity sensor. (EX1006, 2:27-28, 5:1-6:33.) The POSITA would have been motivated to combine either of these sensor types with Jannard. As Irvin notes, the sensor 220 “may be based on a variety of technologies,” and “the particular sensor 220 employed may be tuned or configured such that only stimulus consistent with actual use actuates the sensor,

thus avoiding inadvertent or unintended enabling of the wireless headset 100.”

(EX1006, 5:1-17.) Accordingly, the POSITA would have been motivated to employ the “particular sensor” best suited for the “actual use” of Jannard’s audio device 10D, in order to avoid inadvertent enabling of audio device 10D while in the power saving mode.

101. For some uses of audio device 10D, the POSITA would have been motivated to combine Irvin’s proximity sensor with audio device 10D. For example, for some applications—such as presenting video via a head-mounted display of audio device 10D, *see* EX1004, 27:21-27—using a proximity sensor to detect when the device has been placed on the user’s head may provide the most reliable indication that audio device 10D is in use. For instance, if the user’s head remains motionless during use, such as while watching the video, a motion sensor may falsely detect that the device is not being used; but a proximity sensor would not. For other applications, however, a motion sensor may be advantageous over a proximity sensor. For example, a motion sensor can detect use during the period when the user is raising audio device 10D to his or her head, but has not yet placed the device on the head; a proximity sensor would not detect use until a later point in time, after the device has been placed on the user’s head. This can advantageously avoid delays in returning from the power save mode.

102. The POSITA would have had a reasonable expectation of success in making the combination. For example, Jannard already discloses automatically turning audio device 10D off, or entering a sleep state, based on a determination of whether the user has activated the device; and it would have been straightforward for the skilled artisan to modify Jannard's audio device to use a sensor to make that determination, and automatically transition to and from an inactive state, or a sleep state, as taught by Irvin. (EX1004, 44:63-45:3.) Jannard and Irvin both involve head-worn devices with analogous components (*e.g.*, batteries, power electronics, sensors microphones, speakers); and Jannard already contemplates that the device includes various sensors, including "distance sensors" (analogous to Irvin's proximity sensors) and sensors that measure "speed, acceleration, or jerk" (analogous to Irvin's motion sensors). (EX1004, 22:3-26:25, 35:4-24, FIGS. 10-12; EX1006, 3:28-4:38, FIG. 2A.) The combination thus would have involved the application of known methods to analogous and well-understood components. Moreover, Irvin emphasizes its broad applicability to "any type of device supporting interactive communications with a user," underscoring that the POSITA would have had a reasonable expectation of success in combining Irvin's teachings with Jannard's audio device. (EX1006, 3:29-32.)

3. Claim 12

a. **[Preamble]** *A system as recited in claim 1,*

103. *See claim 1 analysis.*

b. **[A]** *wherein the head-worn personal electronic apparatus comprises: a sensor at least partially contained within the head-worn structure and configured to sense data indicative of whether the head-worn personal electronic apparatus is being worn by the user.*

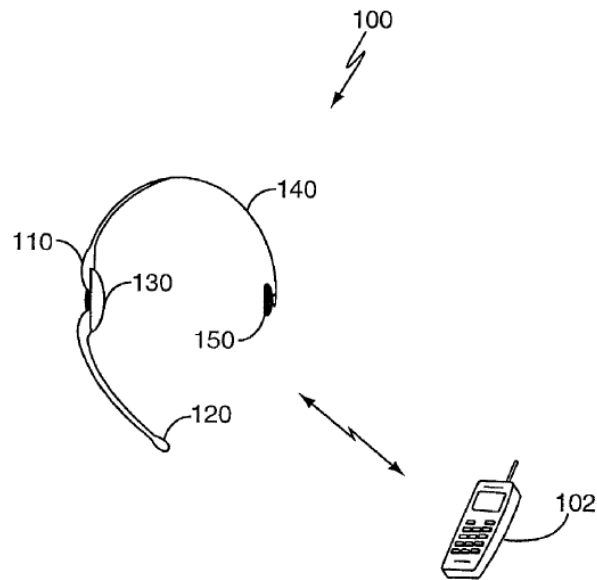
104. Irvin discloses that a wireless electronic headset can include a sensor 220, which provides data used to determine when to transition from an inactive state to an active state. (EX1006, Abstract, 2:16-51, 5:1-6:67.) In the combination of Jannard and Irvin, Jannard's audio device 10D would include such a sensor 220 in order to implement Jannard's power save function, as described above.

105. Sensor 220 can be a proximity sensor (*e.g.*, an IR or acoustic proximity sensor); such that audio device 10D can provide an output signal "based on proximity to the user's body." (EX1006, 6:20-31, FIG. 4D.) Alternatively, sensor 220 can be a motion sensor (*e.g.*, an accelerometer) that detects movement of the device. (EX1006, 5:6-10, FIG. 4A.) The POSITA would understand sensor 220 to sense data indicative of whether audio device 10D is being worn by the user: for example, a proximity sensor "provides indication that a user has placed the wireless headset 100 upon their body"; and, as the '901 patent acknowledges, if

a threshold amount of motion is detected by a motion sensor, eyewear can be “assumed to be worn.” (EX1001, 21:21-25; EX1006, 6:24-26.)

106. Using this data, audio device 10D can thus transition from an inactive state to an active state “in response to a user ... mounting the wireless headset upon their head.” (EX1006, Abstract, 2:16-34.) That is, applied to Jannard’s power save function, audio device 10D can beneficially preserve battery life by turning off the device or entering sleep mode, *i.e.*, when sensor 220 indicates the device is not being worn; and waking up or turning on the device once sensor 220 indicates the device is worn and ready for use. (EX1004, 44:63-45:3; EX1006, 1:61-2:13.)

107. In the combination, audio device 10D contains the sensor 220. For example, Irvin’s sensor 220 may be contained in the structure (*e.g.*, in a primary enclosure 110) of the wireless headset 100, as shown in FIG. 1:

**FIG. 1**

(EX1006, 3:28-45, 4:11-17, FIG. 1.)

108. Jannard's head-worn audio device 10D likewise includes sensors (such as distance sensors), and would thus similarly contain the sensor 220 in combination with Irvin's teachings. (EX1004, 35:4-24.)

4. Claim 13

a. [Preamble] *A system as recited in claim 12,*

109. *See claim 12 analysis.*

- b. ***[A] wherein the sensor is electrically connected to the electronic circuitry, and wherein the electronic circuitry contained within the head-worn structure of the head-worn personal electronic apparatus is configured to at least alter operation of the head-worn personal electronic apparatus based at least in part on the sensed data from the sensor.***

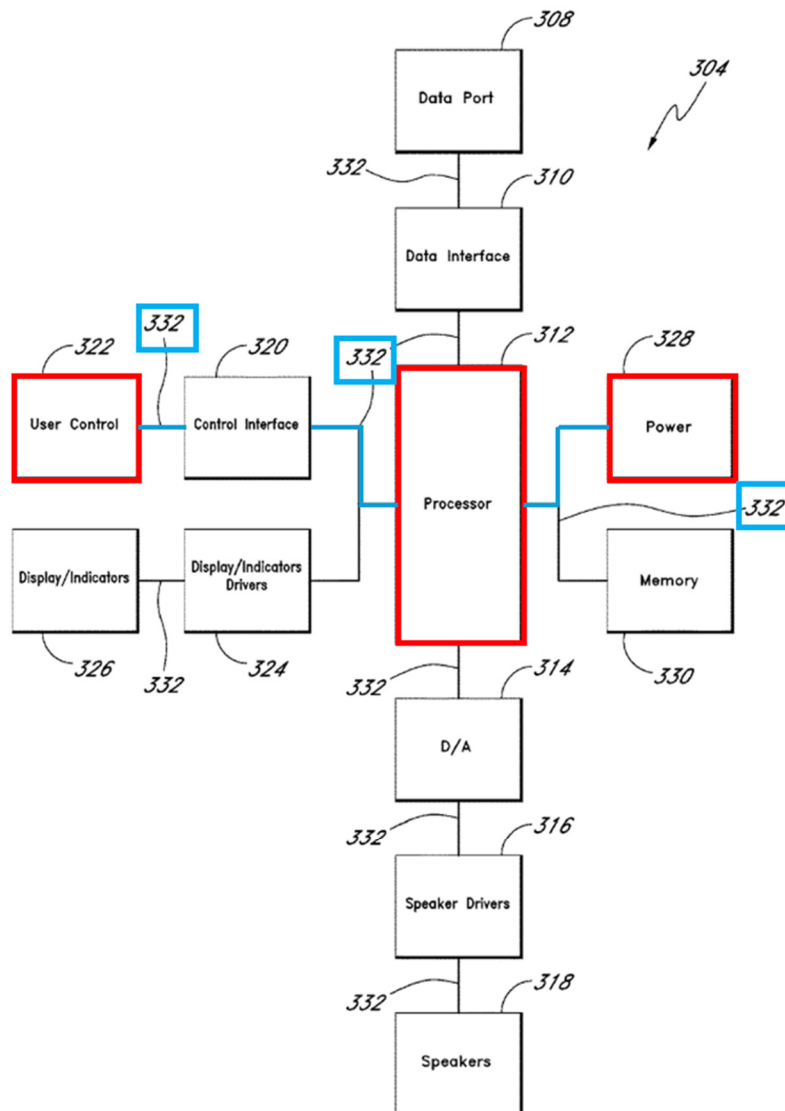
110. As described for claim 12[A], in the combination of Jannard and Irvin, audio device 10D includes sensor 220, which may be a motion sensor or a proximity sensor. (EX1006, 2:27-28, 3:49-52, 4:11-17.)

111. Irvin's sensor 220 can be used by a wireless headset to transition between an inactive state 610 (or a sleep state 720) and an active state 620. (EX1006, 2:16-51, 5:1-24.) In Irvin, a power control circuit 210 uses data received from sensor 220 (*e.g.*, a proximity sensor indicating the distance to the user's head) to enable or disable the headset's electronic circuitry based on whether the headset is being worn. (EX1006, 4:3-10, 4:39-49, 6:20-33.) For example, in Irvin, communications circuit 230 transitions to an active state 620 after the sensor 220 indicates a stimulus (*e.g.*, that the device is worn); and transitions to an inactive state 610 or a sleep state 720 after the indication is no longer provided. (EX1006, 8:11-9:39; FIG. 6, FIG. 7.)

112. Jannard describes a "power save function to conserve power consumption," in which the device automatically enters a sleep state, or turns itself

off, if it has not been “activated by the user” within a fixed period of “non-use” (*e.g.*, 5, 10, 20, or 40 minutes). (EX1004, 44:63-45:3.) The POSITA would understand Jannard’s power save function to be analogous to Irvin’s teachings of transitioning between active state 620 and inactive state 610 or sleep state 720, based on the time elapsed since a detected stimulus. Applying Irvin’s teachings to those of Jannard, the POSITA (motivated as described above) would have implemented Jannard’s power save function by utilizing Irvin’s sensor 220 to determine whether and when audio device 10D has been activated by the user (*e.g.*, worn on the user’s head); and turning off the audio device, or entering a sleep state, after a period of non-use has elapsed since being activated.

113. The POSITA would understand that in the combination, the sensor 220 is electrically connected to audio device 10D’s electronic circuitry. For example, in Jannard, user controls 322 include “any ... input device that may be used by a user to control the audio device 304”; the POSITA would thus understand that in the combination, the user controls 322 include Irvin’s sensor 220 (an input device used by the user to control the headset). (EX1004, 41:22-24, 41:46-58, 44:4-23.) And the user controls 322 are electrically connected to Jannard’s electronic circuitry, including at least processor 312 and power module 328 (analogous to Irvin’s power control circuit 210), and conductors 332, as described for claim 1[F] and shown in FIG. 22:

**FIG. 22**

(EX1004, 44:39-47, FIG. 22 (annotated).)

114. The POSITA would further understand that in the combination, the electronic circuitry alters operation of audio device 10D by entering the power save mode based on sensed data from proximity sensor 220: as Jannard discloses,

the audio device is turned off or in a sleep state during the power save mode, thus limiting or discontinuing device operations (*e.g.*, audio playback) in order to conserve power consumption. (EX1004, 44:63-45:3.)

5. Claim 14

a. [Preamble] *A system as recited in claim 13,*

115. *See* claim 13 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to support audio output to the user via the speaker, and*

116. Jannard discloses that audio device 10D includes left and right speakers 14D, 16D to present audio output (*e.g.*, audio data files). (EX1004, 5:13-14, 9:11-22, 30:21-27, 44:55-60, FIG. 12.)

c. [B] *wherein the operation of the head-worn personal electronic apparatus being altered concerns control of the audio output being provided to the user.*

117. This element is met by Jannard as for claim 13[A]. For example, Jannard discloses that audio device 10D may be turned off while in the power save mode. (EX1004, 44:63-45:3.) The POSITA would understand that the power save mode controls the device's audio output at least by discontinuing the audio output when the device is turned off, *i.e.*, because the audio output actively consumes power and thus cannot function when the device is off. (*See* EX1004, 44:55-60.)

6. Claim 15

a. [Preamble] *A system as recited in claim 13,*

118. See claim 13 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to support a low power operational mode, and*

119. This element is met by Jannard as for claim 13[A]. For example, the POSITA would understand at least Jannard's "sleep state" to be a low power operational mode, at least because Jannard's audio device 10D enters the sleep state to "conserve power consumption from the power module 328." (EX1004, 44:63-45:1; see also EX1006, 2:36-38, 8:51-9:39 (describing a "sleep state" as a mode in which "only a portion of the headset circuitry is enabled, thus conserving power").)

c. [B] *wherein the operation of the head-worn personal electronic apparatus being altered concerns operation of the head-worn personal electronic apparatus in the low power operational mode.*

120. This element is met by Jannard as for claim 13[A]. The POSITA would understand that when audio device 10D is turned off or in the sleep state, operations are disabled in order to "conserve power consumption." (EX1004, 44:63-45:3.)

7. Claim 18

a. [Preamble] *A system, comprising:*

121. The preamble is met by Jannard as for claim 1[Preamble].

b. [A] *a head-worn personal electronic apparatus, including at least:*

122. This element is met by Jannard as for claim 1[A].

c. [B] *a head-worn structure configured to be worn by a user;*

123. This element is met by Jannard as for claim 1[B].

d. [C] *a speaker at least partially contained within the head-worn structure, the speaker being configured to be at or adjacent to an ear of the user when the head-worn structure is being worn by the user;*

124. This element is met by Jannard as for claim 1[C].

e. [D] *a first microphone at least partially contained within the head-worn structure, the first microphone being positioned to pick up at least audio input from at least the user;*

125. Jannard discloses that the head-worn audio device 10D can include two or more banks of microphones positioned “within the audio device,” to support voice recognition with noise-cancellation functionality. (EX1004, 34:10-45.) One of the microphone banks can be a “speaking-microphone” bank, with one or more microphones configured to receive “verbal input from the user”. (EX1004, 34:10-45.) The POSITA accordingly would understand these microphones to be

positioned to detect the audio input from the user (*i.e.*, verbal input); for example, the microphones can be disposed in the frame (*e.g.*, in the bridge or orbitals) and “positioned so as to face toward the user,” as described by Jannard. (EX1004, 30:28-44.)

- f. **[E]** *a second microphone at least partially contained within the head-worn structure, the second microphone being positioned to pick up at least environmental audio input associated with an environment around the head-worn personal electronic apparatus;*

126. Jannard’s microphone banks described above can include a “noise-canceling-microphone” bank of audio device 10D that provides an “ambient noise-cancellation function.” (EX1004, 34:10-45.) The noise-canceling microphone bank can be “arranged in any suitable combination” to permit algorithms to “discern, reduce, and/or eliminate noise.” (EX1004, 34:19-33.) The POSITA thus would understand the noise-canceling microphone bank to be arranged (positioned) to detect audio input from the environment, so that the algorithms can discern, reduce, and/or eliminate the ambient noise from the environmental audio input.

- g. **[F]** *a rechargeable battery contained within the head-worn structure;*

127. This element is met by Jannard as for claim 1[E].

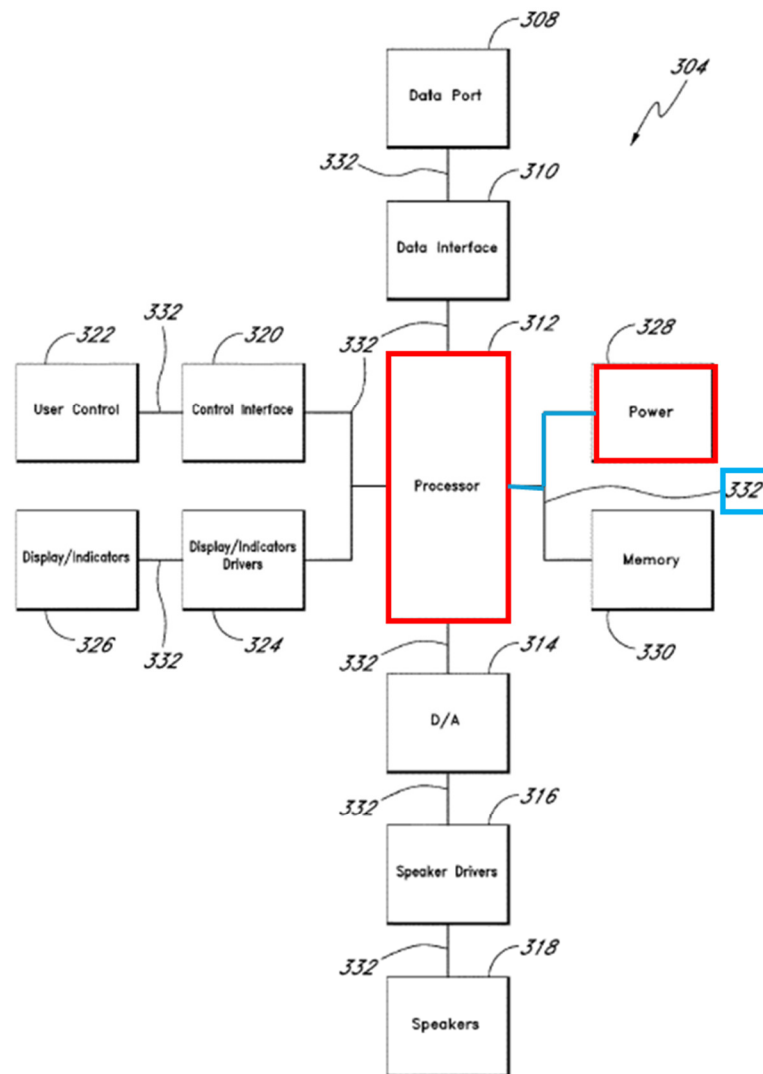
- h. ***[G] a sensor at least partially contained within the head-worn structure and configured to capture data;***

128. This element is met by Jannard in view of Irvin as for claim 12[A].

The claimed sensor is met at least by proximity sensor 220 as described for claim 12[A].

- i. ***[H] electronic circuitry contained within the head-worn structure, the electronic circuitry being electrically connected to at least one or more of the first microphone, the second microphone, the rechargeable battery and the sensor, the electronic circuitry being configured to at least process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone,***

129. Jannard's audio device 304 (which may correspond to audio device 10D) includes processor 312, which "controls the overall function and operation" of the audio device. (EX1004, 41:46-49, 42:21-32.) Jannard's processor 312 can couple "directly or indirectly to the various electronic components" of the audio device, *e.g.*, by conductors 332 of the audio device, which "provide direct or indirect electrical communication between the various components of the audio device 304." (EX1004, 42:21-32, 45:22-24, 45:36-37, FIG. 22.) For example, Jannard's electronic circuitry (including, *e.g.*, processor 312) is electrically connected to the rechargeable battery (power module 328), as shown by FIG. 22:

**FIG. 22**

(EX1004, FIG. 22 (annotated).)

130. As described above for element [E], Jannard's microphones can be used in conjunction with "algorithms to discern, reduce, and/or eliminate noise."

(EX1004, 34:10-32.) The POSITA would understand this operation to be

performed by the audio device's electronic circuitry that includes processor 312 and/or its various coupled electronic components. For example, Jannard discloses that the circuitry includes chips with "ASIC-based noise canceling technology," which are used in conjunction with the microphone banks to "discern, reduce, and/or eliminate noise for the purpose of voice recognition." (EX1004, 34:22-30.) The POSITA would thus understand this circuitry to process the audio input from the first (speaking) microphone, *e.g.*, "discern" a noise component in the audio input; and remove ("eliminate") the noise component from that audio input, based on the environmental audio signal from the second (noise-cancelling) microphone. (EX1004, 34:10-45.) This is at least because Jannard's speaking microphone provides the "verbal input from the user," while the noise-cancelling microphone permits an "ambient noise-cancellation" function. (EX1004, 34:10-45.)

- j. ***[I] the electronic circuitry being configured to process at least the data captured by the sensor, and the electronic circuitry being configured to determine whether the head-worn structure is being worn by a user based on at least the processed sensor data;***

131. This element is met by Jannard in view of Irvin as for claims 12[A] and 13[A]. The POSITA would understand that in the combination of Jannard and Irvin, the output data of sensor 220 is processed by the electronic circuitry of audio device 10D (*i.e.*, Jannard's power module 328 and/or processor 312, which

“controls the overall function and operation”) to determine whether the audio device is being worn, in order to implement Jannard’s power save function.

(EX1004, 42:21-25, 44:63-45:3.)

- k. ***[J] wireless communication circuitry at least partially contained within the head-worn structure, the wireless communication circuitry being electrically connected to at least the rechargeable battery; and***

132. This element is met by Jannard as for claim 1[G].

- l. ***[K] at least one conductive element at least partially included within the head-worn structure, the at least one conductive element being at least partially exposed to enable interconnection therewith, the at least one conductive element being electrically connected to at least the rechargeable battery; and***

133. This element is met by Jannard as for claim 1[H].

- m. ***[L] a charging apparatus having at least a charging connector, wherein on placement of the head-worn personal electronic apparatus in the charging apparatus, electrical connection results at least from the at least one conductive element connecting with the charging connector, and thereby the rechargeable battery of the head-worn personal electronic apparatus is able to be recharged while the head-worn personal electronic apparatus is placed in the charging apparatus.***

134. This element is met by Jannard as for claim 1[I].

8. Claim 19

a. [Preamble] *A system as recited in claim 18,*

135. See claim 18 analysis.

b. [A] *wherein the first microphone is positioned to be directed forward towards the user's front when the head-worn structure is being worn by the user, and the second microphone is positioned to be directed outward away from the user's head when the head-worn structure is being worn by the user.*

136. Jannard's microphone banks can be "positioned at any suitable location or combination of locations" and "arranged in an array" to be used for noise reduction, as described above for claim 18. (EX1004, 34:11-45.) As described for claim 18, the first (speaking) microphone is configured to detect verbal speech input; the POSITA thus would have understood Jannard to teach positioning the first microphone forward toward the user's front, *e.g.*, disposed in the frame of head-worn audio device 10D and "positioned so as to face toward the user," as disclosed by Jannard, in order to best detect the speech input (emitted from the user's mouth) when worn by the user. (EX1004, 18:44-47, 30:28-44, 34:11-45.)

137. The POSITA further would have understood Jannard to teach positioning the second (noise-canceling) microphone directed away from the user's head, at least because this microphone is configured to detect background noise,

such as wind; and Jannard discloses that such noise is minimized when the microphone faces the user. (EX1004, 18:44-47, 30:37-41; *see also* EX1008, 4:18-29 (a microphone in a noise cancellation circuit for speech detection “preferably detects background noise signals”).) This positioning is consistent with Jannard’s disclosure that noise-canceling microphones can be “aimed in different directions.” (EX1004, 34:36-45.)

9. Claim 20

a. [Preamble] *A system as recited in claim 19,*

138. *See* claim 19 analysis.

b. [A] *wherein the head-worn personal electronic apparatus comprises: a touch sensitive surface at least partially contained within the head-worn structure and configured to sense a touch input associated with the user, wherein the sensed touch input operating to at least alter operation of the head-worn electronic personal audio apparatus.*

139. This element is met by Jannard as for claims 1[D] and 2[A].

10. Claim 21

a. [Preamble] *A system as recited in claim 20,*

140. *See* claim 20 analysis.

- b. ***[A] wherein the head-worn electronic personal audio apparatus is configured to support audio output to the user via the speaker, and***

141. This element is met by Jannard as for claim 4[A].

- c. ***[B] wherein the at least one operation of the head-worn electronic personal audio apparatus being altered concerns control of the audio output being provided to the user.***

142. This element is met by Jannard as for claim 4[B].

11. Claim 22

- a. ***[Preamble] A system as recited in claim 20,***

143. See claim 20 analysis.

- b. ***[A] wherein the system comprises: a Hall effect detector configured to capture data associated with a magnetic characteristic.***

144. This element is met by Jannard (via its incorporation of Spitzer) as for claim 16[A].

12. Claim 23

- a. ***[Preamble] A system as recited in claim 18,***

145. See claim 18 analysis.

- b. ***[A] wherein the sensor is positioned to be directed towards the user's head when the head-worn structure is being worn.***

146. Irvin discloses that sensor 220 may be a proximity sensor that indicates whether the user has “mount[ed] the wireless headset upon their head.”

(EX1006, Abstract, 2:16-34, FIG. 4D.) The proximity sensor provides an output signal “based on proximity to the user’s body.” (EX1006, 6:28-31.) In the combination of Jannard and Irvin, as described for claim 12[A], sensor 220 is located in the head-worn audio device 10D. The POSITA would recognize that in order for a proximity sensor located in the head-worn device to indicate when the user has mounted the device on his or her head, the sensor is directed at the user’s head, in order to provide its proximity to the head.

13. Claim 24

a. [Preamble] *A system as recited in claim 23,*

147. *See* claim 23 analysis.

b. [A] *wherein the data captured by the sensor is dependent on thermal characteristics of the user's head when the head-worn structure is being worn.*

148. As described for claim 23[A], in the combination of Jannard and Irvin, sensor 220 may be a proximity sensor directed toward the user’s head, to determine the proximity of the head (and thus whether the user has mounted audio device 10D on his or her head). Further, Irvin discloses that the proximity sensor may be a “resistive or other type of *thermal* sensor.” (EX1006, 6:22-24 (emphasis added).) The POSITA would understand that a head-worn device receives heat from the head of the wearer, *see* EX1001, 35:65-36:4; and thus that a thermal

proximity sensor used to determine a proximity to a user's head does so based on thermal characteristics of the user's head (*e.g.*, a level of thermal energy (heat) provided by the head to the sensor). (EX1006, 6:22-31; *see* EX1009, 32:39-45.)

14. Claim 25

a. [Preamble] *A system as recited in claim 18,*

149. *See* claim 18 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to receive a voice input via the first microphone, determine or receive a determination of a requested operation from the voice input using voice recognition, and control an operation by the head-worn personal electronic apparatus based on the requested operation.*

150. This element is met by Jannard as for claim 10[B]. Further, the POSITA would understand that the microphone described for claim 10[B] can be the first microphone described for claim 18[D], at least because Jannard's user controls 322 include "a microphone that receives a voice command," such as the first microphone configured to detect verbal input, as described above. (EX1004, 44:4-14.)

15. Claim 26

a. [Preamble] *A system as recited in claim 18,*

151. *See* claim 18 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus is configured to at least alter operation of the head-worn personal electronic apparatus based at least in part on the sensed data from the sensor.*

152. This element is met by Jannard in view of Irvin as for claim 13[A].

16. Claim 27

- a. *[Preamble] A system as recited in claim 26,*

153. *See* claim 26 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus is configured to support audio output to the user via the speaker, and*

154. This element is met by Jannard as for claim 4[A].

- c. *[B] wherein the operation of the head-worn personal electronic apparatus being altered concerns control of the audio output being provided to the user.*

155. This element is met by Jannard as for claim 4[B].

17. Claim 32

- a. *[Preamble] A system as recited in claim 18,*

156. *See* claim 18 analysis.

- b. *[A] wherein the system comprises: a Hall effect detector.*

157. This element is met by Jannard (via its incorporation of Spitzer) as for claim 16[A].

18. Claim 33

a. **[Preamble]** *A system as recited in claim 18,*

158. *See claim 18 analysis.*

b. **[A]** *wherein the head-worn personal electronic apparatus comprises: a bone conducting element at least partially contained within the head-worn structure and configured to operate based on signals associated with sound, the bone conducting element being operatively connected to the electronic circuitry.*

159. This element is met by Jannard as for claim 17[A].

19. Claim 34

a. **[Preamble]** *A system as recited in claim 18,*

160. *See claim 18 analysis.*

b. **[A]** *wherein the conductive element is a conductive pad.*

161. Jannard describes that the audio device can “include power contacts 164 for recharging any rechargeable batteries connected thereto.” (EX1004, 33:13-15.) For example, Jannard explains that “with an appropriate recharging cradle (not shown), the audio device 10D can be laid on the cradle, thereby making contact between the power contacts 164 and corresponding contacts in the cradle (not shown).” (EX1004, 33:16-20.) The POSITA would understand the power

contacts 164 to be conductive pads, at least to enable interconnection (*i.e.*, with the corresponding contacts of the cradle).

20. Claim 35

a. [Preamble] *A system, comprising:*

162. The preamble is met by Jannard as for claim 18[Preamble].

b. [A] *a head-worn personal electronic apparatus, including at least:*

163. This element is met by Jannard as for claim 18[A].

c. [B] *a head-worn structure configured to be worn by a user;*

164. This element is met by Jannard as for claim 18[B].

d. [C] *a speaker at least partially contained within the head-worn structure, the speaker being configured to be worn proximate to an ear of the user when the head-worn structure is being worn by the user;*

165. This element is met by Jannard as for claim 18[C].

e. [D] *a first microphone at least partially contained within the head-worn structure, the first microphone being positioned to pick up at least audio input from at least the user;*

166. This element is met by Jannard as for claim 18[D].

- f. ***[E] a second microphone at least partially contained within the head-worn structure, the second microphone being positioned to pick up at least environmental audio input associated with an environment around the head-worn personal electronic apparatus;***

167. This element is met by Jannard as for claim 18[E].

- g. ***[F] a rechargeable battery contained within the head-worn structure;***

168. This element is met by Jannard as for claim 18[F].

- h. ***[G] a “being worn” sensor at least partially contained within the head-worn structure and configured to detect data indicative of whether the head-worn structure of the head-worn personal electronic apparatus is being worn;***

169. This element is met by Jannard in view of Irvin as for claim 12[A].

The claimed “being worn” sensor is met by Irvin’s sensor 220, which may be a proximity sensor configured to detect when audio device 10D is being worn, as described for claim 12[A]. (EX1006, 6:24-26.) Additionally, the “being worn” sensor is met where sensor 220 is a motion sensor, *e.g.*, an accelerometer, as disclosed by Irvin. (EX1006, 5:8-10.) The motion sensor provides motion data that can indicate whether audio device 10D is being worn because, as the ’901 patent acknowledges, if a threshold amount of motion is detected, eyewear can be “assumed to be worn.” (EX1001, 21:21-25.)

- i. ***[H] electronic circuitry contained within the head-worn structure, the electronic circuitry being electrically connected to at least one or more of the first microphone, the second microphone, the rechargeable battery and the “being worn” sensor, the electronic circuitry being configured to at least process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone,***

170. This element is met by Jannard as for claim 18[H].

- j. ***[I] the electronic circuitry being configured to process at least the detected data captured by the “being worn” sensor;***

171. This element is met by Jannard as for claim 18[I].

- k. ***[J] wireless communication circuitry at least partially contained within the head-worn structure, the wireless communication circuitry being electrically connected to at least the rechargeable battery; and***

172. This element is met by Jannard as for claim 18[J].

- l. ***[K] at least one conductive element at least partially included within the head-worn structure, the at least one conductive element being at least partially exposed to enable interconnection therewith, the at least one conductive element being electrically connected to at least the rechargeable battery; and***

173. This element is met by Jannard as for claim 18[K].

- m. ***[L] a charging apparatus having at least a charging connector, wherein on placement of the head-worn personal electronic apparatus in the charging apparatus, electrical connection results at least from the at least one conductive element connecting with the charging connector, and thereby the rechargeable battery of the head-worn personal electronic apparatus is able to be recharged while the head-worn personal electronic apparatus is placed in the charging apparatus.***

174. This element is met by Jannard as for claim 18[L].

21. Claim 36

- a. ***[Preamble] A system as recited in claim 35,***

175. *See* claim 35 analysis.

- b. ***[A] wherein the detected data by the “being worn” sensor is dependent on a physical characteristic of the user.***

176. This element is met by Jannard in view of Irvin. For example, the “being worn” sensor may be met by proximity sensor 220 of Irvin, as described for claim 35[G]. Irvin discloses that proximity sensor 220 provides output data “based on proximity to the user’s body,” which the POSITA would understand to be dependent on the physical characteristics of the user’s body (*e.g.*, position, size, shape) relative to the sensor. (EX1006, 6:28-31.)

22. Claim 37

a. **[Preamble]** *A system as recited in claim 35,*

177. *See* claim 35 analysis.

b. **[A]** *wherein the head-worn structure comprises: an accelerometer, operatively connected to the rechargeable battery, at least partially contained within the head-worn structure and configured to sense movement data.*

178. This element is met by Jannard in view of Irvin as for claim 35[D]. In the combination of Jannard and Irvin, Irvin’s sensor 220 can be a motion sensor configured to “provide a signal responsive to a natural stimulus associated with use of the headset by a user,” such as “[m]ovement or vibration” of audio device 10D. (EX1006, 3:28-45, 4:11-17, 5:1-8.) The sensor 220 may detect this movement by “sensing acceleration, such as with an *accelerometer*.” (EX1006, 5:8-10 (emphasis added).) The POSITA would understand acceleration to be movement data because acceleration expresses a second derivative of displacement (*i.e.*, movement) over time.

179. The POSITA would understand that in the combination, the accelerometer of sensor 220 is operatively coupled to the rechargeable battery as described for claim 1[F]. For example, in Jannard, user controls 322 include “any ... input device that may be used by a user to control the audio device 304”; the POSITA would thus understand that in the combination, the user controls 322

include Irvin's sensor 220 (an input device used by the user to control the headset). (EX1004, 41:22-24, 41:46-58, 44:4-23.) Jannard's power module 328 (a "rechargeable battery") distributes power to the user controls 322 via conductors 332, as described for claim 1[F] and shown in FIG. 22:

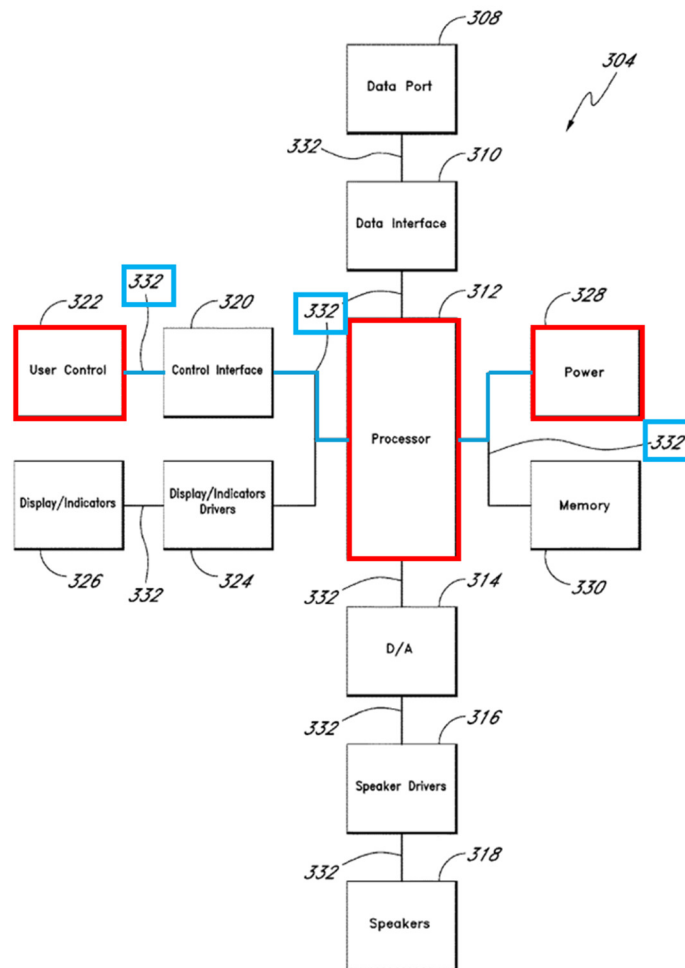


FIG. 22

(EX1004, 44:39-47, FIG. 22 (annotated).)

23. Claim 38

a. [Preamble] *A system, comprising:*

180. The preamble is met by Jannard as for claim 18[Preamble].

b. [A] *a head-worn personal electronic apparatus, including at least:*

181. This element is met by Jannard as for claim 18[A].

c. [B] *a head-worn structure configured to be worn by a user;*

182. This element is met by Jannard as for claim 18[B].

d. [C] *a speaker at least partially contained within the head-worn structure, the speaker being configured to be at or adjacent to an ear of the user when the head-worn structure is being worn by the user;*

183. This element is met by Jannard as for claim 18[C].

e. [D] *a motion detector at least partially contained within the head-worn structure and configured to provide motion data pertaining to the head-worn personal electronic apparatus;*

184. This element is met by Jannard in view of Irvin as for claim 37[A].

The motion detector is met by the accelerometer of sensor 220: “[m]ovement may be detected ... by sensing acceleration, such as with an accelerometer.” (EX1006, 5:8-10.) Similarly, the POSITA would understand the acceleration sensed by the accelerometer to be motion data. (EX1006, 5:8-10.)

- f. ***[E] a first microphone at least partially contained within the head-worn structure, the first microphone being positioned to pick up at least audio input from at least the user;***

185. This element is met by Jannard as for claim 18[D].

- g. ***[F] a second microphone at least partially contained within the head-worn structure, the second microphone being positioned to pick up at least environmental audio input associated with an environment around the head-worn personal electronic apparatus;***

186. This element is met by Jannard as for claim 18[E].

- h. ***[G] a touch sensitive surface at least partially contained within the head-worn structure and configured to sense a touch input associated with the user, wherein the sensed touch input operating to at least alter operation of the head-worn electronic personal audio apparatus;***

187. This element is met by Jannard as for claims 1[D] and 2[A].

- i. ***[H] a rechargeable battery contained within the head-worn structure;***

188. This element is met by Jannard as for claim 18[F].

- j. ***[I] electronic circuitry contained within the head-worn structure, the electronic circuitry being electrically connected to at least the rechargeable battery;***

189. This element is met by Jannard as for claim 18[H].

- k. ***[J] wireless communication circuitry at least partially contained within the head-worn structure, the wireless communication circuitry being electrically connected to at least the rechargeable battery; and***

190. This element is met by Jannard as for claim 18[J].

- l. ***[K] at least one conductive element at least partially included within the head-worn structure, the at least one conductive element being at least partially exposed to enable interconnection therewith, the at least one conductive element being electrically connected to at least the rechargeable battery; and***

191. This element is met by Jannard as for claim 18[K].

- m. ***[L] a charging apparatus having at least a charging connector, wherein on placement of the head-worn personal electronic apparatus in the charging apparatus, electrical connection results at least from the at least one conductive element connecting with the charging connector, and thereby the rechargeable battery of the head-worn personal electronic apparatus is able to be recharged while the head-worn personal electronic apparatus is placed in the charging apparatus.***

192. This element is met by Jannard as for claim 18[L].

24. Claim 39

- a. ***[Preamble] A system as recited in claim 38,***

193. See claim 38 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus comprises: wherein the electronic circuitry is configured to process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone, and*

194. This element is met by Jannard as for claim 18[H].

- c. *[B] wherein the head-worn personal electronic apparatus is configured to receive a voice input via the first microphone, determine or receive a determination of a requested operation from the voice input using voice recognition, and control an operation by the head-worn personal electronic apparatus based on the requested operation.*

195. This element is met by Jannard as for claim 25[A].

25. Claim 41

- a. *[Preamble] A system as recited in claim 39,*

196. *See* claim 39 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus comprises: a sensor at least partially contained within the head-worn structure and configured to sense data indicative of whether the head-worn personal electronic apparatus is being worn by the user,*

197. This element is met by Jannard in view of Irvin as for claim 12[A].

- c. ***[B] wherein the head-worn personal electronic apparatus is configured to at least alter operation of the head-worn personal electronic apparatus based at least in part on the sensed data from the sensor.***

198. This element is met by Jannard in view of Irvin as for claim 13[A].

26. Claim 42

- a. ***[Preamble] A system as recited in claim 41,***

199. *See* claim 41 analysis.

- b. ***[A] wherein the head-worn personal electronic apparatus is configured to support audio output to the user via the speaker, and***

200. This element is met by Jannard as for claim 4[A].

- c. ***[B] wherein the operation of the head-worn personal electronic apparatus being altered concerns control of the audio output being provided to the user.***

201. This element is met by Jannard as for claim 4[B].

27. Claim 43

- a. ***[Preamble] A system as recited in claim 41,***

202. *See* claim 41 analysis.

- b. ***[A] wherein the head-worn personal electronic apparatus is configured to support a low power operational mode, and***

203. This element is met by Jannard in view of Irvin as for claim 15[A].

28. Claim 44

a. [Preamble] *A system, comprising:*

204. The preamble is met by Jannard as for claim 1[Preamble].

b. [A] *a head-worn personal electronic apparatus, including at least:*

205. This element is met by Jannard as for claim 1[A].

c. [B] *a head-worn structure configured to be worn by a user;*

206. This element is met by Jannard as for claim 1[B].

d. [C] *a speaker at least partially contained within the head-worn structure, the speaker being configured to be at or adjacent to an ear of the user when the head-worn structure is being worn by the user;*

207. This element is met by Jannard as for claim 1[C].

e. [D] *a motion detector at least partially contained within the head-worn structure and configured to provide motion data pertaining to the head-worn personal electronic apparatus;*

208. This element is met by Jannard in view of Irvin as for claim 38[D].

f. [E] *a first microphone at least partially contained within the head-worn structure, the first microphone being positioned to pick up at least audio input from at least the user;*

209. This element is met by Jannard as for claim 18[D].

- g. ***[F] a second microphone at least partially contained within the head-worn structure;***

210. This element is met by Jannard as for claim 18[E].

- h. ***[G] a rechargeable battery contained within the head-worn structure;***

211. This element is met by Jannard as for claim 1[E].

- i. ***[H] electronic circuitry contained within the head-worn structure, the electronic circuitry being electrically connected to at least the rechargeable battery;***

212. This element is met by Jannard as for claim 18[H].

- j. ***[I] wireless communication circuitry at least partially contained within the head-worn structure, the wireless communication circuitry being electrically connected to at least the rechargeable battery;***

213. This element is met by Jannard as for claim 18[J].

- k. ***[J] a radiation emitter at least partially contained within the head-worn structure and configured to at least direct radiation towards the user when at least the head-worn structure of the head-worn personal electronic apparatus is being worn;***

214. Jannard's audio device 10D can include a sensor for determining the user's sight direction when the device is worn by the user. (EX1004, 24:31-38, 25:15-28.) The sensor may belong to source electronics that are built into the eyewear. (EX1004, 25:26-28.) As Jannard discloses, the sensor can determine the sight direction by "sensing the position of the wearer's eyes." (EX1004, 24:34-

36.) Using “well known” techniques, the sensor “measur[es] reflected light off of a wearer’s eye.” (EX1004, 24:36-38.) The POSITA would have been familiar with the “well known” techniques referenced in Jannard, and would understand them to include well-known eye tracking methods in which a light (radiation) emitter directs light toward the user’s eye, so that the reflected light can be detected and measured by the sensor, and the sight direction determined accordingly. (EX1001, 21:54-55; *see* EX1011 (describing one such method).) Thus, the POSITA would understand Jannard to teach the claimed radiation emitter.

1. ***[K] a radiation detector at least partially contained within the head-worn structure and configured to detect at least a portion of the radiation from the radiation emitter that is reflected back from the user when at least the head-worn structure of the head-worn personal electronic apparatus is being worn; and***

215. This element is met by Jannard in view of Irvin as for element [J].

That is, the POSITA would understand the reflected light to be detected by a light (radiation) detector. (EX1001, 21:54-55; *see* EX1011, Abstract.)

- m. **[L]** *at least one conductive element at least partially included within the head-worn structure, the at least one conductive element being at least partially exposed to enable interconnection therewith, the at least one conductive element being electrically connected to at least the rechargeable battery; and*

216. This element is met by Jannard as for claim 1[H].

- n. **[M]** *a charging apparatus having at least a charging connector, wherein on placement of the head-worn personal electronic apparatus in the charging apparatus, electrical connection results at least from the at least one conductive element connecting with the charging connector, and thereby the rechargeable battery of the head-worn personal electronic apparatus is able to be recharged while the head-worn personal electronic apparatus is placed in the charging apparatus.*

217. This element is met by Jannard as for claim 1[I].

29. Claim 45

- a. **[Preamble]** *A system as recited in claim 44,*

218. *See* claim 44 analysis.

- b. **[A]** *wherein the radiation detector is operatively connected to the electronic circuitry, and*

219. Jannard's user controls 322 include "any ... input device that may be used by a user to control the audio device 304"; the POSITA would thus understand the user controls 322 to include the sight direction sensor described for

claim 44[J]. (EX1004, 41:22-24, 41:46-58, 44:4-23.) And the user controls 322 are operatively connected to Jannard's electronic circuitry, including at least processor 312 and power module 328 (analogous to Irvin's power control circuit 210), and conductors 332, as described for claim 1[F] and shown in FIG. 22:

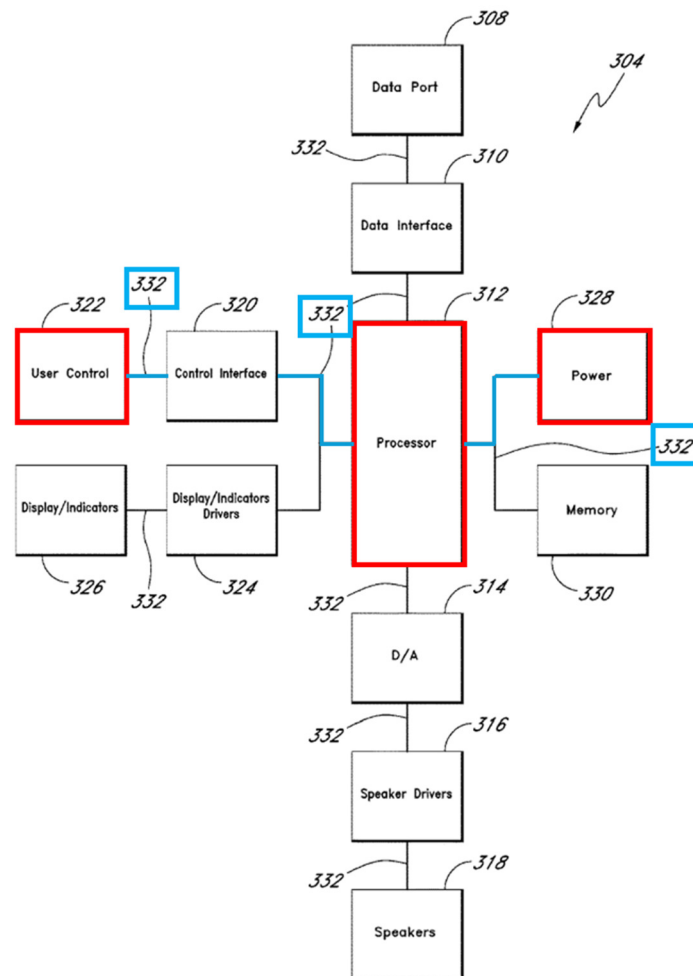


FIG. 22

(EX1004, 44:39-47, FIG. 22 (annotated).)

- c. ***[B] wherein electronic circuitry within the head-worn structure is configured to facilitate determining whether the head-worn structure of the head-worn personal electronic apparatus is being worn by the user.***

220. This element is met by Jannard in view of Irvin as for claim 12[A].

30. Claim 47

- a. ***[Preamble] A system as recited in claim 45,***

221. *See* claim 45 analysis.

- b. ***[A] wherein the head-worn personal electronic apparatus is configured to at least alter operation of the head-worn personal electronic apparatus based at least in part on the determination of whether the head-worn structure of the head-worn personal electronic apparatus is being worn by the user based on at least the motion data.***

222. This element is met by Jannard in view of Irvin as for claims 13[A] and 38[D]. That is, in the combination of Jannard and Irvin, as described for claim 13[A], operation of audio device 10D is altered by, *e.g.*, entering Jannard's power save mode based on data provided by sensor 220. As described for claim 38[D], sensor 220 can be an accelerometer that provides motion data.

31. Claim 48

- a. ***[Preamble] A system as recited in claim 47,***

223. *See* claim 47 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus is configured to support audio output to the user via the speaker, and*

224. This element is met by Jannard as for claim 4[A].

- c. *[B] wherein the operation of the head-worn personal electronic apparatus being altered concerns control of the audio output being provided to the user.*

225. This element is met by Jannard as for claim 4[B].

32. Claim 49

- a. *[Preamble] A system as recited in claim 47,*

226. *See* claim 47 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus is configured to support a low power operational mode, and*

227. This element is met by Jannard in view of Irvin as for claim 15[A].

- c. *[B] wherein the operation of the head-worn personal electronic apparatus being altered concerns operation of the head-worn personal electronic apparatus in the low power operational mode.*

228. This element is met by Jannard in view of Irvin as for claim 15[B].

33. Claim 50

- a. *[Preamble] A system as recited in claim 45,*

229. *See* claim 45 analysis.

- b. *[A] wherein the second microphone is positioned to pick up at least environmental audio input associated with an environment around the head-worn personal electronic apparatus,*

230. This element is met by Jannard as for claim 18[E].

- c. *[B] wherein the electronic circuitry is configured to process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone, and*

231. This element is met by Jannard as for claim 18[H].

- d. *[C] wherein the head-worn personal electronic apparatus is configured to receive a voice input via the first microphone, determine or receive a determination of a requested operation from the voice input using voice recognition, and control an operation by the head-worn personal electronic apparatus based on the requested operation.*

232. This element is met by Jannard as for claim 25[A].

34. Claim 59

- a. *[Preamble] A system as recited in claim 44,*

233. *See claim 44 analysis.*

- b. *[A] wherein the first microphone is positioned to be directed forward towards the user's front when the head-worn structure is being worn by the user, and the second microphone is positioned to be directed outward away from the user's head when the head-worn structure is being worn by the user.*

234. This element is met by Jannard as described for claim 19[A].

D. Ground 4: Claims 28-31 and 56-58 are Rendered Obvious by Jannard in view of Irvin and Zadesky

235. It is my view that Jannard in view of Irvin and Zadesky teaches each and every limitation of claims 28-31 and 56-58 of the '901 patent, for the reasons set forth below.

1. Claim 28

- a. *[Preamble] A system as recited in claim 18,*

236. *See* claim 18 analysis.

- b. *[A] wherein the head-worn personal electronic apparatus comprises: a user input device supported by the head-worn structure, the user input device being configured to receive a user input, the user input device is based on at least capacitive effect, wherein the user input being received induces at least a capacitive change to produce at least an electrical response.*

237. As described for claim 1[D], Jannard discloses that its head-worn audio device includes a touchpad configured to receive user input and control the audio device. (EX1004, 41:46-58, 44:4-23.) As described above for claim 5, the

POSITA would have been motivated to combine Jannard with the touchpad input teachings of Zadesky, and had a reasonable expectation of success in doing so, in order to obtain advantages such as ease and speed of use, accessibility, and ergonomics. (EX1005, 3:26-37, 4:37-40, 5:61-6:8, 13:36-60.)

238. Zadesky explains that such touchpads may be “based on ... capacitive sensing,” by which the touchpad includes electrodes and “detect[s] the change in capacitance at each of the electrodes as the finger passes over the grid.” (EX1005, 2:29-34, 2:60-64.) The POSITA would understand this capacitive change to produce an electrical response, *i.e.*, as measured by an ASIC circuit that computes the finger position based on the change. (EX1005, 2:65-3:5.)

2. Claim 29

a. [Preamble] *A system as recited in claim 28,*

239. *See* claim 28 analysis.

b. [A] *wherein the user input device is configured to distinguish at least a direction of the user input with respect to the user input device.*

240. This element is met by Jannard in view of Zadesky as for claim 5[A].

3. Claim 30

a. [Preamble] *A system as recited in claim 28,*

241. *See* claim 28 analysis.

- b. *[A] wherein the electronic circuitry is electrically connected to the user input device to receive user input data from the user input device, and wherein the head-worn personal electronic apparatus is configured to detect at least a sliding of a finger action with respect to the user input device using at least the electronic circuitry and the user input data.*

242. This element is met by Jannard in view of Zadesky as for claim 6[A].

4. Claim 31

- a. *[Preamble] A system as recited in claim 28,*

243. *See* claim 28 analysis.

- b. *[A] wherein the electronic circuitry is electrically connected to the user input device to receive user input data from the user input device, and wherein the head-worn personal electronic apparatus is configured to distinguish at least whether the user input pertains to a forward sliding action or a backward sliding action with respect to the user input device using at least the electronic circuitry and the user input data.*

244. This element is met by Jannard in view of Zadesky as for claim 7[A].

5. Claim 56

- a. *[Preamble] A system as recited in claim 44,*

245. *See* claim 44 analysis.

- b. ***[A] wherein the head-worn personal electronic apparatus comprises: a force sensor at least partially contained within the head-worn structure and configured to sense a force input associated with the user, wherein the sensed force input operating to at least alter operation of the head-worn electronic personal audio apparatus.***

246. Zadesky discloses that a touchpad of a head-worn device includes a sensor, such as a pressure sensor, for “detecting the presence of an object such as a finger” on the touchpad. (EX1005, 9:39-61.) The POSITA would understand Zadesky to teach using a force sensor in the touchpad, *i.e.*, a sensor whose output varies with a force applied by the finger to the touchpad. This is at least because, as the POSITA would recognize, a pressure sensor is a sensor that detects an input pressure, which, for a surface such as a touchpad, is an applied force per unit area. (*See, e.g.*, P. HEWITT, CONCEPTUAL PHYSICS (3RD ED.) (Addison-Wesley Publishing Co. 1997), 64-65.) Zadesky’s sensor can thus be used to detect the force applied by the user’s finger and to alter the operation of the head-worn device accordingly, *e.g.*, by “vary[ing] a characteristic of the media player,” such as changing the volume. (EX1005, 5:61-6:8, 10:40-51.) Likewise, the combination of Jannard and Zadesky teaches using a force sensor in the touchpad of Jannard’s audio device 10D to detect a force applied by the user’s finger to the touchpad, and altering operation of audio device accordingly, *e.g.*, by controlling

the volume of the audio device. (EX1004, 44:14-22, 45:4-5; EX1005, 5:61-6:8, 10:40-51.)

6. Claim 57

a. [Preamble] *A system as recited in claim 56,*

247. *See* claim 56 analysis.

b. [A] *wherein the head-worn electronic personal audio apparatus is configured to support audio output to the user via the speaker, and*

248. This element is met by Jannard in view of Irvin as for claim 14[A].

c. [B] *wherein the at least one operation of the head-worn electronic personal audio apparatus being altered concerns control of the audio output being provided to the user.*

249. This element is met by Irvin as for claim 14[B].

7. Claim 58

a. [Preamble] *A system as recited in claim 56,*

250. *See* claim 56 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to support voice calls to the user, and*

251. This element is met by Jannard as for claim 3[A].

- c. ***[B] wherein the at least one operation of the head-worn personal electronic apparatus being altered concerns at least accepting or declining a voice call to the user.***

252. This element is met by Jannard as for claim 3[B].

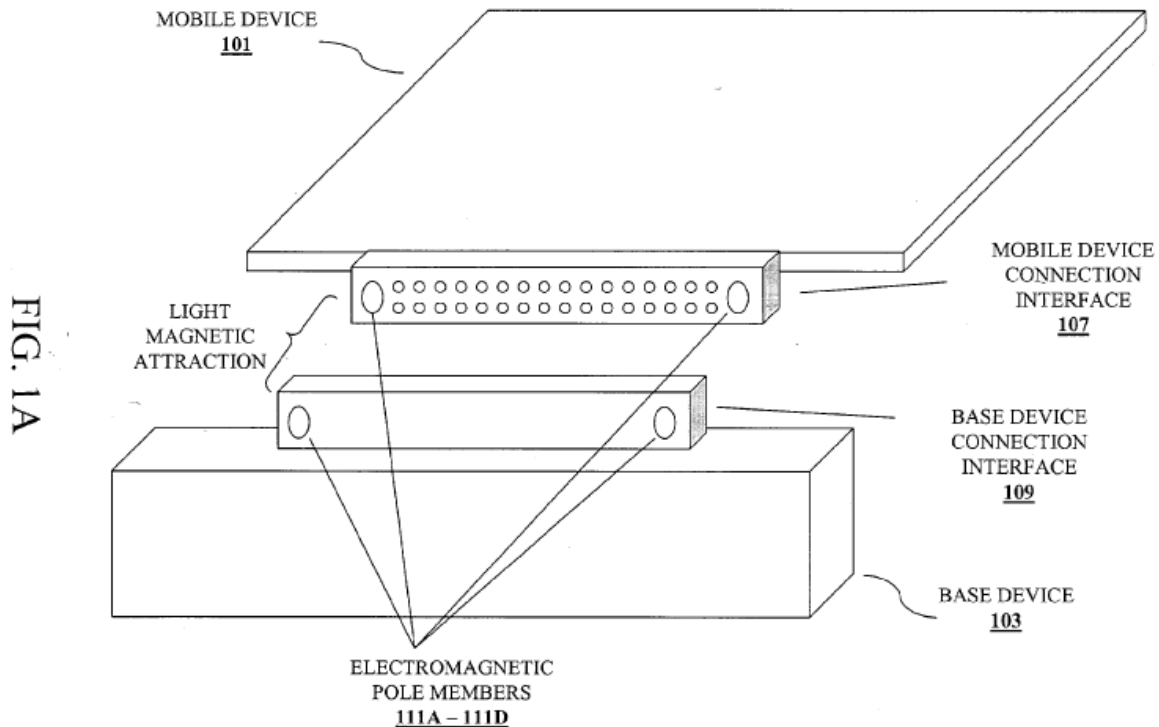
E. Ground 5: Claim 9 is Rendered Obvious by Jannard in view of Clapper

253. It is my view that Jannard in view of Clapper teaches each and every limitation of claim 9 of the '901 patent, for the reasons set forth below.

1. Summary of Clapper

254. I understand that Clapper is the October 21, 2004, publication of a U.S. patent application (Appl. No. 10/419,487) that was filed on April 21, 2003. (EX1010.) I understand that Clapper is thus prior art to the '901 patent under at least 35 U.S.C. §§102(a) and (e).

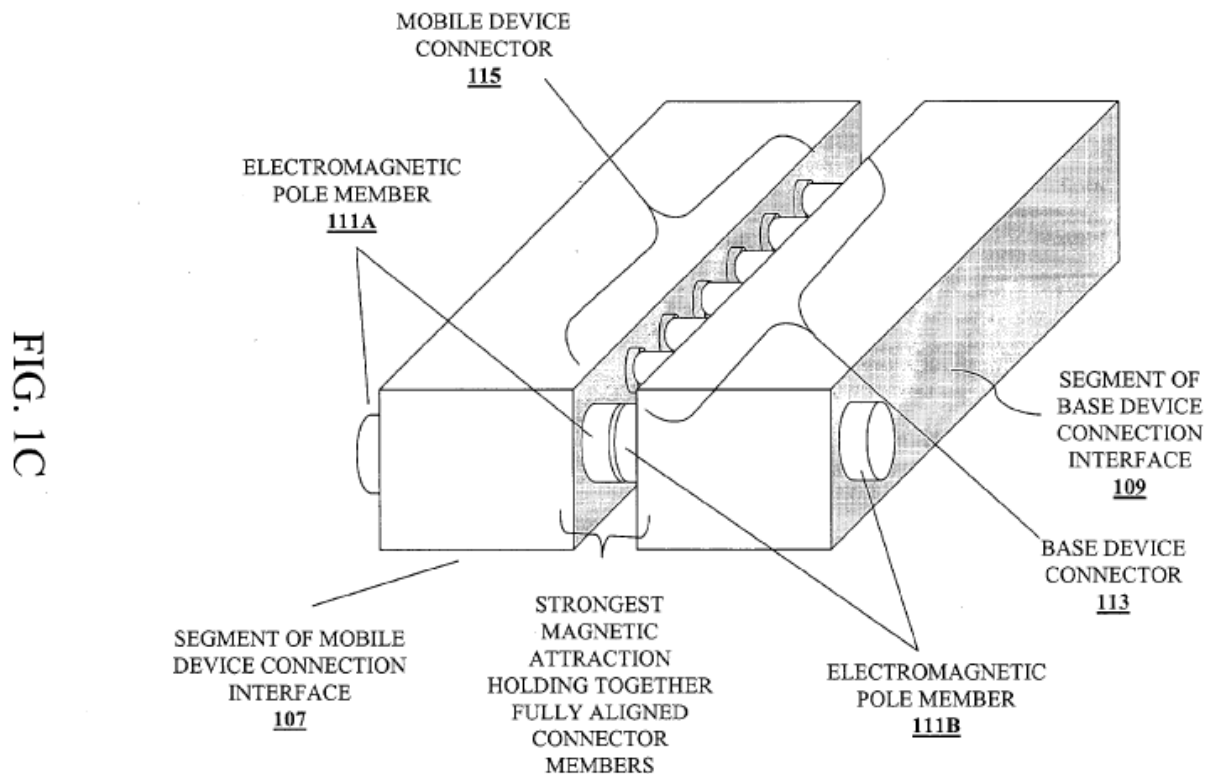
255. Clapper discloses “utiliz[ing] magnetic attraction to align and dock a mobile device with a base device.” (EX1010, Abstract.) For example, a mobile device 101 (*e.g.*, a cell phone or PDA) can be configured to dock into a base device 103 (*e.g.*, a charging cradle) to charge the mobile device’s battery. (EX1010, [0004], [0018], FIGS. 1A-1C.) FIG. 1A illustrates:



(EX1010, FIG. 1A.)

256. The mobile device 101 can include a mobile device connection interface 107 that is configured to connect to connection interface 109 of the base device 103, in order to charge the mobile device battery. (EX1010, [0004], [0018]-[0019].) In order to align the mobile device 101 with the base device 103, mobile device connection interface 107 can include electromagnetic pole members (111A) that magnetically attract corresponding electromagnetic pole members (111B) of the base device connection interface 109, pulling the devices together and permitting “automatic docking” of the mobile device in the base device. (EX1010,

[0019], FIGS. 1A-1C.) When the mobile device 101 and the base device 103 are docked, their electrical connectors (115, 113) are in contact and carry electrical signals, *e.g.*, for battery charging. (EX1010, [0004], [0018], [0021].) FIG. 1C illustrates:



(EX1010, FIG. 1C.)

257. To remove the mobile device from the base device, the electromagnetic pole members can be reversed or shut off, decreasing the attractive force between the connection interfaces 107 and 109 and permitting “graceful” undocking. (EX1010, [0022].)

258. Clapper is analogous art to the claimed invention at least because it is directed to the same field of endeavor—portable devices with electronic components, *e.g.*, for audio or communications functionality. (*See, e.g.*, EX1010, [0004], [0018].) Moreover, by disclosing improvements to battery charging for such portable devices, Clapper is reasonably pertinent to a problem faced by the '901 patent inventors, *e.g.*, facilitating an electrical connection between a wireless device and a battery charger. (EX1001, 32:19-45; EX1010, [0004]-[0009].)

259. I understand that Clapper was not cited during prosecution of the '901 patent.

2. Motivation to Combine Jannard and Clapper with Reasonable Expectation of Success

260. A POSITA would have had multiple motivations to combine the teachings of Jannard and Clapper. For example, Jannard discloses that mobile audio device 10D can be laid on a recharging cradle, and that doing so causes the power contacts 164 to make contact with the corresponding contacts in the cradle. (EX1004, 33:16-20.) However, the specific details of the recharging cradle, including how the power contacts engage with the contacts of the charger, are “not shown.” (EX1004, 33:16-20.) The POSITA thus would have been motivated to look to other references to supply these missing details from Jannard.

261. The POSITA would have looked to Clapper, which (like Jannard) discloses using a cradle to recharge a mobile device's battery. In both Clapper and Jannard, as described above, electrical contacts of the mobile device removably couple with corresponding electrical contacts of a battery charger. And both Clapper and Jannard describe inserting the mobile device into a charging cradle to couple the mobile device's contacts to the charger's contacts.

262. Clapper supplies implementation detail not specified in Jannard: that the mobile device includes magnetic elements (*i.e.*, electromagnetic pole members 111A) to facilitate electrical coupling with the base device's charging contacts (*i.e.*, corresponding electromagnetic pole members 111B), as described above. (EX1010, [0018]-[0019], FIGS. 1A-1C.) Moreover, Clapper explains benefits of its magnetic elements: they allow a more reliable contact force between the electrical contacts, and permit the mobile device and its charging cradle to be easily engaged and disengaged without "misalignment" and "awkward handling" by the user. (EX1010, [0006], [0023]-[0024].) Clapper also reduces the risk of damaging the devices, because "manual pressure" need not be applied, and potentially harmful locking mechanisms are not necessary. (EX1010, [0006]-[0007], [0024].)

263. The benefits of Clapper's magnetic elements apply to Jannard, in which it is beneficial for the wearable device to be easily inserted and removed

from its charger, yet securely mounted. For example, the POSITA would understand that without a securing mechanism such as Clapper's magnetic elements, the power contacts of Jannard's wearable device would be susceptible to dimensional and positional variation in the charger, such that an electrical connection may be lost between the device and the charger's power contacts. This is problematic because a faulty connection to the charging contacts can result in the wearable device's battery failing to charge properly; the POSITA would thus have been motivated to improve the reliability of the electrical connection to mitigate this problem. The POSITA thus would have been motivated to apply Clapper's magnetic element teachings to Jannard, in order to realize these benefits for Jannard's mobile devices. Additionally, Clapper's teachings of using magnetic elements to obtain a "more reliable contact force" without manual pressure, and to protect the mobile device from damage and wear, would apply beneficially to Jannard, which explains that avoiding unnecessary force on the headset is a consideration for the charging cradle. (EX1004, 33:28-35; EX1010, [0007], [0023]-[0024].) And as Clapper notes, its advantages may be particularly significant for lightweight mobile devices, in which the device's own weight may be insufficient to supply the contact force; this further encourages Clapper's combination with the "sleek, low weight" wearable devices of Jannard. (EX1004, 21:27-34, 46:33-38; EX1010, [0008].)

264. Moreover, Clapper and Jannard utilize analogous hardware components (mobile electronic devices; battery charging cradles; corresponding sets of electrical contacts) to achieve analogous goals (recharging the mobile device), and the combination relates to using straightforward and well-understood technology (electromagnetic poles). Further, Clapper’s teachings apply to a range of mobile electronic devices (*e.g.*, cell phones, PDAs), which the POSITA would understand to include electronic eyewear such as in Jannard. (EX1010, [0004], [0018].) And Clapper addresses Jannard’s concerns about the mobile device’s “bulk, weight, and power consumption characteristics,” by teaching that power can be supplied to the mobile device’s electromagnetic poles 111A by the base device—thus offloading power electronics from the mobile device. (EX1004, 21:56-61; EX1010, [0024].) Thus, the POSITA would have had a reasonable expectation of success in making the combination.

3. Claim 9

a. [Preamble] *A system as recited in claim 1,*

265. *See* claim 1 analysis.

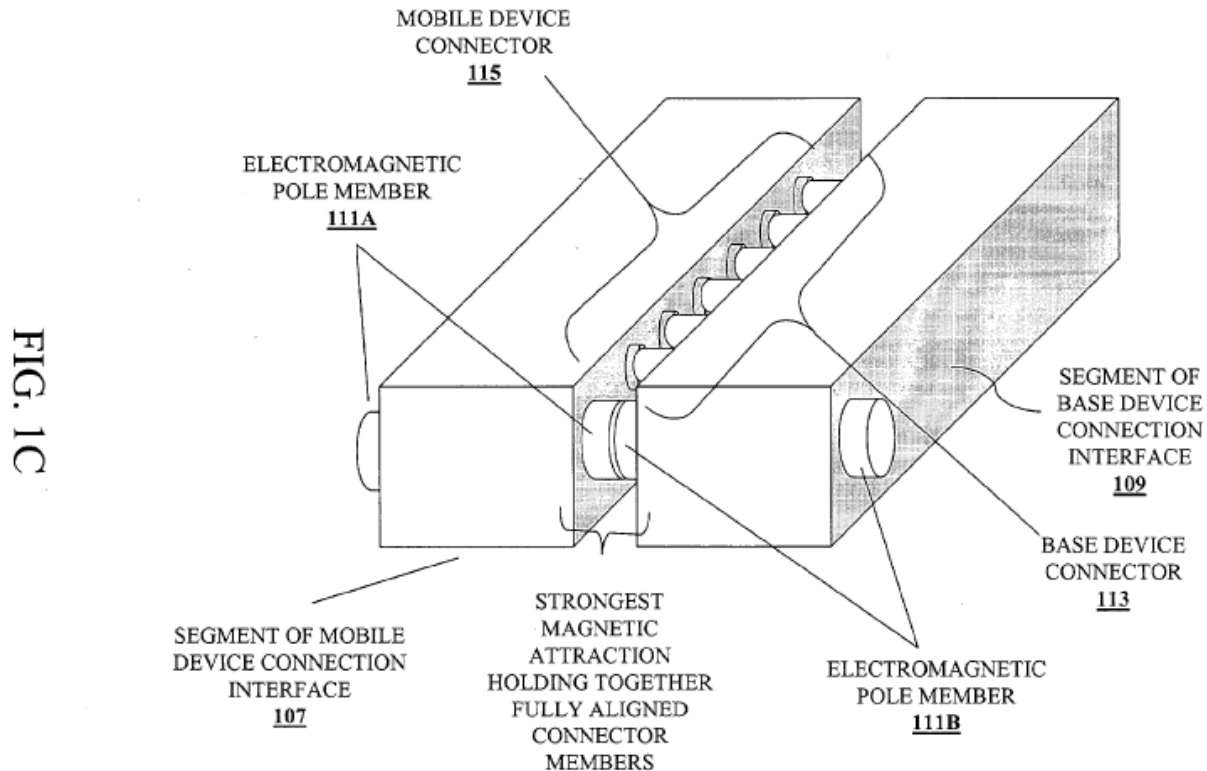
b. [A] *wherein the head-worn personal electronic apparatus comprises:*

266. This element is met by Jannard as for claim 1[A].

- c. ***[B] at least one magnetic element at least partially contained within the head-worn structure and configured to support a magnetic force that facilitates an electrical connection.***

267. Jannard discloses that audio device 10D includes power contacts 164, which can be electrically connected to a recharging cradle to charge the audio device's battery. (EX1004, 33:13-27.) And Clapper teaches that a mobile device, which may correspond to Jannard's audio device 10D, includes magnetic elements to permit "automatic docking" with the charging cradle. (EX1010, [0019], FIGS. 1A-1C.) For example, in Clapper, the mobile device 101 includes electromagnetic pole members 111A, which are magnetically attracted to corresponding electromagnetic pole members 111B in the base device 103 (*i.e.*, a charging cradle as in Jannard). (EX1010, [0019], FIGS. 1A-1C.) This magnetic force pulls the mobile device and the charging cradle together in a docking configuration, such that their electrical connectors (115, 113) are in contact and carry electrical signals,

e.g., for battery charging. (EX1010, [0004], [0018], [0021].) FIG. 1C illustrates:



(EX1010, FIG. 1C.)

268. The POSITA, motivated as described above, would have combined the teachings of Jannard and Clapper by incorporating electromagnetic pole members 111A into Jannard's audio device 10D, to correspond with electromagnetic pole members in Jannard's charging cradle. The magnetic elements 111A of audio device 10D would support a magnetic force toward the magnetic elements 111B of charging cradle, to facilitate docking audio device 10D with the charging cradle—*i.e.*, making an electrical connection between the audio

device's power contacts 164 and the charging cradle's electrical contacts to recharge the audio device battery, as taught by Clapper. (EX1004, 33:13-27; EX1010, [0019], FIGS. 1A-1C.) The combination would have advantageously permitted "automatic docking" of audio device 10D without "manual pressure" by the user—thus providing a more reliable contact force between the audio device and the charging cradle, while minimizing misalignment, awkward handling, and risk of damage to the audio device. (EX1010, [0006]-[0007], [0024].)

F. Ground 6: Claims 40 and 46 are Rendered Obvious by Jannard in view of Irvin and Clapper

269. It is my view that Jannard in view of Irvin and Clapper teaches each and every limitation of claims 40 and 46 of the '901 patent, for the reasons set forth below.

1. Motivation to Combine Jannard, Irvin, and Clapper with a Reasonable Expectation of Success

270. The POSITA would have been motivated to combine Jannard with Irvin and Clapper, and had a reasonable expectation of success in doing so, for the reasons discussed above for Ground 3 and Ground 5.

2. Claim 40

a. [Preamble] *A system as recited in claim 39,*

271. The preamble is met by Jannard in view of Irvin as for claim 39.

b. [A] *wherein the head-worn personal electronic apparatus comprises:*

272. This element is met by Jannard as for claim 1[A].

c. [B] *at least one magnetic element at least partially contained within the head-worn structure and configured to support a magnetic force that facilitates an electrical connection.*

273. This element is met by Jannard in view of Clapper as for claim 9[B].

3. Claim 46

a. [Preamble] *A system as recited in claim 45,*

274. The preamble is met by Jannard in view of Irvin as for claim 45.

b. [A] *wherein the head-worn personal electronic apparatus comprises:*

275. This element is met by Jannard as for claim 1[A].

c. [B] *at least one magnetic element at least partially contained within the head-worn structure and configured to support a magnetic force that facilitates an electrical connection.*

276. This element is met by Jannard in view of Clapper as for claim 9[B].

G. Ground 7: Claims 51-55 are Rendered Obvious by Jannard in view of Irvin and Vaissie

277. It is my view that Jannard in view of Irvin and Vaissie teaches each and every limitation of claims 51-55 of the '901 patent, for the reasons set forth below.

1. Summary of Vaissie

278. I understand that Vaissie is a U.S. patent that was filed on December 23, 1999 and issued on August 13, 2002. I understand that Vaissie is thus prior art to the '901 patent under at least 35 U.S.C. §§ 102(a), (b), and (e).

279. Vaissie discloses using an eye tracker in a “head mounted display that has an integrated eye-tracking function.” (EX1011, 1:56-58.) FIG. 5 illustrates an example display, which may belong to a head-worn eyewear structure:

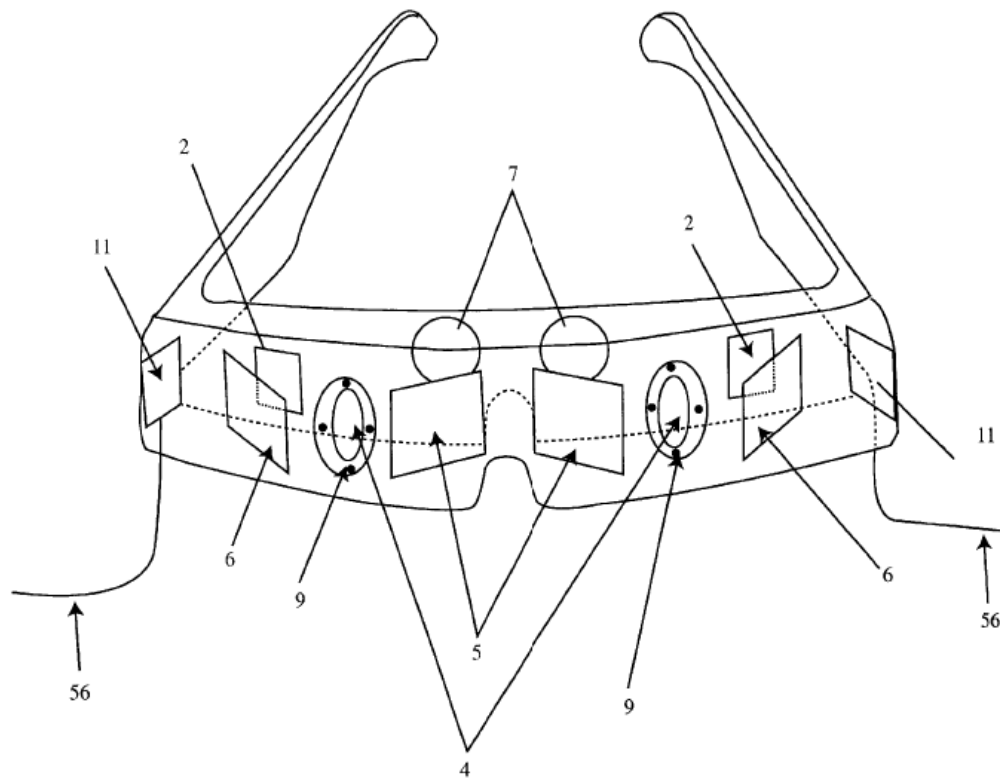


Figure 5

(EX1011, 3:47-56, FIG. 5.)

280. To perform eye tracking, a light source (*e.g.*, one or more infrared LEDs) illuminates the cornea of the eye via a beam splitter. (EX1011, 3:16-31.) A sensor (*e.g.*, a CCD camera) detects a light image reflected in the cornea from the light source. (EX1011, 3:16-31.) This provides an image of the eye to a computer, which processes the image to identify the location of pupil 42 and thus the user's sight direction. (EX1011, 3:39-46, FIG. 4.) For example, with respect to FIG. 7b below, the computer measures a pupil center 72 and a corneal reflection barycenter

74, and determines the sight direction based on the vector PH based on the pupil center and the corneal reflection barycenter:

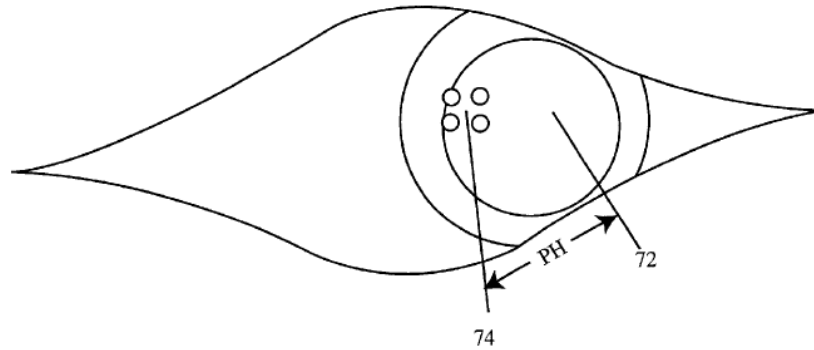


Figure 7b

(EX1011, 3:59-4:3, FIG. 7b.)

2. Motivation to Combine Jannard and Irvin with Vaissie Reasonable Expectation of Success

281. A POSITA would have been motivated to combine the teachings of Jannard, Irvin, and Vaissie. Jannard, in describing sight tracking for the head-worn audio device 10D, notes that “[s]uch techniques are well known to those of skill in the art” and include “methods of measuring reflected light off of a wearer’s eye.” (EX1004, 24:31-38.) But Jannard does not expressly disclose how to implement these techniques, including how the reflected light is measured and used to determine the user’s sight direction. The POSITA seeking to practice the techniques of Jannard would thus have been motivated to combine Jannard’s

teachings with those of Vaissie, *i.e.*, describing how to implement eye tracking for an eyewear device such as Jannard's audio device 10D.

282. Additionally, Vaissie describes a "serious need" for head-mounted devices that implement Vaissie's sight direction tracking, which advantageously allows "physically challenged people" to interact with such devices. (EX1011, 1:45-53.) Vaissie also describes additional advantages, for example: enhancing local images, correcting for depth perception difficulties, and increased resolution of visual displays. (EX1011, 1:45-53.) Vaissie also beneficially "provides eye-tracking without occlusion of the field of view," and utilizes infrared LEDs for "improve[d] accuracy of tracking." (EX1011, 1:45-53, 4:4-16.) The POSITA would have been motivated to combine Vaissie's eye tracking teachings with Jannard's audio device 10D, in combination with Irvin as described above, to realize these advantages and to meet the "serious need" for such a combination. (EX1011, 1:45-48.)

283. Vaissie suggests the combination of its eye tracking techniques with a "head mounted display that has an integrated eye-tracking function"—analogous to the head-worn audio device 10D of Jannard, which includes an integrated sensor to sense the position or orientation of the user's eyes. (EX1011, 1:56-58; EX1004, 24:31-36, 25:16-28.) Vaissie's eye tracking includes reflecting light off of the user's eye, and measuring the reflected light to determine the sight direction, as

described for Jannard’s audio device 10D. (EX1011, 3:16-25.) Given these structural and functional similarities, the combination of Vaissie and Jannard/Irvin would have been predictable and provided a reasonable expectation of success—reinforced by Jannard’s assurance that methods such as those of Vaissie are “well known.” (EX1004, 24:36-38.)

3. Claim 51

a. [Preamble] *A system as recited in claim 45,*

284. *See* claim 45 analysis.

b. [A] *wherein the radiation detector is an infrared radiation detector, and wherein the radiation being detected by the radiation detector includes infrared radiation.*

285. As described for claims 44[J] and 44[K], Jannard’s audio device 10D includes a sensor configured to emit light and to “measur[e] reflected light off of a wearer’s eye,” meeting the claimed radiation detector. (EX1004, 24:36-38.) In combination with Vaissie, the sensor of audio device 10D emits infrared light, and detects that infrared light as reflected in the user’s eye. For example, Vaissie describes that in “critical steps” of its eye tracking technique, LEDs emit infrared light (*i.e.*, radiation having a wavelength of 900 nanometers) toward the user’s eye; and a “reflected IR beam from the cornea” is detected and processed to “determine the sight direction.” (EX1011, Abstract, 2:10-14, 3:1-10, 3:16-31.) The POSITA

would have understood that in the combination, using infrared light (as opposed to, *e.g.*, visible light) to image the eye is a “means invisible to the user,” such that the eye tracking method advantageously does not interfere with the user’s vision or sight direction. (*See* EX1011, 2:10-14.)

4. Claim 52

a. [Preamble] *A system as recited in claim 51,*

286. *See* claim 51 analysis.

b. [A] *wherein the first microphone is positioned to be directed forward towards the user's front when the head-worn structure is being worn by the user, and the second microphone is positioned to be directed outward away from the user's head when the head-worn structure is being worn by the user.*

287. This element is met by Jannard as for claim 19[A].

5. Claim 53

a. [Preamble] *A system as recited in claim 52,*

288. *See* claim 52 analysis.

b. [A] *wherein the head-worn personal electronic apparatus is configured to at least alter operation of the head-worn personal electronic apparatus based at least in part on the determination of whether the head-worn structure of the head-worn personal electronic apparatus is being worn by the user.*

289. This element is met by Jannard in view of Irvin as for claim 13[A].

6. Claim 54

a. **[Preamble]** *A system as recited in claim 53,*

290. *See claim 53 analysis.*

b. **[A]** *wherein the second microphone is positioned to pick up at least environmental audio input associated with an environment around the head-worn personal electronic apparatus,*

291. This element is met by Jannard as for claim 18[E].

c. **[B]** *wherein the electronic circuitry is configured to process the audio input from at least the user via the first microphone to remove at least a portion of the environmental audio input associated with the environment picked up via the second microphone, and*

292. This element is met by Jannard as for claim 18[H].

d. **[C]** *wherein the head-worn personal electronic apparatus is configured to receive a voice input via the first microphone, determine or receive a determination of a requested operation from the voice input using voice recognition, and control an operation by the head-worn personal electronic apparatus based on the requested operation.*

293. This element is met by Jannard as for claim 25[A].

7. Claim 55

a. **[Preamble]** *A system as recited in claim 54,*

294. *See claim 54 analysis.*

- b. [A] *wherein the motion detector comprises an accelerometer, and***

295. This element is met by Jannard in view of Irvin as for claim 37[A].

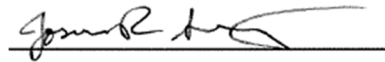
- c. [B] *wherein the system comprises a Hall effect detector.***

296. This element is met by Jannard (via its incorporation of Spitzer) as for claim 16[A].

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Executed the 11th of February, 2026 in Seattle, Washington.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Joshua R. Smith", is written over a solid horizontal line.

Joshua R. Smith