

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LUXOTTICA OF AMERICA INC.,
Petitioner,

v.

E-VISION OPTICS, LLC,
Patent Owner.

Case IPR2024-01071
Patent 8,905,541

**DECLARATION OF JOHN FELAND
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,905,541**

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I, John Feland, Ph.D., declare as follows:

1. I am making this declaration at the request of Luxottica of America Inc. (“Luxottica”). I have been retained by Luxottica as a technical expert in this matter.

2. I am being compensated for my work on this matter and I am being reimbursed at cost for my expenses. My compensation in no way depends upon the outcome of this proceeding. I do not own any stock in Luxottica and, to my knowledge, I have no financial interest in Luxottica.

3. In preparation for this declaration, I have considered the following materials:

Exhibit No.	Description
1001	U.S. Patent 8,905,541
1003	File History of U.S. Patent 8,905,541
1004	U.S. Patent Pub. 2005/0230596 (Howell-596)
1005	U.S. Provisional Patent Application 60/583,169
1006	U.S. Patent Pub. 2006/0023158 (Howell-158)
1007	JP S58-113913 (Hattori-913)
1008	U.S. Patent Pub. 2008/0273166 (Kokonaski-166)
1009	WO 2010/080999 (Kokonaski-999)
1010	U.S. Patent 2,915,598 (Brunton)
1011	Generic Standard on Printed Board Design IPC-2221A, IPC Association Connecting Electronics Industries (May 2003)
1012	EP 1785763 (Dudli)

Exhibit No.	Description
1013	IT UD20010094 (Della)
1014	CV of John Feland
1015	Sandra Corns Pickel, <i>The Evolution of the Modern Spectacle Frame</i> , 136 Review of Optometry 9 (June 15, 1999) (“Pickel”)

4. I have also relied on my education, training, and experience, and my knowledge of pertinent literature in the field of the '541 patent.

I. EXPERIENCE AND QUALIFICATIONS

5. My experience and qualifications are summarized in my *curriculum vitae*, a copy of which is provided as Exhibit 1014.

6. I have over 30 years of experience in mechanical engineering, electromechanical engineering, and mechatronics. I graduated from the Massachusetts Institute of Technology with a bachelor of science degree in mechanical engineering in 1994. After graduating from MIT, I attended Stanford University, where I received an M.S. in 1996 and then a Ph.D. in 2005, both also in mechanical engineering. Although my degrees were in mechanical engineering, I completed coursework and research involving electronic circuitry, electromechanical engineering, and mechatronics.

7. Beginning in June 1996, I worked as a mechatronic design engineer for IDEO Product Development. From March 1997 to April 1999, I worked for the

National Air Intelligence Center as a Program Manager, Defense Intelligence Systems, managing mission requirements and software development for an \$18 billion missile warning satellite program. From April to July 1999, I served as Director, Measurement and Signals Intelligence Systems, for the Joint Analysis Center, supervising classified intelligence support for Operation Allied Force in Kosovo.

8. From August 1999 to July 2001, I was an Assistant Professor of Engineering Mechanics for the United States Air Force Academy. In that time, I launched the Academy's first mechatronics course. From 2002 to 2004, I worked as a design strategy consultant for Trusted Nomad, taught at Stanford, and worked as Senior Mechanical Engineer for Symyx Technologies, developing MEMS industrial sensors.

9. From December 2004 to August 2008, I worked at Synaptics. While at Synaptics, I designed and built several mobile devices and mobile-device accessories. The team I managed retrofitted or designed from scratch hundreds of capacitive touch interfaces for multiple consumer electronic devices. Through this work, I gained deep experience with manufacturing electronic assemblies and integrating them into a wide array of consumer electronics. This work also provided me with significant experience in the path to mass production, including how to deliver technological improvements that could be mass produced, as we

recommended these prototypes as potential product features for customers. My work at Synaptics included architecting the Onyx, a working multitouch-controlled mobile phone prototype, which gained international recognition in 2006, winning the Red Dot Design Concept Award months ahead of Apple's 2007 launch of the iPhone.

10. Also at Synaptics, I both developed and evaluated gesture interactions on multiple consumer devices, including audits of the then-nascent iPhone interface and attempts by competitors to leverage Synaptics's touch technology to compete in the market. This included work on designing improved capacitive touch switches for integration into consumer electronics.

11. After Synaptics, I was Chief Technologist at SK Telecom Americas from September 2008 to September 2009. While at SK Telecom Americas, I evaluated several user experience designs across a range of interfaces, including voice, touch, and gesture. From October 2009 to September 2011, I held positions at Stanford, including Executive Director of the Global Design Innovation course that connects graduate students with corporate partners, as well as Consulting Assistant Professor in the Design Group of the Mechanical Engineering department. In 2012, I served as Distinguished Lecturer at Cogswell Polytechnical College, teaching courses in robotics and entrepreneurship.

12. After leaving SK Telecom in September 2009, I founded Argus Insights, a consulting firm that I have run for nearly 15 years. Some of my projects have included analyzing what UX aspects are driving adoption in autonomous vehicles and designing UX for industrial cutting tools to lower training requirements and increase operator effectiveness.

13. I am currently a Principal Strategist at CableLabs, a non-profit think tank for the broadband industry. I pursue a mixture of quantitative and qualitative research on consumer behaviors and preferences. I also coach innovation teams and work extensively in artificial intelligence strategy. From April 2017 to September 2018, I served as forum chair and moderator for the IoT (Internet of Things) Forum in Silicon Valley. Since August 2018, I have also taught engineering at the Nueva School.

14. As shown in my CV, I have authored or co-authored over 30 publications, most of which relate to engineering or design. I am a named inventor on at least six issued patents, including patents on technology involving capacitive touch sensing.

II. APPLICABLE LEGAL STANDARDS

15. I have been asked to provide my opinion as to whether the claims of U.S. Patent. No. 8,905,541 (“the ’541 patent”) would have been obvious to a person

of ordinary skill in the art at the time of the alleged invention, in view of the prior art.

16. I am an engineer by training and profession. The opinions I am expressing in this report involve the application of my training and technical knowledge and experience to the evaluation of certain prior art with respect to the '541 patent.

17. Although I have been involved as a technical expert in patent matters before, I am not an expert in patent law. Therefore, attorneys from Knobbe, Martens, Olson & Bear have provided me with guidance as to the applicable patent law in this matter. The paragraphs below express my understanding of how I must apply current principles related to patent validity to my analysis.

A. Relevant Timeframe

18. I understand that the earliest claimed priority date of the '541 patent is July 2, 2010, and I have been instructed to assume for the purposes of my opinions that this is the invention date for the '541 patent.

B. Claim Construction

19. It is my understanding that in determining whether a patent claim is anticipated by or obvious in view of the prior art, the Patent and Trademark Office construes the claim by giving the claim terms their plain and ordinary meaning, as they would have been understood by a person of ordinary skill in the art at the time

of the invention in view of the intrinsic record (patent claims, patent specification, and file history). For the purposes of this review, and to the extent necessary, I have interpreted each claim term in accordance with its plain and ordinary meaning as it would have been understood by a person of ordinary skill in the art at the time of the invention, in view of the intrinsic record.

20. I understand that a patent and its prosecution history are considered “intrinsic evidence” and are the most important sources for interpreting claim language in a patent. I also understand that in reading the claim, I must not import limitations from the specification into the claim terms; in other words, I must not narrow the scope of the claim terms by implicitly adding disclosed limitations that have no express basis in the claims. The prosecution history of related patents and applications can also be relevant.

21. I understand that sources extrinsic to a patent and its prosecution history (such as dictionary definitions and technical publications) may also be used to help interpret the claim language, but that such extrinsic sources cannot be used to contradict the unambiguous meaning of the claim language that is evident from the intrinsic evidence.

22. Unless expressly stated herein, I have applied the plain and ordinary meaning of the claim terms, which I understand is the meaning that a person of

ordinary skill in the art would have given to terms at the time of the claimed invention based on a review of the intrinsic evidence.

C. Obviousness

23. It is my understanding that a claim is “obvious” if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the alleged invention. I understand that an obviousness analysis involves a number of considerations. I understand that the following factors must be evaluated to determine whether a claim would have been obvious: (i) the scope and content of the prior art; (ii) the differences, if any, between each claim of the ’541 patent and the prior art; (iii) the level of ordinary skill in the art at the time of the claimed invention; and (iv) additional considerations, if any, that indicate that the invention was obvious or not obvious. I understand that these “additional considerations” are often referred to as “secondary considerations” or “objective indicia” of non-obviousness or obviousness.

24. I also understand that the frame of reference when evaluating obviousness is what a hypothetical person of ordinary skill in the pertinent art would have known at the time of the claimed invention. I understand that the hypothetical person of ordinary skill is presumed to have knowledge of all pertinent prior art references.

25. I understand that a prior art reference may be a pertinent prior art reference (or “analogous art”) if it is in the same field of endeavor as the patent or if it is pertinent to the problem that the inventors were trying to solve. I understand that a reference is reasonably pertinent if it logically would have commended itself to an inventor’s attention in considering the problem at hand. If a reference relates to the same problem as the claimed invention, I understand that supports use of the reference as prior art in an obviousness analysis. Here, all of the references relied on in my obviousness analysis below are in the same field of endeavor as the ’541 patent, e.g., eyewear and/or consumer electronics. The references are also pertinent to a particular problem the inventor was focused on, e.g., incorporating electronics into eyewear.

26. It is my understanding that the law recognizes several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include:

- combining prior art elements according to known methods to yield predictable results;
- simple substitution of one known element for another to obtain predictable results;
- a predictable use of prior art elements according to their established functions;

- using known techniques to improve similar devices (methods, or products) in the same way;
- applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success (in which case a claim would have been obvious to try);
- known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; and
- some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

27. I understand that “secondary considerations” must be considered as part of the obviousness analysis when present. I further understand that the secondary considerations may include: (1) a long-felt but unmet need in the prior art that was satisfied by the claimed invention; (2) the failure of others; (3) skepticism by experts; (4) commercial success of a product covered by the patent; (5) unexpected results achieved by the claimed invention; (6) industry praise of the claimed invention;

(7) deliberate copying of the invention; and (8) teaching away by others. I also understand that evidence of the independent and nearly simultaneous “invention” of the claimed subject matter by others is a secondary consideration supporting an obviousness determination and may support a conclusion that a claimed invention was within the knowledge of a person of ordinary skill as of the time of the claimed invention. I am not aware of any evidence of secondary considerations that would suggest that the claims of the ’541 patent would have been nonobvious at the time of the claimed invention.

28. I understand that when assessing obviousness, using hindsight is impermissible; that is, what is known today or what was learned from the teachings of the patent should not be considered. The patent should not be used as a road map for selecting and combining items of prior art. Rather, obviousness must be considered from the perspective of a person of ordinary skill at the time the alleged invention was made. (See paragraph 18 for discussion of invention date.)

29. I also understand that an obviousness analysis must consider the invention as a whole, as opposed to just a part or element of the invention. I understand this “as a whole” assessment to require showing that one of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the elements from the prior art and combined them in the claimed manner.

III. PERSON OF ORDINARY SKILL IN THE ART

30. It is my understanding that when interpreting the claims of the '541 patent and evaluating whether a claim would have been obvious, I must do so based on the perspective of a person of ordinary skill in the art (POSITA) at the time of invention. (See paragraph 18 for discussion of invention date.)

31. I understand that in determining the level of ordinary skill in the art, several factors are considered. Those factors may include: (i) the type of problems encountered in the art; (ii) prior art solutions to those problems; (iii) the rapidity with which innovations are made; (iv) the sophistication of the technology; and (v) the educational level of active workers in the field. A person of ordinary skill in the art must have the capability of understanding the scientific and engineering principles applicable to the pertinent art.

32. Based on my review of the specification and claims of the '541 patent, it is my opinion that a person of ordinary skill in the art would have had a minimum of a bachelor's degree in mechanical or manufacturing engineering; mechatronics; electrical engineering plus coursework in mechanical engineering, manufacturing engineering, or mechatronics; or a similar technical degree. A POSITA would have also had at least 2 years of experience designing consumer electronics, such as eyewear with electronics. Additional work experience could serve as a substitute for a formal degree and vice versa. However, my opinions do not turn on this specific

definition of the level of ordinary skill. The claims would be obvious from the perspective of a skilled artisan under any reasonable definition.

33. My conclusions below that the claims of the '541 patent would have been obvious would remain the same even if the invention date, field of endeavor, or level of ordinary skill were slightly different.

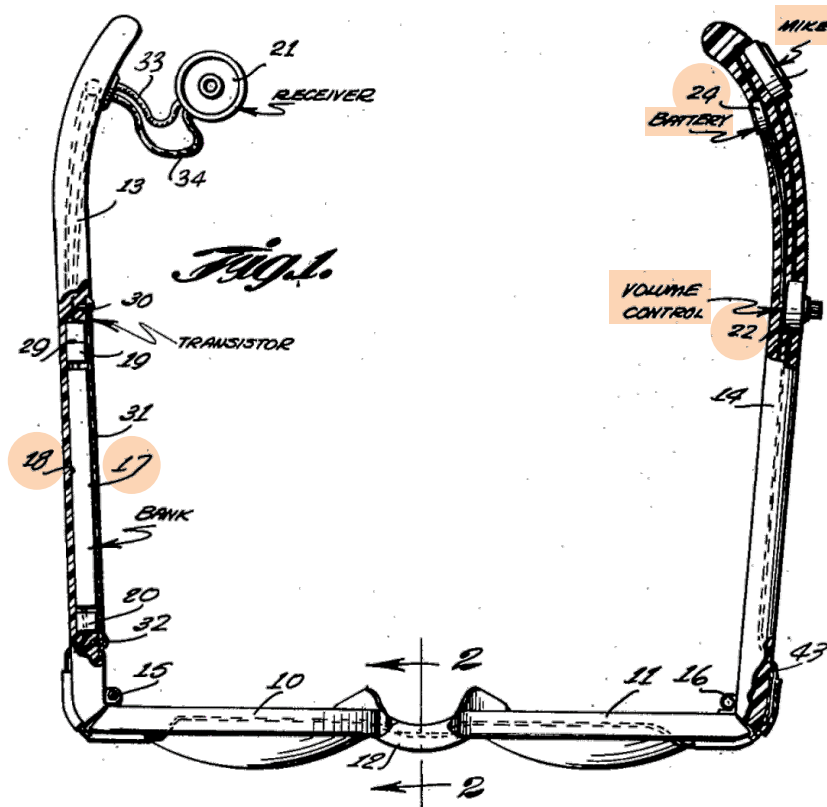
34. I am able to make this assessment because in the 2000s, I was familiar with design and operation principles common in the mechanical, manufacturing, and mechatronic domains as they relate to the design, specification, and manufacturing of consumer electronic components. I, and the engineers that I worked with during the 2000s, had the requisite knowledge to make and use eyewear as described in the claims of the '541 patent. Specifically, I worked on and supervised the design and integration of hundreds of capacitive-touch-enabled prototypes of consumer electronics products, developed intellectual property on novel capacitive touch interfaces including capacitive touch switches, and was issued patents related to the design and integration of capacitive touch switches into consumer electronics products. These efforts included the integration of interface electronics into consumer products with significant space constraints, such as gaming controllers, smart watches, portable music players, pre iPhone mobile handsets of multiple configurations and more. These products have similar design and manufacturing constraints to eyewear. Because I have worked with and supervised designers,

engineers, and software developers, I know very well what their capabilities were in the 2000s, how they would interpret and understand the claims of the '541 patent, and how they would understand the disclosures in the prior art discussed herein. Additionally, I have been a professor of mechanical engineering undergraduate and graduate programs where I developed novel curriculum that integrated mechatronic course content within existing mechanical engineering curriculums. As of May 2007, I had been an assistant professor at the United States Air Force Academy, as well as a graduate teaching assistant at Stanford University within the departments of Engineering Mechanics and Mechanical Engineering respectively.

IV. TECHNOLOGY BACKGROUND AND OVERVIEW OF THE PRIOR ART

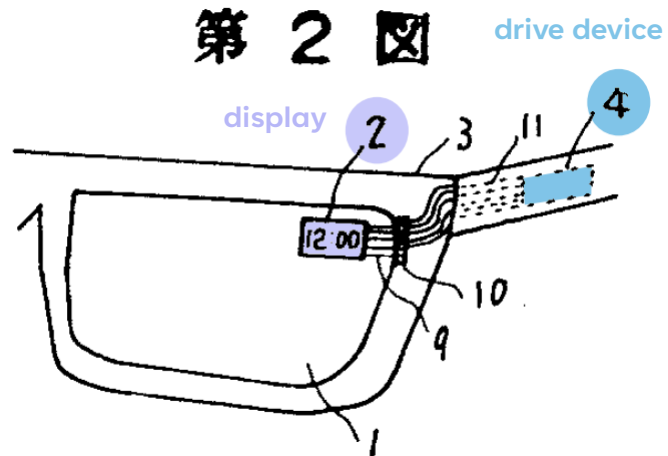
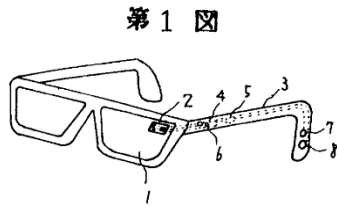
35. By the mid-1900s, glasses became marketed as means to deliver non-visual technologies to consumers. Some of those technologies utilized electronics, which were packaged into modules and embedded into temples.

36. In 1954, Brunton applied for a patent on combining a hearing aid with glasses, with electronics for the hearing aid embedded in the temples:

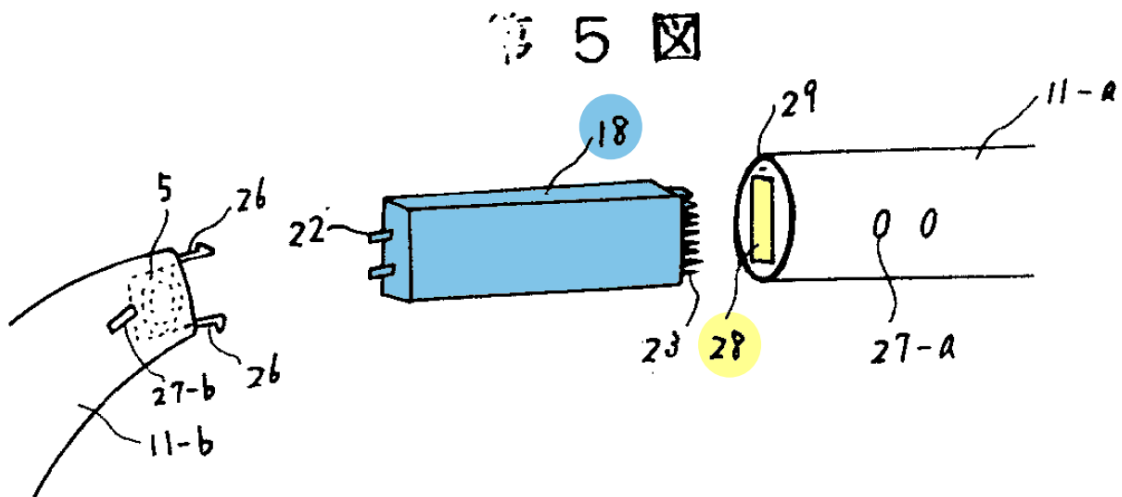


Ex. 1010. Brunton employed a module to “contain[] the elements of a hearing aid, such as resistors, transistors, and capacitors.” *Id.*, 3:51-52. The module, termed unit 17, could “readily be removed from one frame and installed in another.” *Id.*, 3:55-56. The unit 17 was “positioned in a cavity 18 in the temple.” *Id.*, 3:39-40. Wires connected the hearing aid unit to other electronic components like a volume control 22, a microphone 23 and a battery 24. *Id.*, 3:41-44.

37. In 1983, Hattori-913 published and disclosed a pair of glasses that incorporate a drive device 4 for a liquid crystal display 2:

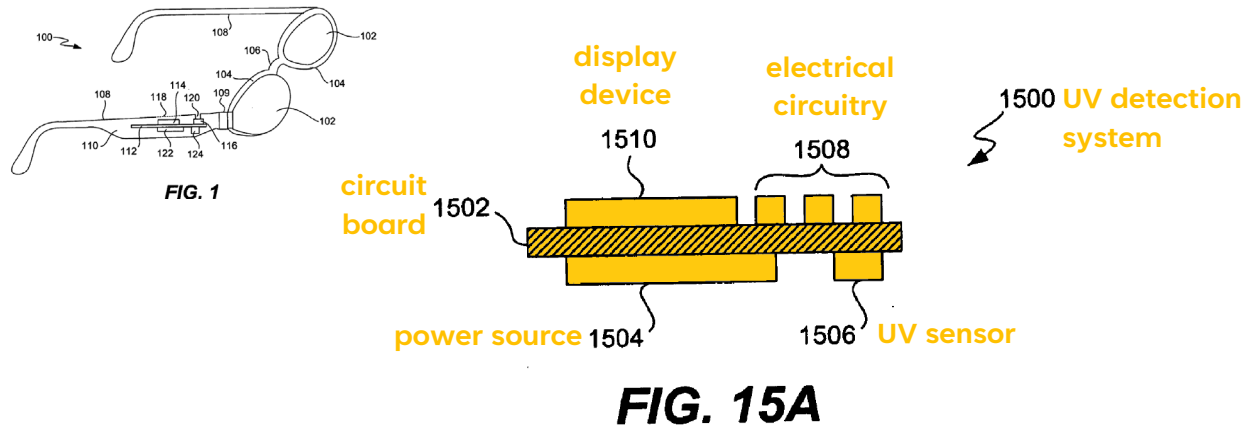


Ex. 1007, Figs. 1, 2. The drive device 4 could be implemented with electronic components such as “capacitors and transistors” collected on an integrated circuit 18 and embedded within a hollow 28 in a temple:

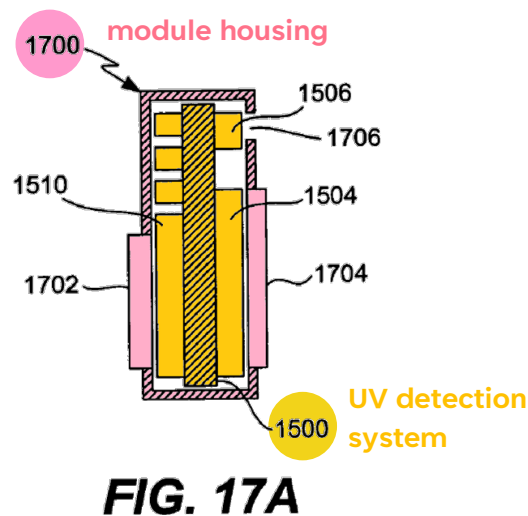


Id., 68, Fig 5. Hattori-913’s device includes a switch to turn power on and off and control the display. *Id.*, 68 (e.g., reference numerals 6, 27a, 27b). The switch can be a touch switch. *Id.*

38. In 2005, Howell-596 published and disclosed eyewear that incorporates a UV detection system 1500:



Ex. 1004, Figs. 1, 15A, ¶184. The UV detection system “includes a power source 1504, an UV sensor 1506, electrical circuitry 1508 and a display device 1510 (e.g., LCD or LED).” *Id.* ¶¶ 184, 187, 194-95. The UV detection system also incorporates a touch sensitive capacitance switch. *Id.* ¶88; Ex. 1005, 172 ¶57. The UV detection system is embedded into a “module housing 1700”:



Ex. 1004, Fig. 17A, ¶¶ 184, 194-95. The resulting module is then inserted into a temple region of an eyewear housing 1720:

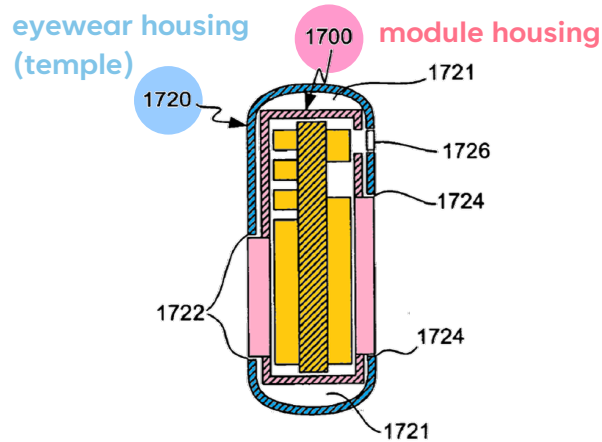
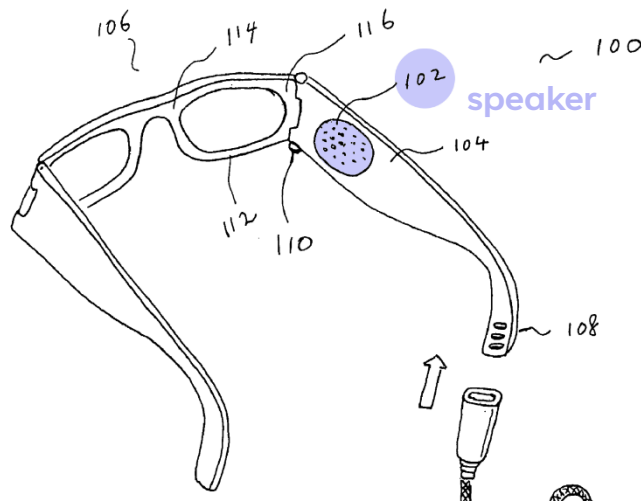


FIG. 17B

Id., Fig. 17B, ¶¶ 195-96.

39. In 2006, Howell-158 published and disclosed glasses that embed an electrical component such as speaker 102:



Ex. 1006, Fig. 1 (excerpt). The glasses include a “functional module” including electrical components. *Id.*, Claim 26. The functional module is “removably”

provided within a cavity of the eyeglass frame. *Id.*, Claim 27. An insulating layer is disposed between the electrical components the frames. *Id.* ¶53.

40. In 2008, Kokonaski-166 published and disclosed an electronic module in the temple of eyeglass frames for controlling electro-active lenses. Ex. 1008, ¶¶ 3, 73-74, 80. Figure 6 shows the eyeglass frames with frame component pieces 602 and 603 housing an electronic module:

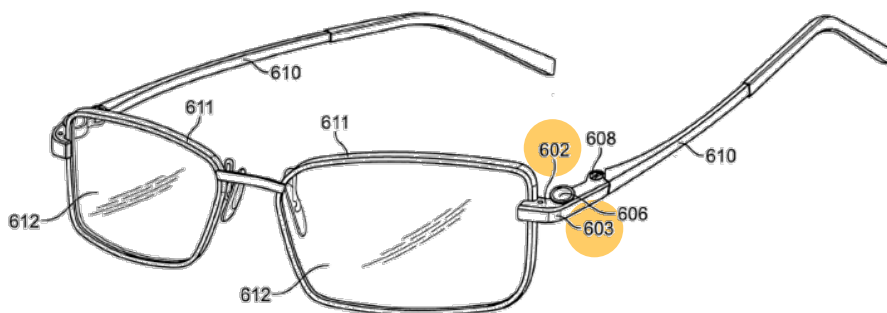
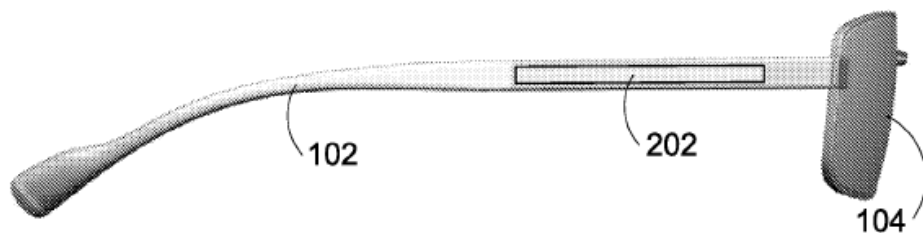


FIG. 6

Id., Fig. 6, ¶80; see also *id.*, Figs. 1A-1C, ¶73-74.

41. In January 2010, Kokonaski-999 was filed, and it published that July. Kokonaski-999 discloses an electronic module in the temple of eyeglass frames for controlling electro-active lenses. Ex. 1009, ¶¶33-36, 39-57. Figure 2 shows the eyeglass frames with the electronic module 202 in one of the temples:



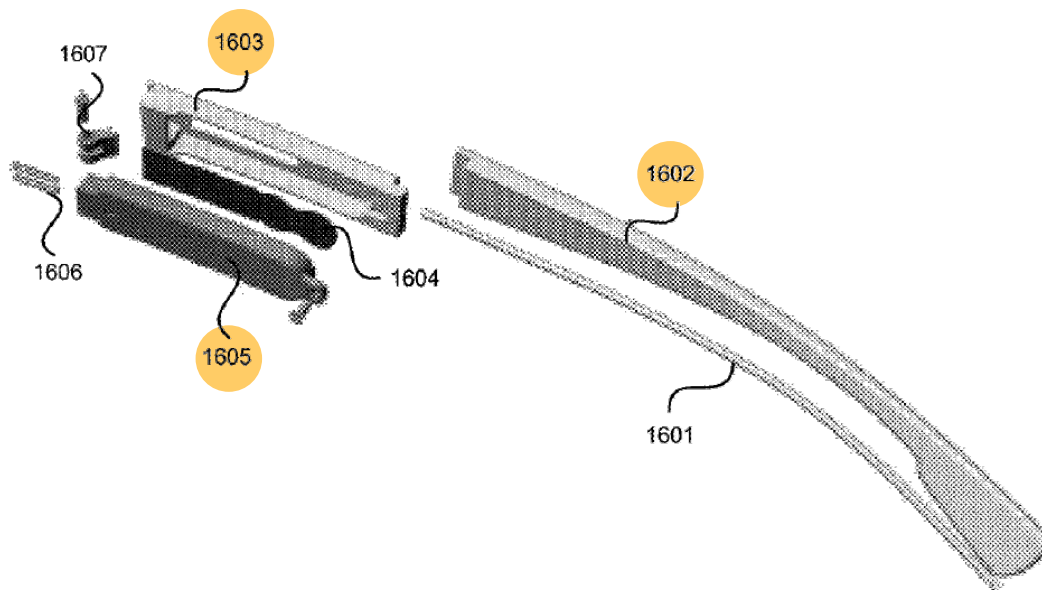
Id., Fig. 2, ¶33.

V. THE '541 PATENT

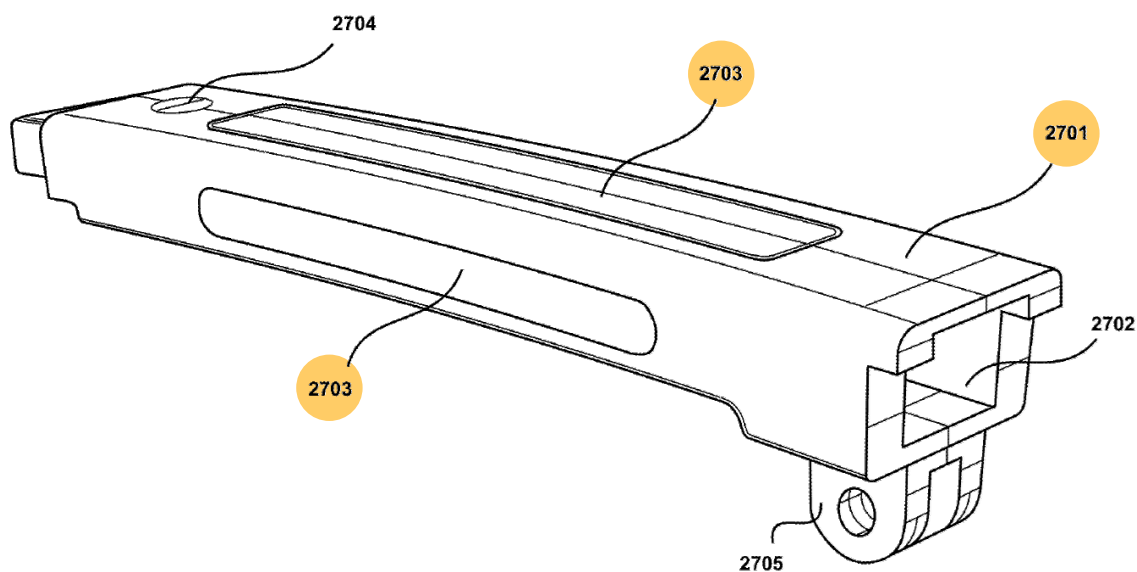
A. Overview

42. The claims of the '541 patent recite generic, well-known eyewear components and materials. These include “a frame”; a “temple”; “a structural member” (which “may refer to any portion of the frame”); a “lens”; “an opening”; “a cavity”; a “capacitive switch”; an “insulating layer,” and “conductive material.” Each of those eyewear features was well known by the priority date of the '541 patent, as discussed above.

43. The '541 patent also recites two modules: a “housing module” and an “electronics module.” As shown in Figure 16, a portion of the temple 1602 may comprise a “housing module” 1603. *Id.*, 42:1-5, Fig. 16. A housing module refers to a component that may house electronics or an “electronics module” 1605. *Id.*, 42:1-5, 50:40-48. An electronics module refers electrical components within a housing or container. *Id.*, 7:45-51.



Id., Fig. 16. Figure 27 shows an exemplary housing module 2701 having an opening 2702 in one end in which the electronics module may be selectively inserted. *Id.*, Fig. 27, 70:26-28. Figure 27 shows portions 2703 of the electronics module extending into apertures of the housing module. *Id.*, Fig. 27, 70:31-37.



Id., Fig. 27. As discussed above, the practice of packaging electronics into modules for use in eyewear was common practice long before the priority date of the '541 patent.

44. The “electronics module may comprise a power source (such as a battery), a sensing mechanism (such as a capacitance switch, which may activate or deactivate the electronics) and/or a controller (such as a microprocessor).” *Id.*, 7:47-51. These components were generic, well-known electronics by the priority date of the '541 patent. The claims recite collecting two of these generic electronics into an “electronics module,” locating that module within a “housing module,” and arranging the generic components in predictable locations.

45. An insulating layer may be disposed between one or more electronic components located within the electronics module and the frame. *Id.*, 2:6-9. It was standard practice, long before the priority date of the '541 patent, to insulate electric components. For example, a 2003 Generic Standard on Printed Board Design instructed that metal-cased components shall be “insulated from adjacent electrically conductive elements.” Ex. 1011, 57. The standard further instructed that “[f]iber or plastic insulators should be incorporated where adequate clearance from circuitry cannot be provided.” *Id.*, 64.

B. Prosecution History

46. During prosecution of the application leading to the '541 patent, the Examiner issued a single rejection based on one reference, which was Konokaski-166. Ex. 1003, Feb. 19, 2014, office action. In response, the applicant added one limitation. Namely, to what is now claim 1, the applicant added an insulating layer disposed between one or more electronic components and the frame. *Id.*, May 16, 2014, amendment at 2. Applicant argued it was entitled to issuance because an “insulating layer between electronic components and frame” was not “necessarily present” in Kokonaski-166. *Id.*, May 16, 2014, reply to office action at 11-12. The Examiner allowed the claims for the “reasons set forth” in the applicant’s argument. *Id.*, Aug. 5, 2014 notice of allowance at 3. But prior art the Examiner did not discuss, including Howell-158, discloses the claimed “insulating material.” Ex. 1006 ¶53. Moreover, prior art that was not cited to the Examiner (and thus the Examiner did not consider), including Howell-596, renders obvious that claimed “insulating material.” Ex. 1004 ¶¶194-96. Thus, the claims were allowed under a mistaken premise.

VI. GROUND 1: HOWELL-596 AND HOWELL-158 RENDER CLAIMS 1-19 OBVIOUS

A. Claim 1

1. Preamble and 1[a]: frame comprising temples and a housing module coupled to a structural member

47. The preamble and element 1[a] recite: “A first device, comprising: a frame comprising a first temple and a second temple, wherein the frame comprises a housing module coupled to a structural member.”

48. Howell-596 discloses glasses 100 (first device) that include a frame comprising temples 108:

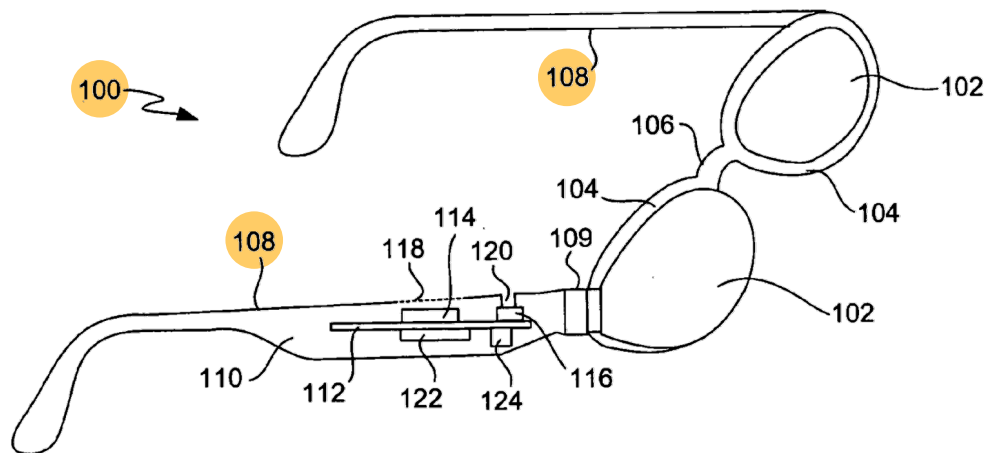
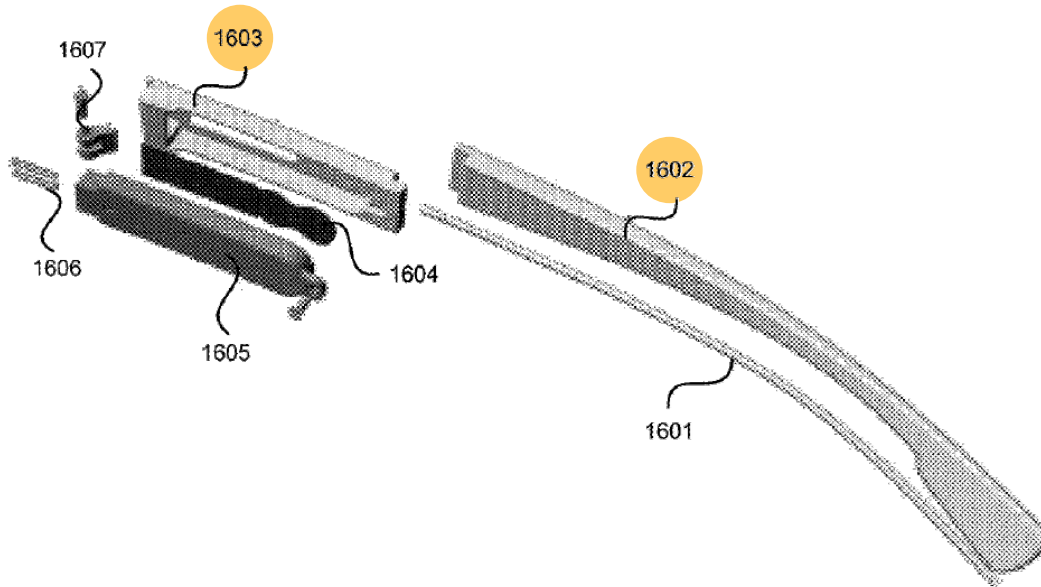


FIG. 1

Ex. 1004, Fig. 1, ¶73.

49. According to the '541 patent, “a ‘housing module’ may refer to a component that may house (e.g. contain, substantially contain, surround, surround a portion of, encircle, etc.) of [sic] the electronics (and/or an electronics module) of the electronic spectacles.” Ex. 1001, 50:40-48. As shown in Figure 16 of the '541

patent, “the housing module 1603 may comprise a portion of the temple 1602.” *Id.*, 42:3-5.



Id., Fig. 16. The '541 patent states that a “‘structural member’ may refer to any portion of the frame.” *Id.* 55:63-66.

50. Howell-596 discloses such a housing module coupled to a structural member of the frame. Figure 17B shows a cross-section of eyewear housing 1720 at the temple, which “has an opening, cavity, or container 1721 for receiving the module housing 1700.” Ex. 1004 ¶196. Howell-596’s eyewear housing 1720 meets the claimed “housing module” because it contains an opening/cavity/container that contains module housing 1700.

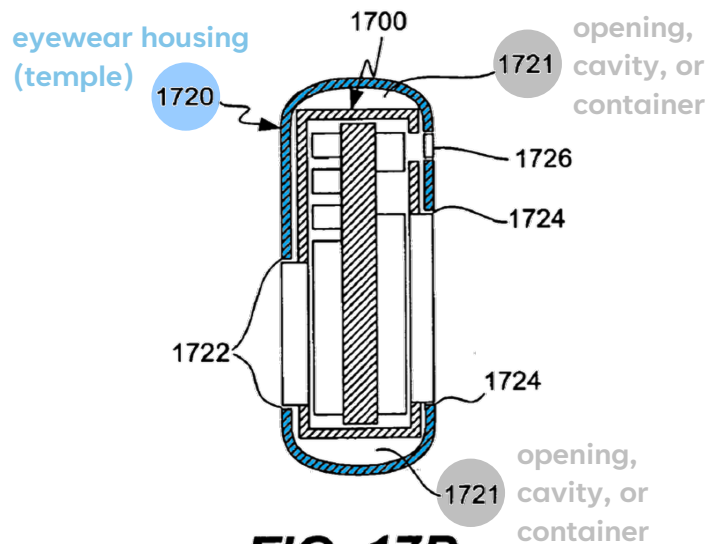


FIG. 17B

Id., Fig. 17B, ¶¶194-96.

51. Howell-596's module housing 1700 is a housing for a module such as a UV detection system. *Id.* ¶195. Howell-596 elaborates that the temple of the eyeglass frame has an opening/cavity/container that holds the UV detection system:

Since the UV detection system is compact and modular, the end product need only have an opening, cavity or container to hold or encompass the UV detection system. As such, the end product can quickly be transformed into an end product capable of providing UV monitoring. . . . For example, in case in which the end product is an eyeglass frame, a temple of the eyeglass frame can have an opening, cavity or container to hold or encompass the UV detection system

Id. ¶183.

52. Howell-596's eyewear housing 1720, which is part of the temple, is coupled to the lens holder 104 (Fig. 1) of the eyeglass frame, which is a structural member of the eyeglass frame.

53. Accordingly, Howell-596 discloses a first device with a frame (see Fig. 1) that has two temples (temples 108, Fig. 1) and a housing module (eyewear housing 1720) coupled to a structural member.

2. 1[b]: first and second lenses coupled to the frame

54. Claim element 1[b] recites: “a first lens and a second lens coupled to the frame.”

55. As shown in Figure 1, Howell-596's glasses have two lenses 102 coupled to the frame:

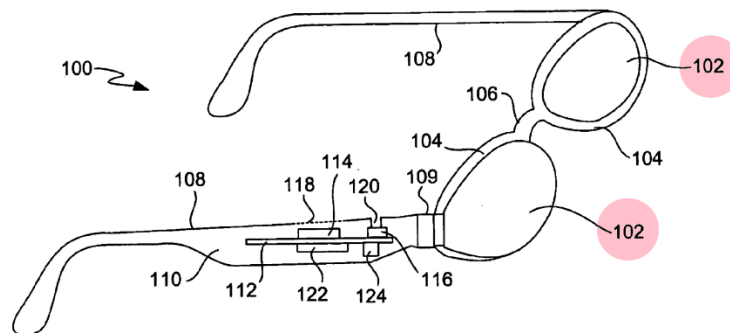


FIG. 1

Ex. 1004, Fig. 1, ¶73.

3. 1[c]-1[d]: electronics module located within the housing module and comprising at least two of a power source, controller, and sensing mechanism

56. Claim elements 1[c]-1[d] recite: “an electronics module, wherein the electronics module is located within the housing module; wherein the electronics module comprises at least any two of: a power source; a controller; and a sensing mechanism.”

57. According to the '541 patent, “an ‘electronics module’ may refer to a housing or container that comprises a plurality of electrical components.” Ex. 1001, 7:45-51.

58. Howell-596 discloses an electronics module siting inside the eyewear housing 1720 (housing module):

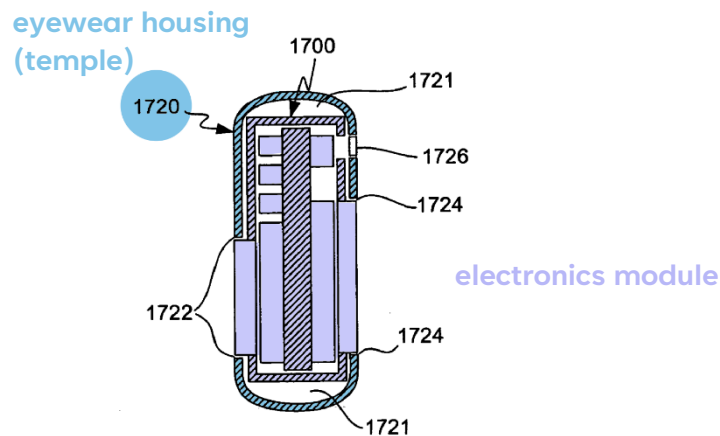
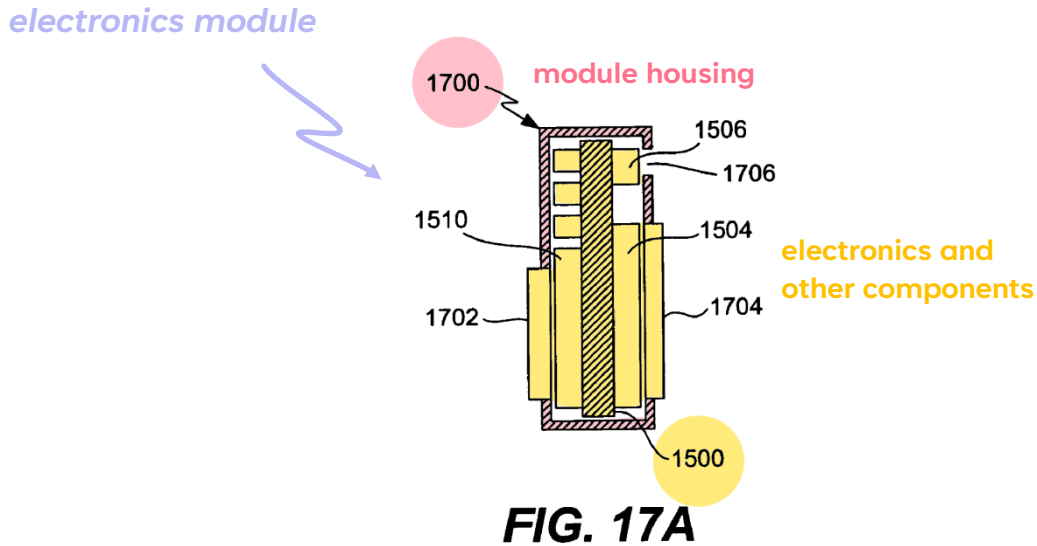


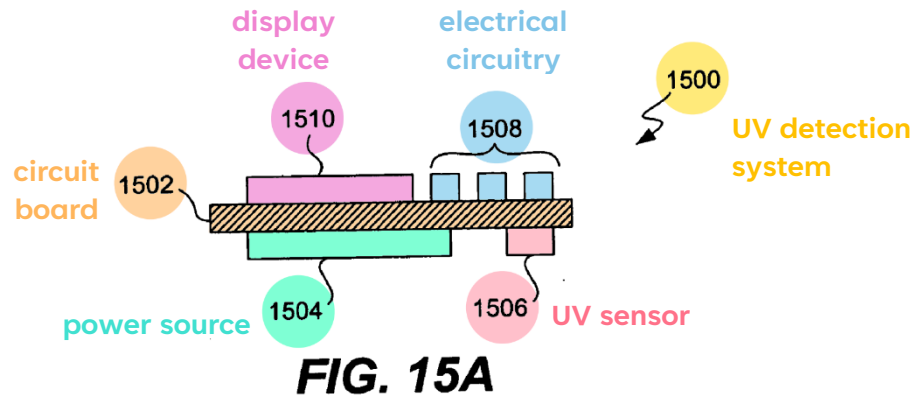
FIG. 17B

Ex. 1004, Fig. 17B, ¶¶195-96. As shown in Figure 17A, the electronics module has a “module housing 1700” and electronics and other components inside the housing:



Id., Fig. 17A.

59. In an embodiment illustrated in figure 17A above and figure 15A below, the components make up a UV detection system 1500, which includes “various electrical components.” *Id.*, Fig. 17A, ¶¶ 184, 194-95.



Id., Fig. 15A.

60. UV detection system 1500 “includes a power source 1504, an UV sensor 1506, electrical circuitry 1508 and a display device 1510 (*e.g.*, LCD or

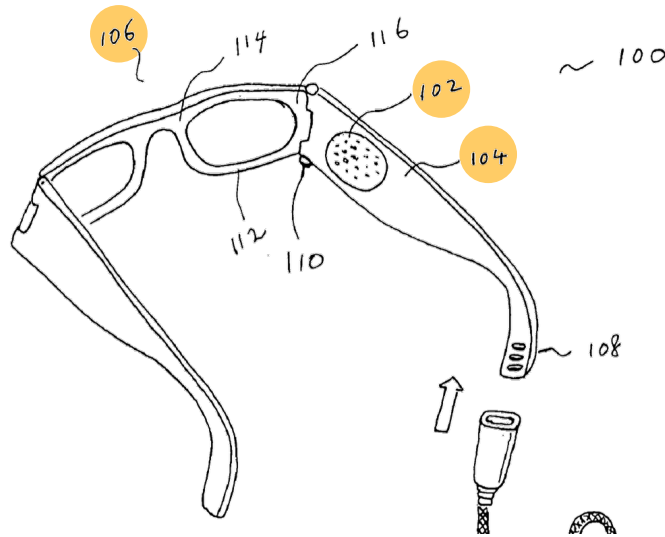
LED).” *Id.* ¶¶ 184, 187, 194-95. Electrical circuitry 1508 may include “integrated circuits” that control the UV detection system. *Id.* ¶184, ¶192 (disclosing a “microcontroller” as the integrated circuit). It was well known before the priority date that integrated circuits that control a system such as UV detection system 1500 imply a controller to effect that control.

61. Thus, Howell-596 discloses elements 1[c] and 1[d]: an “electronics module” located within the housing module (eyewear housing 1720) and comprising “a power source; a controller; and a sensing mechanism.”

4. 1[e]: insulating layer between electronic component and frame

62. Claim element 1[e] recites: “wherein an insulating layer is disposed between one or more electronic components located within the electronics module and the frame of the first device.”

63. Howell-158 discloses “approaches to embed an electrical component into a pair of glasses.” Ex. 1006 ¶51. For example, Howell-158 discloses glasses 106 (first device) that embed an electrical component such as speaker 102 in temple 104:



Ex. 1006, Fig. 1, ¶¶ 8, 48-49, 106, 112, 170, Claim 26.

64. Howell-158 incorporates by reference Howell-596 and expressly instructs the POSITA to consider their “related” disclosures. Ex. 1006 ¶3 (“this application is related to each of: . . . (iii) [Howell-596’s] U.S. patent application Ser. No. 11/006,343, . . . which is hereby incorporated herein by reference”). Howell-158 further instructs the POSITA that its disclosed eyeglasses should be used with a radiation detection system such as the UV radiation detection system disclosed by Howell-596. *Id.* ¶¶ 3, 18 (“In still another embodiment, a pair of glasses includes one or more sensors. . . . Another sensor can be used to detect an environmental condition, such as the amount of ultraviolet radiation in the vicinity of the glasses.”), 167 (“In one embodiment, another type of sensor is an environmental sensor. The environmental sensor can sense environmental conditions, such as one or more of ultraviolet radiation . . . and toxins (e.g., chemicals, radiation, etc.).”).

65. Howell-158 further discloses an “insulating layer between the electrical components or circuit board and the metallic frames.” *Id.* ¶53. The glasses include this insulation to “prevent circuits from being shorted” and to “reduce leakage current” in glasses with metallic frames. *Id.* “One example of an insul[a]ting layer is a tape to encapsulate the electrical components.” *Id.* “The tape is non-conducting so as to provide insulation” *Id.* The “insulator material (e.g., dielectric tape) can cover the top and the bottom surfaces of the circuit board,” which “is then sandwiched between the faces” of the temple piece. *Id.* The “dielectric tape can be double-sided sticky tape, with one side sticking to the circuit board, and the other side sticking to the temple.” *Id.*

66. A POSITA would have been motivated to apply Howell-158’s insulating layer between the electronics and other components located within Howell-596’s electronics module and its frame for several reasons. First, Howell-158 incorporates by reference Howell-596, so it expressly instructs the POSITA to combine the disclosures of the two references. Second, a POSITA would have been motivated to add the insulating layer disclosed in Howell-158 to “prevent circuits from being shorted” and “reduce leakage current” in glasses with metallic frames. Ex. 1006 ¶53. These goals, which were expressly disclosed in Howell-158, were well understood before the priority date. *Id.* Since long before the priority date, it had been standard practice to insulate electric components. For example, a 2003

publication of IPC-2221A (which is a generic standard on printed board design) instructed that metal-cased components shall be “insulated from adjacent electrically conductive elements.” Ex. 1011, 57. The standard further instructed that “[f]iber or plastic insulators should be incorporated where adequate clearance from circuitry cannot be provided.” *Id.*, 64. Insulating layers like those disclosed in Howell-158 were well known long before the priority date in 2010. For example, IPC-2221A discusses many such insulators. *E.g.*, Ex. 1011, 19-20 (section 4.2.5 discussing “Thermally Conductive/Electrically Insulating Adhesives”), 25 (section 4.5.2 discussing “Conformal Coatings,” which act as “an electrical insulation material”), 64 (identifying “Fiber or plastic insulators”) 67 (identifying for wire an “insulating material, such as a polymer coating”).

67. A POSITA would have had a reasonable expectation of success in applying Howell-158’s teachings to Howell-596. As discussed above, insulating layers had been widely used to insulate electrical materials since long before the priority date. Moreover, Howell-158 identifies several ways to incorporate such well-known insulating layers between a circuit board and eyewear frames in glasses similar to those in Howell-596. Ex. 1006 ¶53.

68. Howell-158 discloses only three materials for making its eyeglass frames that house electrical components: metal, plastics, and rubber. Ex. 1006 ¶¶51-54. A POSITA would have understood that metallic frames have several

advantageous properties. For example, a 1999 article by Pickel notes desirable qualities of malleability, strength, ductility, light weight, plate-ability (the ability to be “overlaid over a base metal”), and corrosion resistance. Ex. 1015 at 11-12. Further, a POSITA would recognize that there are a limited number of identified materials for making Howell-158 and Howell-596’s eyeglass frames such that selecting metallic frames for use would have been obvious.

69. Applying Howell-158’s insulating layer represents nothing more than the simple addition of one known element (insulating layer) to another known element (temple containing electronics) to obtain predictable results (electrically insulating the electronics from the temple “to prevent circuits from being shorted or to reduce leakage current”). Ex. 1006 ¶53. Similarly, the combination represents the use of a known technique (surrounding electrical components with an insulating layer) to improve similar glasses in the same way. Ex. 1006 ¶53.

B. Claim 2

70. Claim 2 depends from claim 1 and further recites: “wherein the housing module comprises the insulating layer.”

71. According to the ’541 patent, “the housing module may comprise the insulating layer. That is, for example, the housing module (or a portion thereof) may comprise an insulating material.” Ex. 1001, 57:60-62.

72. Howell-158 discloses “sticking [insulating tape] to the temple” in the area where the electronics are located. Ex. 1006 ¶53. In that configuration, the insulating tape would form part of the housing module. Thus, it would have been obvious to a POSITA to dispose an insulating layer in the housing module of Howell-596 such that the housing module comprises the insulating layer.

C. Claim 3

73. Claim 3 depends from claim 2 and further recites: “wherein the electronics module comprises a conductive material.”

74. The '541 patent describes that its electronics module comprises a housing *and* “a plurality of electrical components.” Ex. 1001, 7:45-47.

75. As discussed for elements 1[c]-1[d], Howell-596’s electronics module includes “various electrical components,” including “electrical circuitry 1508,” that make up UV detection system 1500. *Supra* §VI.A.3; Ex. 1004 ¶184. It was well known long before the priority date that electrical circuitry must include conductive material in order to function properly to allow a current to flow through the elements of the circuit. Moreover, Howell-596 discloses a UV monitoring circuit 700 in which a transistor 708 can be a “semiconductor” and “conducts” to activate output device 710. Ex. 1004 ¶96, Fig. 7A. A POSITA would understand that the proper function of these components requires conductive material. Howell-596 thus discloses an electronics module comprising a conductive material.

D. Claim 4

76. Claim 4 depends from claim 1 and recites “wherein the housing module comprises a conductive material; and wherein the insulating layer is disposed between at least a portion of the housing module and the electronics module.”

77. It would have been obvious to a POSITA to include a conductive material in Howell-596’s housing module. Glasses with metal frames were well known before the priority date in 2010. *E.g.*, Ex. 1015. Indeed, Howell-158 disclosed metal frames. A POSITA would have known that metal is a conductive material. Ex. 1006 ¶52-53 (“In another embodiment, the glasses have metallic frames.”).

78. A POSITA would have been motivated to use metal frames for Howell-596’s frames based on desirable properties of metallic frames and to address aesthetic demands from eyewear users that prefer metal frames to other materials. For example, a POSITA would have understood that metallic frames have advantageous properties including malleability, strength, ductility, light weight, plate-ability (the ability to be “overlaid over a base metal”), and corrosion resistance. Ex. 1015 at 11-12. As another example, a POSITA would have been aware that some users prefer metal frames to other materials, including based on the aforementioned advantageous properties.

79. Further, metal is one of a finite number of well-known options for frame material. Based on the prevalence and known properties of metal frames (*e.g.*, Ex. 1015 at 11-12), a POSITA would have a reasonable expectation of success in selecting metal for the material of a frame.

80. As discussed above, the housing module is a portion of the eyewear frame (namely, the portion of the frame that houses the electronics module). *Supra* §VI.A.1. Thus, the housing module in metal-framed eyewear would comprise a conductive material in the form of the metal in the eyewear frame.

81. In addition, it would have been obvious in light of Howell-158 to dispose an insulating layer between the housing module (metal frames) and the electronics module disclosed in Howell-596.

Howell-158 discloses:

For glasses with metallic frames, to prevent circuits from being shorted or to reduce leakage current, one embodiment provides an insulating layer between the electrical components or circuit board and the metallic frames. One example of an insulating layer is a tape to encapsulate the electrical components.

Ex. 1006 ¶53. Based on this disclosure underscoring the well-known need to insulate electronic components from metal frames (*e.g.*, Ex. 1011), it would have been obvious to a POSITA to encapsulate the electronics module of Howell-596

with an insulating layer before installing it into the housing module (eyewear housing 1720) defined by a metal frame, thus disposing an insulating layer between the eyewear housing 1720 and the electronics module.

E. Claim 5

82. Claim 5 depends from claim 1 and further recites: “wherein the insulating layer comprises a portion of the electronics module.”

83. As discussed above for claim 4, it would have been obvious to a POSITA in light of Howell-158 to encapsulate the electronics module of Howell-596 with an insulating layer (*e.g.*, insulative tape). *Supra* §VI.D. In this configuration, the insulating layer comprises at least a portion of the electronics module. This renders the claim obvious.

84. It would have also been obvious to adhere Howell-158’s insulating layer to the electronics within Howell-596’s electronics module, thus rendering the insulating layer part of the electronics module. For example, Howell-158 discloses “sticking [insulating tape] to the circuit board.” *Supra* §VI.A.4; Ex. 1006 ¶53. In this configuration, the insulating layer is within the electronics module. That combination is the simple addition of a well-known insulating layer to well-known electronics to electrically insulate the electronics. This technique was commonplace long before the priority date, and the result would have been predictable to a POSITA.

F. Claim 6

85. Claim 6 depends from claim 5 and further recites: “wherein the housing module comprises a conductive material.” Claim 6 would have been obvious to a POSITA for the same reasons discussed for claim 4. *Supra* VI.D.

G. Claim 7

86. Claim 7 depends from claim 1 and further recites: “wherein the electronics module is removably coupled to the housing module.”

87. Howell-596 discloses that its “module housing 1700 is contained by the eyewear housing 1720” and “can, for example, be held in position with respect to the eyewear housing 1720 by . . . an interference fit.” Ex. 1004 ¶196. An interference fit is a type of fastening where two parts are held together by friction. This can provide a removable connection. Thus, a POSITA would have understood that an interference fit between Howell-596’s eyewear housing 1720 (housing module) and its module housing 1700 containing UV detection system 1500 (electronics module) is a removable connection.

88. Alternatively, claim 7 would have been obvious to a POSITA in view of Howell-158. Howell-158 discloses glasses whose “frame includes a cavity for receiving [a] functional module” that includes “electrical components.” Ex. 1006, Claim 26. The “functional module is *removably* provided within the cavity of the eyeglass frame.” *Id.*, Claim 27. Howell-158 also discloses benefits of removable

modules, including enabling an eyeglass frame to “support different function or operations depending on the removable electronic device that is attached.” *Id.* ¶86. These benefits provide motivation to apply the removeable modules disclosed in Howell-158 to Howell-596. Moreover, that combination represents the use of a known technique (removably coupling an electronics module within an eyewear housing) to improve similar devices in the same way. It would have been obvious to a POSITA to apply Howell-158’s removable coupling within Howell-596.

H. Claim 8

89. Claim 8 depends from claim 7 and further recites: “wherein the electronics module is adapted to be removed and recoupled to the housing module.”

90. As discussed for claim 7, Howell-596 discloses that the electronics module can be removably placed in the housing module. *Supra* §VI.G. Furthermore, Howell-596 states: “The module housing 1700 can also be used to ***regularize or standardize the form factor for the UV detection system***, such that the opening, cavity or container of the eyewear housing can be regularized or standardized.” Ex. 1004 ¶195. This regularization/standardization of the dimensions of the UV detection system having module housing 1700 (electronics module) and dimensions of the eyewear housing (housing module) has several benefits, all of which a POSITA would understand. For example, such regularization/standardization allows the UV detection system to be easily

removable and swappable. As another example, such regularization/standardization allows for a removeable, self-contained module, like the one disclosed in Howell-596 to be recouple-able after removal. This would allow, for example, removing the electronics module for maintenance and cleaning and then recoupling it to the housing module.

I. Claim 9

91. Claim 9 depends from claim 1 and recites: “wherein the housing module comprises a first end, a second end, and a body disposed between the first end and the second end; wherein the first end comprises an opening; and wherein the electronics module is configured to be inserted into the opening.”

92. Howell-596 discloses:

The [modular] UV detection systems can be built on a single substrate that is designed to be inserted into an end product. . . . [I]n case in which the end product is an eyeglass frame, a temple of the eyeglass frame can have an opening, cavity or container to hold or encompass the [modular] UV detection system”

Ex. 1004 ¶183. By definition, an opening, cavity, or container has a first end, a second end, and an opening therebetween. The opening, cavity, or container disclosed by Howell-596 into which the modular UV detection system is inserted. Thus, Howell-596 discloses claim 9.

J. Claim 10

93. Claim 10 depends from claim 9 and further recites: “wherein the electronics module is pressure fitted to the housing module.”

94. The '541 patent states: “[T]he electronics module may be pressure fitted to the housing module. That is, for instance, the electronics module (or a component thereof) may expand into a section or portion of the housing module such that it locks into place (and may thereby be coupled to the housing module).” Ex. 1001, 60:63-61:5.

95. As discussed for claim 7, Howell-596 discloses its module housing 1700 “can, for example, be held in position with respect to the eyewear housing 1720 by . . . an interference fit.” *Supra* §VI.G. An interference fit is a type of fastening where two parts are held together by friction. That friction is created and increased by applying pressure (force over an area) between the interference-fit parts. Thus, one of skill would understand an interference fit would provide a pressure fitted connection.

96. Moreover, a POSITA would recognize that Howell-596’s Figures 17A and 17B show that windows 1702 and 1704 of the electronics module expand into corresponding openings 1722 and 1724 of eyewear housing 1720. Ex. 1004 ¶196, Fig. 17B. Figure 17B further shows that such protrusions would restrict the

electronics module's vertical movement within eyewear housing 1720. *Id.* ¶196 (the electronics module is “contained by the eyewear housing 1720”).

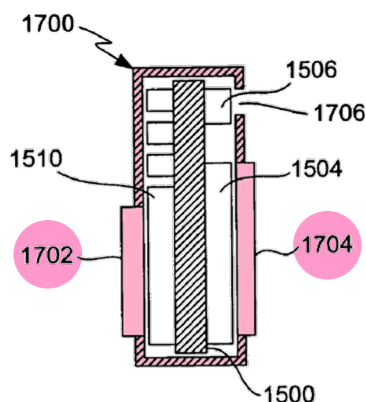


FIG. 17A

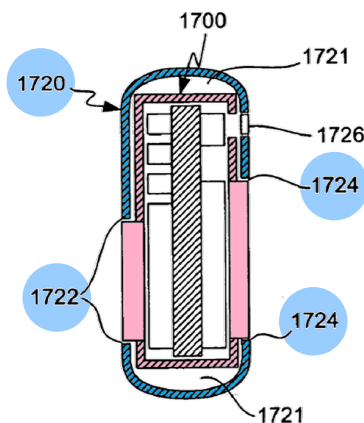


FIG. 17B

Id., Figs. 17A-17B. A POSITA would understand from this disclosure that Howell-596's electronics module is pressure fitted to its eyewear housing 1720 (housing module).

K. Claim 11

97. Claim 11 depends from claim 9 and further recites: “wherein the electronics module is located within the body of the housing module.” As discussed for elements 1[c]-1[d] and claim 9, Figure 17B shows an electronics module sitting inside the body of Howell-596's eyewear housing. *Supra* §§ VI.A.3, VI.I.

L. Claim 12

98. Claim 12 depends from claim 1 and further recites: “wherein the structural member comprises a cavity in the first temple; and wherein the housing module is configured to be selectively placed within the cavity.”

99. Howell-596's module housing 1700 qualifies as the claimed housing module including because it is "a housing for the UV detection system 1500" including its electrical circuitry. Ex. 1004 ¶¶ 184, 194; *see* Ex. 1001, 50:40-48 ('541 patent stating "a 'housing module' may refer to a component that may house . . . the electronics . . . of the electronic spectacles"). Howell-596 discloses a UV detection system 1500 disposed within a module housing 1700 (housing module). Ex. 1004 ¶¶194-96, Figs. 17A-17B.

100. Howell-596's eyewear housing 1720 qualifies as the claimed structural member including because it is part of the frame. Ex. 1004 ¶196; Ex. 1001, 55:63-66 ('541 patent stating a "'structural member' may refer to any portion of the frame"). The module housing 1700 is coupled to a cavity 1721 in eyewear housing 1720 (structural member) at the temple. *Id.* ¶196, Fig. 17B.

101. Howell-158's insulating layer qualifies as the claimed electronics module including because it "encapsulate[s] the electrical components" to provide both insulation and "mechanical stiffness." Ex. 1006 ¶53; Ex. 1001, 7:45-51 ('541 patent stating "an 'electronics module' may refer to a housing or container that comprises a plurality of electrical components").

102. Howell-596's Figures 17A-17B show that, with all other limitations mapped as in §VI.A, *supra*, the module housing 1700 (housing module) is

configured to be selectively placed within the cavity 1721 of the eyewear housing 1720 (structural member):

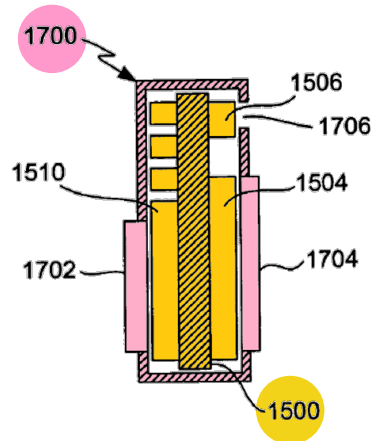


FIG. 17A

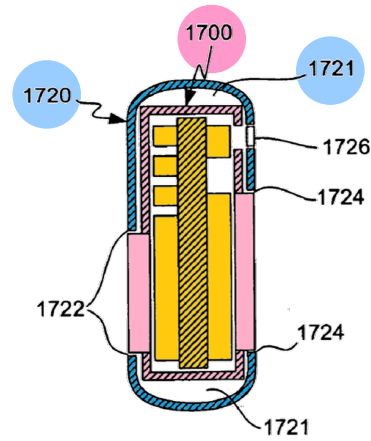


FIG. 17B

Id., Figs. 17A-17B. For example, Howell-596 explains that “eyewear housing 1720 has an opening, cavity or container 1721 for receiving the module housing 1700.” *Id.* ¶196. Moreover, “[a]s shown in FIG. 17B, the module housing 1700 is contained by the eyewear housing 1720.” *Id.* Further, various structures in eyewear housing 1720 are selectively placed to correspond to structures in module housing 1700; Howell-596 explains, with reference to Figure 17B, that:

The eyewear housing 1720 includes an opening 1722 that corresponds to the first window 1702 of the module housing 1700. The eyewear housing 1720 also includes an opening 1724 that corresponds to the second window 1704 of the module housing 1700. Still further, the eyewear housing 1720 can optionally further include an optical filter

1726 corresponding to the third opening 1706 of the module housing 1700 (and thus proximate to the UV sensor 1506).

Id.

103. Thus, claim 12 would have been obvious in view of Howell-596 and Howell-158.

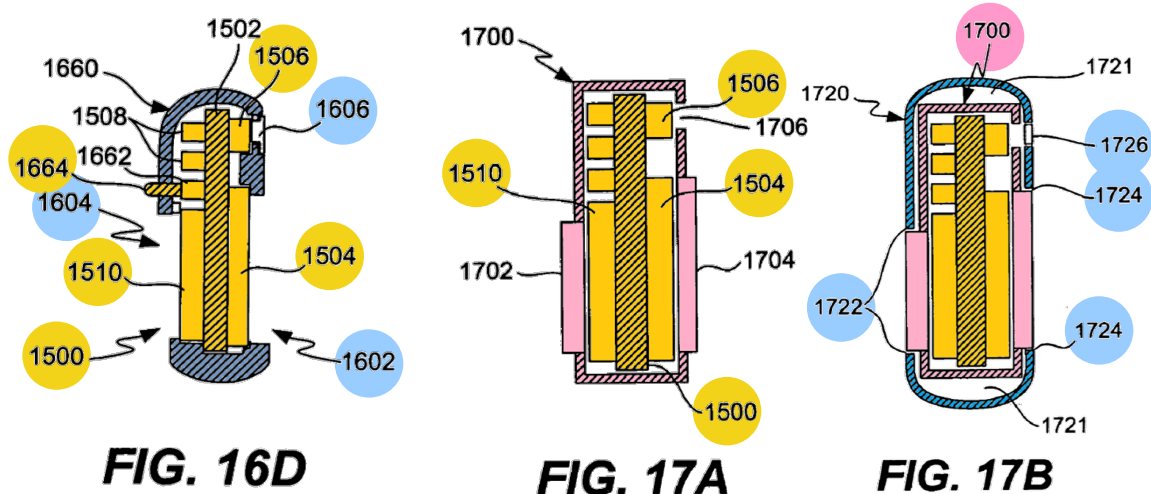
M. Claim 13

104. Claim 13 depends from claim 1 and further recites: “wherein the housing module further comprises an aperture disposed on an outer side of the housing module.”

105. According to the '541 patent, the “outer side” may refer to a side of the housing module that does not face toward a wearer’s head (e.g. the side that faces away from the wearer’s head).” Ex. 1001, 63:9-14.

106. Howell-596’s Figures 16D and 17B each show cross-sections of an eyewear housing. Ex. 1004, Figs. 16D, 17A-17B, ¶¶ 191, 194-96. Each eyewear housing is configured to contain the UV detection system 1500 shown in Figure 15A. *Id.* For example, as shown, each contains an optical filter 1606/1726 corresponding to UV sensor 1506, an opening 1602/1724 corresponding to power supply 1504, and an opening 1604/1722 corresponding to display device 1510. *Id.* Figure 16D shows how to incorporate a switch 1664, while Figure 17B shows how

to incorporate a module housing 1700. *Id.* Howell-596 discloses that such features in embodiments are not mutually exclusive. *Id.* ¶239.



Id., Figs. 16D, 17A-17B, *see id.* ¶¶ 184, 191, 194-196 (discussing figures).

107. Howell-596’s Figures 16D and 17B each show a pair of openings 1602/1724 and 1604/1722 (apertures) through the eyewear housing. *Id.*, Figs. 16D, 17B, ¶¶ 191, 196. Figure 16D further shows a switch 1664 protruding through an aperture in the eyewear housing. *Id.*, Fig. 16D, ¶191.

108. Claim 13 recites that the aperture is disposed on “an outer side” of the housing module. There are a finite number of identified, predictable sides on the eyewear housing to dispose an aperture: the ends, the sides, the top, and the bottom. A POSITA would understand that an aperture could be disposed on any of those sides. Howell-596 discloses that switch 1664 “protrudes outside of the eyewear housing 1660 (or is otherwise accessible) so that a user can activate the switch (e.g., press the button).” Ex. 1004, Fig. 16D, ¶191. This would inform a POSITA that

disposing the aperture for switch 1664 on an outer side of the housing module would make the switch “accessible” and avoid contacting the wearer’s head to unintentionally engage the switch, *id.*, thus motivating a POSITA to dispose the aperture there. Figures 16D and 17B show switch 1664 and openings 1602/1724 and 1604/1722 as disposed on both vertical sides of the eyewear housing. Ex. 1004, Figs. 16D, 17B. Thus, at least one such opening is necessarily disposed on an outer side of the eyewear housing.

N. Claims 14-15

109. Claim 14 depends from claim 13 and further recites: “wherein the sensing mechanism comprises a touch sensitive switch exposed substantially through the aperture.”

110. Claim 15 depends from claim 14 and further recites: “wherein the touch sensitive switch is a capacitance switch.”

111. As discussed for claim 13, the electronics module includes a switch 1664 that “protrudes outside of the eyewear housing 1660 (or is otherwise accessible) so that a user can activate the switch (*e.g.*, press the button).”

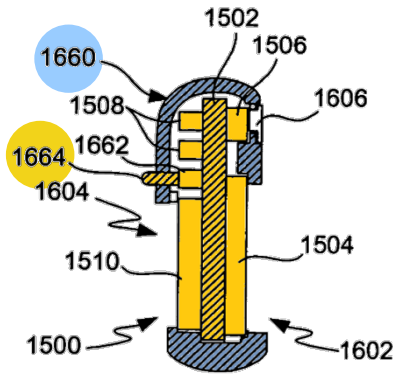


FIG. 16D

Ex. 1004, Fig. 16D; *see id.* ¶ 191; *supra* §VI.M.

112. Howell-596 discloses that switch 1664 can be a touch sensitive capacitance switch. Howell-596 incorporates by reference U.S. Provisional Patent Application No. 60/583,169 to Howell et al., and points to a specific section therein titled “Eyeglasses with User Input Capability.” Ex. 1004 ¶88. That identified section explains that the switch “can be activated depending on electrical forces 158” that in turn “depend[] on capacitive effect.” Ex. 1005, 172 ¶57. The identified section further discloses that, “[b]y changing the capacitance, the switch is turned on and off. For example, the capacitance is changed by placing one’s finger over a metallic pad.” *Id.* This discloses a touch sensitive capacitance switch.

113. The incorporated “Eyeglasses with User Input Capability” section further discloses that the switch “can be placed at different position[s] on the glasses,” including the “top surface of the temple.” *Id.* ¶50. The top surface is an

“outer side” of the temple because it “does not face toward a wearer’s head.” Ex. 1001, 63:9-14.

114. Thus, Howell-596 discloses that a sensing mechanism that comprises a touch sensitive switch exposed substantially through the aperture (claim 14) wherein the touch sensitive switch is a capacitance switch (claim 15).

O. Claims 16-17

115. Claim 16 depends from claim 1 and further recites: “wherein the structural member comprises the first temple.”

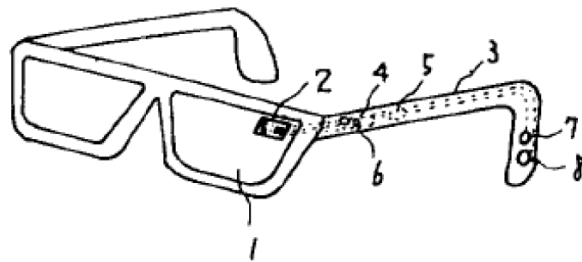
116. Claim 17 depends from claim 16 and further recites: “wherein the first temple comprises a first portion and second portion, and wherein the housing module comprises the first portion of the first temple.”

117. The ’541 patent states that a “‘structural member’ may refer to any portion of the frame” Ex. 1001, 55:63-66.

118. Howell-596’s eyewear housing may represent only “a portion” of a temple. Ex. 1004 ¶188. “Typically, the portion of the temple region [represented by the eyewear housing] is forward of the user’s ear (i.e., towards the lens holders) when the glasses are being worn.” *Id.* In that “typical” configuration, the first portion of the temple is its front portion, while the second portion of the temple is the back portion. *See id.*

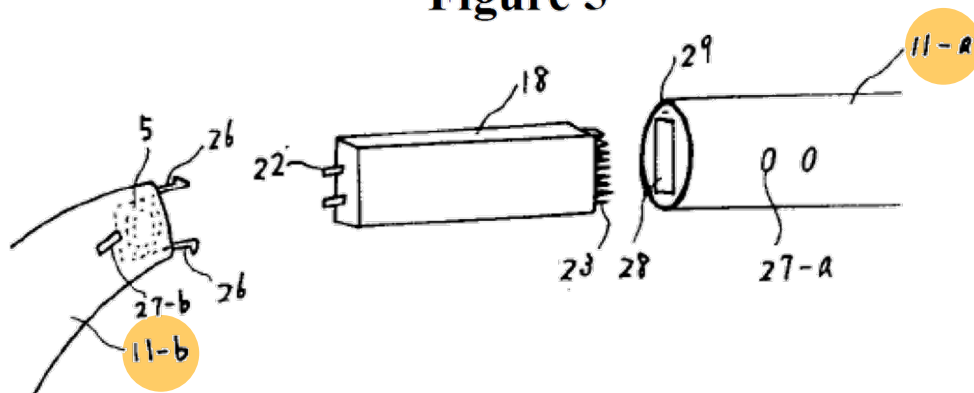
119. Moreover, POSITAs would have otherwise been long aware that that electronics are beneficially housed in one of two separable portions of a temple to facilitate incorporating and accessing the electronics as well as enhancing “multifunctionality.” See Ex. 1007, 68, Fig. 5. In fact, in 1983, Hattori-913 discussed housing electronics in one of two separable portions of a temple. *Id.* Hattori-913 discloses eyeglasses comprising two temples:

Figure 1



Id., 68, Fig. 1. Figure 5 of Hattori-913 shows a temple comprising two portions: frame 11-a and frame 11-b. *Id.*, 68, Fig. 5.

Figure 5



Id., 68, Fig. 5. Portion 11-a is the first portion and houses “electronic components 20 such as capacitors and transistors” within integrated circuit 18. *Id.* Portion 11-a

is therefore a housing module comprising the first portion of a first temple. Portion 11-b is the second portion of the temple. *Id.* First portion 11-a is coupled to second portion 11-b by hooked portion 26. *Id.* There are a limited number of well-known suitable choices for incorporating Howell-596's two-portion temple, Ex. 1004 ¶188. Hattori-913 communicates to a POSITA that one such suitable choices would be to dispose the portions as two separate and connectable pieces. *See* Ex. 1007, 68, Fig. 5.

P. Claim 18

120. Claim 18 depends from claim 1 and further recites: “wherein the housing module has a thickness that is less than or equal to approximately 0.7 mm.”

121. According to the '541 patent, “the ‘thickness’ of the housing module may refer to the dimension of one of the sides of the housing module in a direction that is perpendicular to the electronics module.” Ex. 1001, 66:12-15. According to the '541 patent, “the term ‘approximately’ may refer to plus or minus 10 percent, inclusive.” *Id.*, 9:46-47.

122. The only limitation that claim 18 adds to claim 1 is a range for the thickness of a side of the housing module. A POSITA would recognize that space within eyewear is limited by ergonomic and aesthetic considerations. Ergonomic considerations include, for example, (a) limiting the weight of glasses on the ears or nose, which creates pressure and discomfort; (b) limiting the width of the temple, as

too much width can deflect a user's ears and cause discomfort; (c) limiting the height of the temple, as too much height can interfere with hats and other headwear, causing additional downward pressure on the ears and therefore discomfort. Aesthetic considerations include, for example the shape and dimensions of the temples. To mitigate the ergonomic and aesthetic issues associated with a thick housing module, a POSITA would have been motivated to make the housing module as thin as possible. It would be obvious to a POSITA to optimize the thickness of the housing module and arrive at the claimed range through routine optimization.

123. Alternatively, a POSITA would have been long aware that Howell-596's eyewear housing 1720 or Howell-158's temple (housing module) could have a thickness that is less than or equal to approximately 0.7 mm. Before the priority date, multiple references—including Dudli and Della—disclosed temples whose entire widths were approximately 0.7 mm thick or less. For example, in 2007, Dudli explicitly disclosed a temple for spectacles “preferably with a thickness of 0.2 to 0.5 mm.” Ex. 1012, Claim 2; *id.*, 1 (publication date May 16, 2007). As another example, in 2002, Della explicitly disclosed temples with a forward portion 13a having a thickness of “around 0.7 mm.” Ex. 1013 p.9, Figs. 1-3; *id.*, 1 (publication date November 22, 2002).

124. In addition, before the priority date, a POSITA would have been well aware of the demands of design aesthetics of electronic eyewear. These demands

would have included maintaining the proportions of the components of the electronic eyewear similar to those of traditional eyewear. These demands would have also included maintaining the weight of traditional eyewear; should the frame be made of metal, housings thicker than 0.7 mm would be heavy and uncomfortable to wear for the user. A POSITA would also understand that reducing the thickness of the housing module would help offset any bulkiness from addition of the electronic module into the housing module (and temple) of the eyewear.

125. Prior art would provide a POSITA with further motivation to minimize housing module thickness to maintain design ergonomics and aesthetics of the electronic eyewear. For example, Howell-596 discloses integrating components within eyewear such that “disturbance to design features of the eyewear can be reduced.” Ex. 1004 ¶¶ 7, 68. Similarly, Kokonaski-166 emphasizes integrating electronic components into an electro-active frame in a “cosmetically pleasing manner.” Ex. 1008, Abstract. Kokonaski-166 further explains “it is becoming important to find ways to incorporate electronics into eyewear without harming the aesthetics and functionality of the eyewear. The challenge is to not limit the fashion design of the eyeglass frame or limit the materials which the eyeglass frame can be made of” *Id.* ¶7. To that end, Kokonaski-166 “desires to avoid . . . a thick temple or frame housing electronics that distracts from the aesthetic appearance of the eyeglass frames.” *Id.* ¶6.

Q. Claim 19

1. Preamble

126. The preamble recites: “A method of fabricating a device.”

127. As discussed for element 1[a], Howell-596 discloses glasses 100. *Supra* §VI.A.1. Howell-596 further discloses that its disclosure “can be implemented in numerous ways, including as a . . . method.” Ex. 1004 ¶9.

2. 19[a][1]: device comprises a frame having first and second temples

128. Claim element 19[a][1] recites: “wherein the device comprises a frame having a first temple and second temple.” As discussed for element 1[a], Howell-596 discloses this limitation. *Supra* §VI.A.1.

3. 19[a][2][A]: device comprises a housing module that comprises first and second ends, wherein the first end comprises an opening

129. Claim element 19[a][2][A] recites: wherein the device comprises “a housing module comprising: a first end and a second end, wherein the first end comprises an opening.” As discussed for claim 9, Howell-596 discloses this limitation. *Supra* §VI.I.

4. 19[a][2][B]: housing module comprises a body between first and second ends, wherein the body comprises a cavity

130. Claim element 19[a][2][B] recites: wherein the device comprises a housing module comprising “a body disposed between the first and second end,

wherein the body comprises a cavity.” As discussed for claim 9, Howell-596 discloses this limitation. *Supra* §VI.I.

5. 19[b]: inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity

131. Claim element 19[b] recites: “wherein the method comprises inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity of the body of the housing module.” As discussed for claims 9 and 11, Howell-596 discloses this limitation. *Supra* §§ VI.I, VI.K.

VII. GROUND 2: HOWELL-596, HOWELL-158, AND HATTORI-913 RENDER CLAIMS 16-17 OBVIOUS

132. Claims 16 and 17 both recite limitations that relate to coupling a housing module to a temple. Claim 17 further recites that the housing module comprises a first portion of the temple.

133. The limitations of claims 16 and 17 would have been obvious to a POSITA in view of Howell-596, Howell-158, and in further view of Hattori-913. As discussed herein for ground 1, claims 16-17, Hattori-913 expressly discloses the limitations of those claims. *See supra* §VI.O.

134. A POSITA would have been motivated to combine Hattori-913’s disclosure with Howell-596 because these two references address the same goal of embedding electrical components in glasses. For example, Howell-596 is directed

to “embed[ing] or partially embed[ing] electrical components” into glasses. Ex. 1004, ¶7. Hattori-913 describes “embodiment[s] of the incorporation” of electronics into glasses. Ex. 1007, 68, Figs. 4-5. A POSITA would also recognize that both Howell-596 and Hattori-913 also address a well-known need to minimize the manufacturing burden of embedding electrical components. For example, Howell-596 identifies a need to “regularize or standardize the form factor” of its electronics, such that the receiving portion of “eyewear housing can be regularized or standardized.” Ex. 1004 ¶195. Hattori-913’s embodiments addresses incorporating its electronic function “without any precision processing of frames at all.” Ex. 1007, 69. A POSITA would have readily recognized the similar objectives of Howell-596 and Hattori-913.

135. A POSITA would have been motivated to incorporate Hattori-913’s two-portion temple because it provides an exemplary way to achieve Howell-596’s disclosed device that beneficially facilitates incorporating and accessing the electronics as well as enhancing “multifunctionality.” *See* Ex. 1007, 68, Fig. 5. Howell-596 identifies that its electronics module is “placed into an opening, cavity or container of an eyewear housing, such as a temple region of the eyewear housing.” Ex. 1004 ¶195. Hattori-913’s two-portion temple provides an “example[] of incorporating” electronics that provides direct access to the opening of the eyewear housing at the coupling point of the frame portions. Ex. 1007, 68, Fig. 5.

136. Applying Hattori-913's two-portion temple to Howell-596's glasses represents nothing more than the simple substitution of a well-known two-portion temple for a well-known one-portion temple such that electrical components can be accessed at the coupling point of the two portions. Ex. 1007, 68, Fig. 5. This result would have been predictable to a POSITA well before the priority date.

VIII. GROUND 3: HOWELL-596 RENDERS CLAIMS 1-11 AND 13-19 OBVIOUS

A. Claim 1

1. Preamble and 1[a]: frame comprising temples and a housing module coupled to a structural member

137. The preamble and element 1[a] recite: "A first device, comprising: a frame comprising a first temple and a second temple, wherein the frame comprises a housing module coupled to a structural member." As discussed for ground 1, Howell-596 discloses this limitation. *Supra* §VI.A.1.

2. 1[b]: first and second lenses coupled to the frame

138. Claim element 1[b] recites: "a first lens and a second lens coupled to the frame." As discussed for ground 1, Howell-596 discloses this limitation. *Supra* §VI.A.2.

3. 1[c]-1[d]: electronics module located within the housing module and comprising at least two of a power source, controller, and sensing mechanism

139. Claim elements 1[c]-1[d] recite: “an electronics module, wherein the electronics module is located within the housing module; wherein the electronics module comprises at least any two of: a power source; a controller; and a sensing mechanism.” As discussed for ground 1, Howell-596 discloses this limitation. *Supra* §VI.A.3.

4. 1[e]: insulating layer between electronic component and frame

140. Claim element 1[e] recites: “wherein an insulating layer is disposed between one or more electronic components located within the electronics module and the frame of the first device.”

141. According to the ’541 patent, “where an electronics module comprises an exterior wall . . . that is made of . . . an insulating material, the exterior wall may be considered as the insulating layer disposed between the electronic components (that are disposed within the electronics module) and the frame.” Ex. 1001, 58:50-55.

142. As discussed for ground 1, Howell-596’s electronics module has a “module housing 1700” that houses the UV detection system 1500. *Supra* §VI.A.3; Ex. 1004 ¶194. UV detection system 1500 is built on a substrate that “can be a

printed circuit board” and includes electrical circuitry such as “integrated circuits.”

Ex. 1004 ¶184.

electronics module

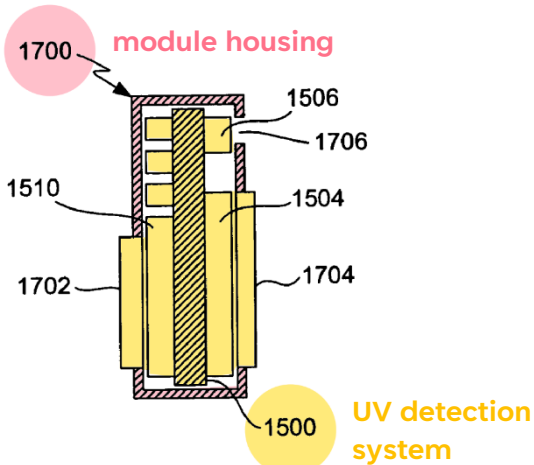


FIG. 17A

Ex. 1004, Fig. 17A, ¶¶194-95.

143. It would have been obvious to a POSITA to select an insulating material for Howell-596’s module housing 1700. Howell-596 instructs that “module housing 1700 protects the module” including UV detection system 1500. Ex. 1004 ¶195. Before the priority date, a POSITA would have understood that protecting the UV detection system’s “printed circuit board” having “integrated circuits” would advantageously include insulating those electric components. For example, a 2003 publication of IPC-2221A (which is a generic standard on printed board design) instructed that metal-cased components shall be “insulated from adjacent electrically conductive elements.” Ex. 1011, 57. The IPC-2221A further instructed that “[f]iber or plastic insulators should be incorporated where adequate clearance from circuitry

cannot be provided.” *Id.*, 64. Moreover, insulating layers were well known long before the priority date in 2010. For example, IPC-2221A discusses many such insulators—including “plastic insulators” and “polymer coating.” *E.g.*, Ex. 1011, 64 (identifying “Fiber or plastic insulators”), 67 (identifying for wire an “insulating material, such as a polymer coating”); *see also id.*, 19-20 (section 4.2.5 discussing “Thermally Conductive/Electrically Insulating Adhesives”), 25 (section 4.5.2 discussing “Conformal Coatings,” which act as “an electrical insulation material”).

144. Moreover, a POSITA’s selection of an insulating material for module housing 1700 would be a simple design choice. For example, a POSITA would understand that plastic is one of a finite number of identified, predictable materials for Howell-596’s module housing 1700. Before the priority date, plastic was commonly used for insulation, including in eyewear frames that house electronics. Ex. 1011, 64 (“plastic insulators should be incorporated where adequate clearance from circuitry cannot be provided”); Ex. 1006 ¶51 (discussing “embed[ding] an electrical component into a pair of glasses” that are “made of plastic (e.g., plastic frames)”). Thus, a POSITA would have had a reasonable expectation of success in using plastic for Howell-596’s module housing 1700.

B. Claim 2

145. Claim 2 depends from claim 1 and further recites: “wherein the housing module comprises the insulating layer.”

146. According to the '541 patent, “the housing module may comprise the insulating layer. That is, for example, the housing module (or a portion thereof) may comprise an insulating material.” Ex. 1001, 57:60-62.

147. As shown in Figure 17B of Howell-596, eyewear housing 1720 (housing module) contains module housing 1700 (insulating layer) such that a portion of the eyewear housing 1720 comprises module housing 1700:

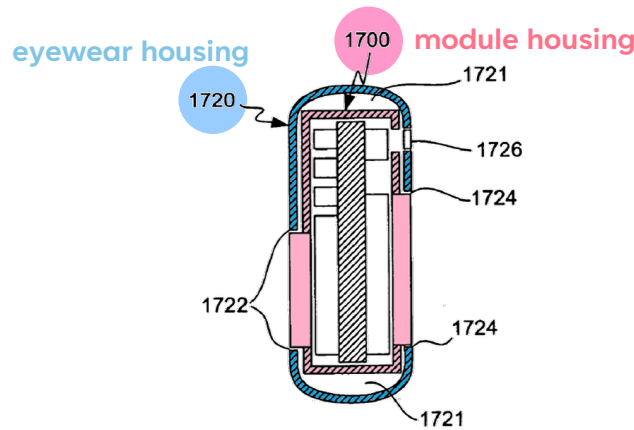


FIG. 17B

Ex. 1004, Fig. 17B, ¶196. Thus, this limitation would be obvious to a POSITA in light of the disclosure in Howell-596.

C. Claim 3

148. Claim 3 depends from claim 2 and further recites: “wherein the electronics module comprises a conductive material.” As discussed for ground 1, Howell-596 discloses this limitation. *Supra* §VI.C.

D. Claim 4

1. 4[a]: housing module comprises conductive material

149. Claim 4 depends from claim 1. Claim element 4[a] further recites: “wherein the housing module comprises a conductive material.” As discussed for ground 1, Howell-596 discloses this limitation. *Supra* §VI.D.

2. 4[b]: insulating layer between a portion of the housing module and the electronics module

150. Claim element 4[b] further recites: “wherein the insulating layer is disposed between at least a portion of the housing module and the electronics module.”

151. As shown in Figures 17A and 17B of Howell-596, module housing 1700 (insulating layer) is disposed between at least a portion of eyewear housing 1720 (housing module) and at least the portion of Howell-596’s electronics module comprising UV detection system 1500:

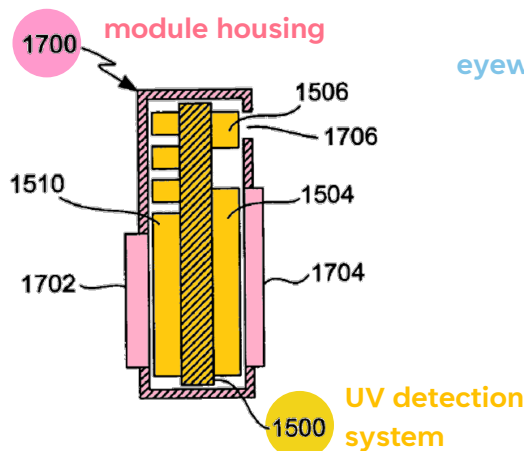


FIG. 17A

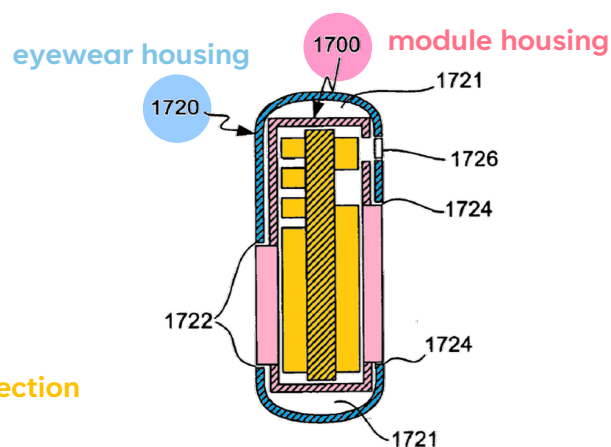


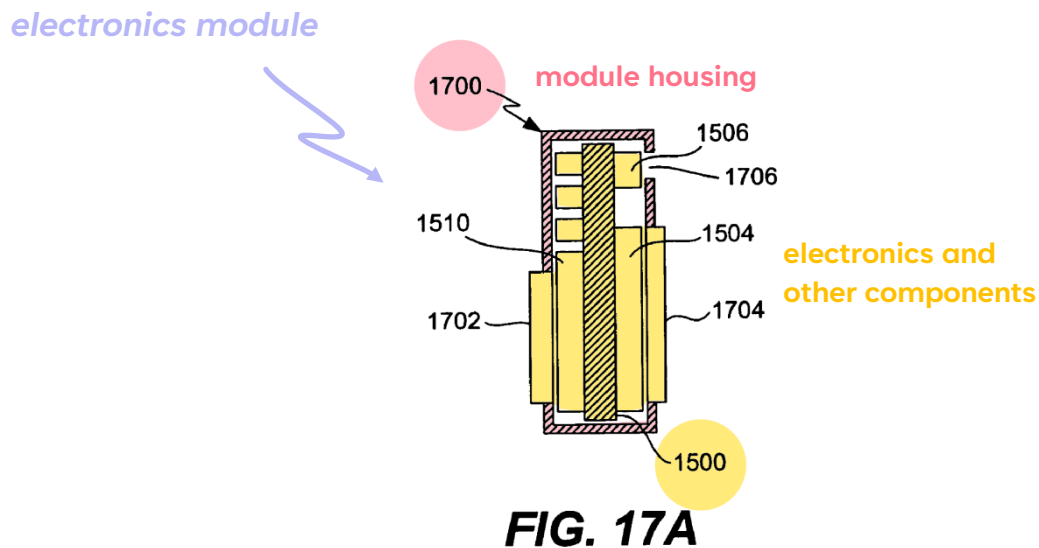
FIG. 17B

Ex. 1004, Figs. 17A-17B, ¶¶194-96. Thus, this limitation would be obvious to a POSITA in light of the disclosure in Howell-596.

E. Claim 5

152. Claim 5 depends from claim 1 and further recites: “wherein the insulating layer comprises a portion of the electronics module.”

153. As discussed for elements 1[c]-1[d] and shown in Figure 17A of Howell-596, module housing 1700 (insulating layer) is a portion of the electronics module. *Supra* §§ VI.A.3, VIII.A.3.



Ex. 1004, Fig. 17A, ¶¶194-96. Thus, this limitation would be obvious to a POSITA in light of the disclosure in Howell-596.

F. Claim 6

154. Claim 6 depends from claim 5 and further recites: “wherein the housing module comprises a conductive material.” Claim 6 would have been obvious to a POSITA for the same reasons discussed for element 4[a]. *Supra* §§ VI.D, VIII.D.1.

G. Claims 7-11, 13-19

155. As discussed for ground 1, Howell-596 discloses or renders obvious claims 7-11 and 13-19. *Supra* §§ VI.G-VI.K, VI.M-VI.Q.

IX. GROUND 4: HOWELL-596 AND HATTORI-913 RENDER CLAIMS 16-17 OBVIOUS

156. For the same reasons discussed for ground 2, the limitations of claims 16 and 17 would have been obvious to a POSITA in view of Howell-596 and Hattori-913. *See supra* §VII.

X. GROUND 5: KOKONASKI-166 AND HOWELL-158 RENDER CLAIMS 1-9, 11, AND 13-19 OBVIOUS

A. Claim 1

1. Preamble and 1[a]: frame comprising temples and a housing module coupled to a structural member

157. Kokonaski-166 discloses electronic eyeglass frames with two temples:

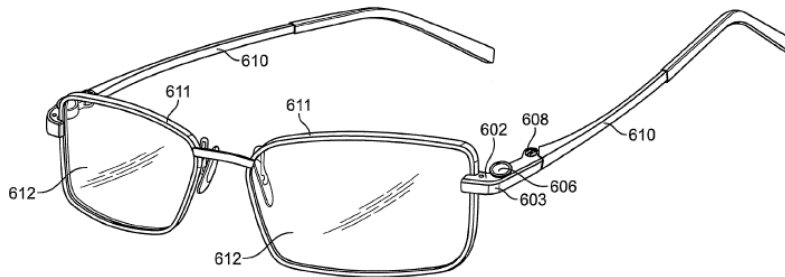


FIG. 6

Ex. 1008, Fig. 6; ¶¶3, 80. Figures 1A-1C show “a universal frame housing that comprises an electronic module” in the frame of Kokonaski-166’s eyewear:

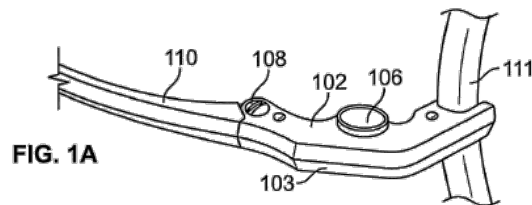


FIG. 1A

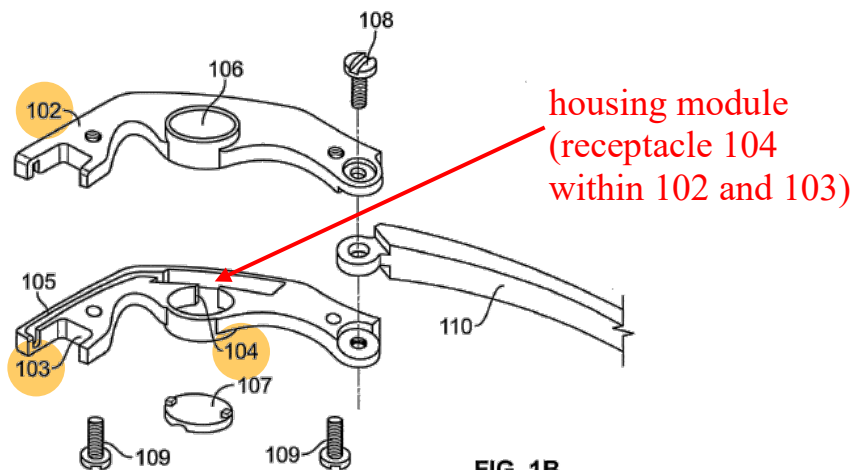


FIG. 1B

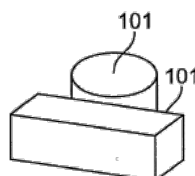


FIG. 1C

Id., Figs. 1A-1C, ¶¶20-22, 73-74. “The module 101 is shown housed between an upper electro-active lens frame component piece 102 and a lower electro-active lens frame component piece 103 that contains a receptacle 104 for the module 101.” *Id.* ¶74.

A POSITA would understand that receptacle 104 houses the electronic module. Receptacle 104 is a housing module coupled to component pieces 102/103, which are structural members. Kokonaski-166 thus discloses a “first device [electronic eyeglass frames], comprising: a first temple and a second temple, wherein the frame comprises a housing module [receptacle 104] coupled to a structural member [part of the frames].”

2. 1[b]: first and second lenses coupled to the frame

158. As shown, for example, in Figure 6 below, Kokonaski-166’s eyewear has a “first lens [612] and second lens [612] coupled to the frame.

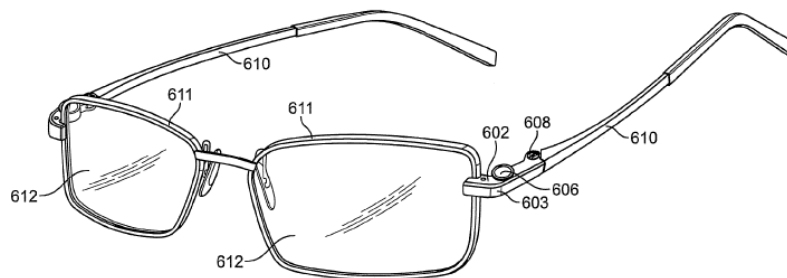


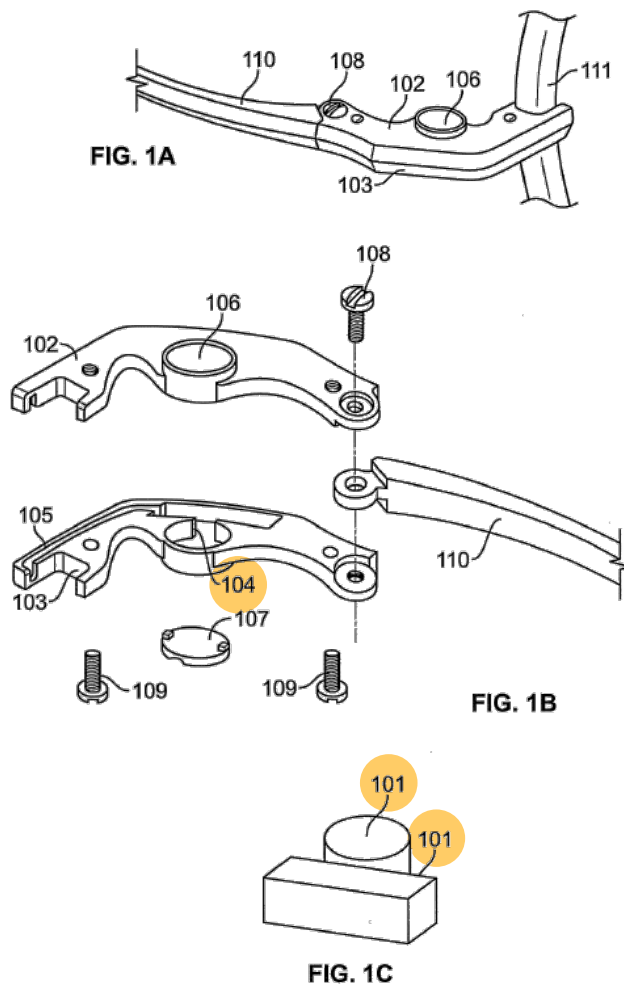
FIG. 6

Ex. 1008, Fig. 6, ¶80.

3. 1[c]-1[d]: electronics module located within the housing module and comprising at least two of a power source, controller, and sensing mechanism

159. A POSITA would understand that Kokonaski-166 discloses an electronic module 101 that contains a plurality of electronic components. For example, Kokonaski-166's electronic module may contain "both a power source and a drive circuit," a "sensing mechanism," and "an antenna, a receiver, a transmitter, a transceiver, a sensor, a range finder, a micro-processor, and a controller." Ex. 1008, ¶¶12, 73, 98. From this disclosure, a POSITA would understand that the electronic module could comprise at least two of a power source, controller, and sensing mechanism.

160. Kokonaski-166's Figures 1A-1C show "a universal frame housing that comprises the electronic module":



Id., Figs. 1A-1C, ¶¶20-22, ¶74. A POSITA would understand that the electronics module 101 is disposed in the receptacle 104 (housing module), as shown above. *Supra* §X.A.1.

4. 1[e]: insulating layer between electronic component and frame

161. Kokonaski discloses an electronic module in both Figures 1 and 10. Ex. 1008 ¶¶ 76, 87, Figs. 10-11. For each, Kokonaski-166 discloses using a seal to “to prevent water from contacting the electronic” components while within a universal frame component. *Id.* ¶¶ 76, 87. Referencing Figure 10, Kokonaski-166 discloses

that its electronic module may be sealed with silicone, which is insulative. *Id.* ¶87. It would have been obvious to a POSITA to apply that insulation to electronic module 101 in Figure 1. For example, for both Figures 1 and 10, the seal for the electronic module is directed to the same goal “to prevent water from contacting the electronic” components while within a universal frame component. *Id.* ¶¶ 76, 87.

162. Long before the priority date, a POSITA would have known that silicone is an insulative material. A POSITA would understand that when the electronic module is disposed within the housing module, the insulating layer of silicone would be disposed between the electronic module and the housing module. In this configuration, the insulating layer would be disposed between the electronic components within the electronics module and the frame.

163. Additionally, as discussed above, Howell-158 discloses disposing an “insulating layer between the electrical components or circuit board and []metallic frames.” Ex. 1006, ¶53; *see supra* §VI.A.4. Kokonaski-166 discloses that its “frame can be made of zyle, metal, or any combination thereof.” Ex. 1008, ¶84. In addition, like Kokonaski-166, Howell-158 also discloses “approaches to embed an electrical component into a pair of glasses.” Ex. 1006 ¶51. For the same reasons described above for Ground 1 for Howell-596, a POSITA would have been motivated to dispose an insulating layer between the electronics module and housing module in the metal frame of Kokonaski-166 and would have had a reasonable expectation of

success in applying Howell-158's teachings. *Supra* §VI.A.4. Claim 1 is thus obvious over Kokonaski-166 in light of Howell-158.

B. Claim 2

164. Claim 2 depends from claim 1 and further recites: “wherein the housing module comprises the insulating layer.” Kokonaski-166's frame containing the electronic modules “can be made of zyle, metal, or any combination thereof.” Ex. 1008, ¶84. Long before the priority date, a POSITA would know that zyle—or plastic—is an insulative material. Kokonaski-166 thus discloses this limitation.

165. As another alternative, Howell-158 discloses disposing its insulating layer within the frame, with one side of the insulating layer “sticking to the temple.” *Supra* §VI.A.4; Ex. 1006, ¶53. A POSITA would understand that this means the housing module comprises the insulating layer. Thus, Claim 2 would have been obvious.

C. Claim 3

166. Claim 3 depends from claim 2 and further recites: “wherein the electronics module comprises a conductive material.” As discussed for elements 1[c]-1[d], Kokonaski-166's electronic module includes “electrical components,” including, for example, “a drive circuit[.]” *Supra* §X.A.3; Ex. 1008, ¶73. A POSITA would understand that electrical circuitry requires a conductor to properly function to allow a current to flow through the elements of the circuit, and therefore that

Kokonaski-166's electrical components must include a conductive material. Kokonaski-166 thus discloses an electronics module comprising a conductive material. Claim 3 is thus obvious.

D. Claim 4

167. Claim 4 depends from Claim 1 and further recites: “wherein the housing module comprises a conductive material; and wherein the insulating layer is disposed between at least a portion of the housing module and the electronics module.” As discussed above for Claim 2, Kokonaski-166 discloses that its eyewear frame can be made of metal. A POSITA would understand that this means that the housing module can be made of metal. Long before the priority date, a POSITA would also know that metal is a conductive material.

168. In addition, as discussed for element 1[e], Kokonaski-166 in combination with Howell-158 disclose disposing an insulative layer between at least a portion of the housing and electronics modules. *Supra* §X.A.4. Claim 4 is thus obvious.

E. Claim 5

169. Claim 5 depends from Claim 1 and further recites: “wherein the insulating layer comprises a portion of the electronics module.” As discussed for Claim 4, Kokonaski-166 discloses an electronic module sealed with silicone. *Supra*

§X.D. Before the priority date, it would have been obvious to a POSITA that the silicone seal can form part of the electronic module.

170. Alternatively, because Howell-158 discloses that its layer can have “one side sticking to the circuit board,” it would have been obvious to a POSITA to adhere Howell-158’s insulating layer to Kokonaski-166’s circuitry. A POSITA would understand that, in this configuration, the insulating layer would be part of the electronics module. *Supra* §§ VI.A.4, VI.E; Ex. 1006, ¶53.

F. Claim 6

171. Claim 6 depends from Claim 5 and further recites: “wherein the housing module comprises a conductive material.” As discussed for Claim 4, Kokonaski-166 discloses metal frames, which include housing 1110. *Supra* §X.D.

G. Claims 7 and 8

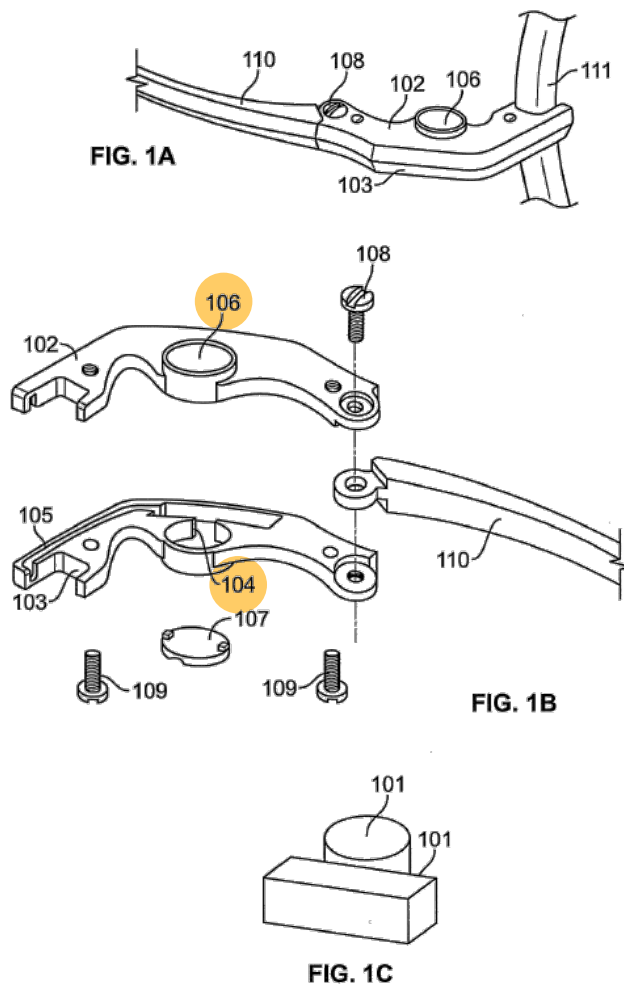
172. Claim 7 depends from Claim 1 and further recites: “wherein the electronics module is removably coupled to the housing module.” Claim 8 depends from claim 7 and further recites: “wherein the electronics module is adapted to be removed and recoupled to the housing module.” Kokonaski-166 discloses, for example, that “in the event of a malfunction of one or more of the electronic components housed within the module, the module can be replaced without having to repurchase a complete pair of new electronic eyewear” Ex. 1008, ¶98. From this disclosure, it would be obvious to a POSITA that Kokonaski-166’s electronic

module is removably coupled to a housing module and can be recoupled. Claims 7 and 8 are thus obvious.

H. Claims 9 and 11

173. Claim 9 depends from Claim 1 and recites “wherein the housing module comprises a first end, a second end, and a body disposed between the first end and the second end; wherein the first end comprises an opening; and wherein the electronics module is configured to be inserted into the opening.” Claim 11 depends from claim 9 and further recites: “wherein the electronics module is located within the body of the housing module.”

174. Kokonaski-166 discloses the limitations of claims 9 and 11. For example, a POSITA would recognize that, as shown in Figures 1A-1C, Kokonaski-166’s housing module includes a first end at the bottom of receptacle 104, a second end 106, and a body (receptacle 104) therebetween:



See Ex. 1008, Figs. 1A-1C, ¶¶20-22, 74.

175. A POSITA would also understand that Kokonaski-166 discloses that the electronics module 101 is housed in the body (receptacle 104): “The module 101 is shown housed between an upper electro-active lens frame component piece 102 and a lower electro-active lens frame component piece 103 that contains a receptacle 104 for the module 101.” *Id.*, ¶74.

I. Claim 13

176. Claim 13 depends from Claim 1 and further recites: “wherein the housing module further comprises an aperture disposed on an outer side of the housing module.” Kokonaski-166’s Figures 10-11 show a universal electronic frame component 1100 comprising a housing 1110 for holding electronic module 1000:

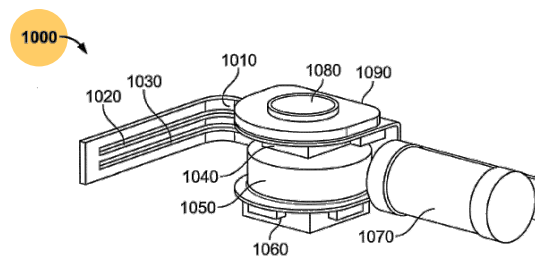


FIG. 10

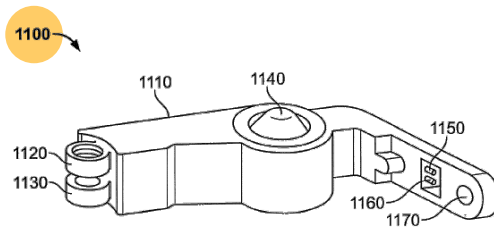


FIG. 11

Ex. 1008, Fig. 10-11, ¶¶87-88. “The top of housing 1110 has an aperture to allow a manual switch 1140 to extend outward so as to be accessed by the wearer.” *Id.*, ¶88. A POSITA would recognize that the “top” of the housing is an “outer side” because it does not face toward the wearer’s head. *Id.*, Fig. 11; *see also id.*, Fig. 6. Kokonaski-166 thus discloses claim 13.

J. Claims 14-15

177. Claim 14 depends from Claim 13 and further recites: “wherein the sensing mechanism comprises a touch sensitive switch exposed substantially through the aperture.” Claim 15 depends from Claim 14 and further recites: “wherein the touch sensitive switch is a capacitance switch.” A POSITA would understand that, in Figure 11, Kokonaski-166 discloses a switch 1140 exposed substantially through an aperture at the top of the housing 1110:

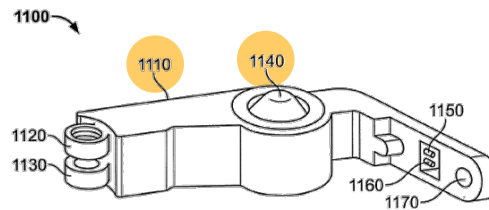


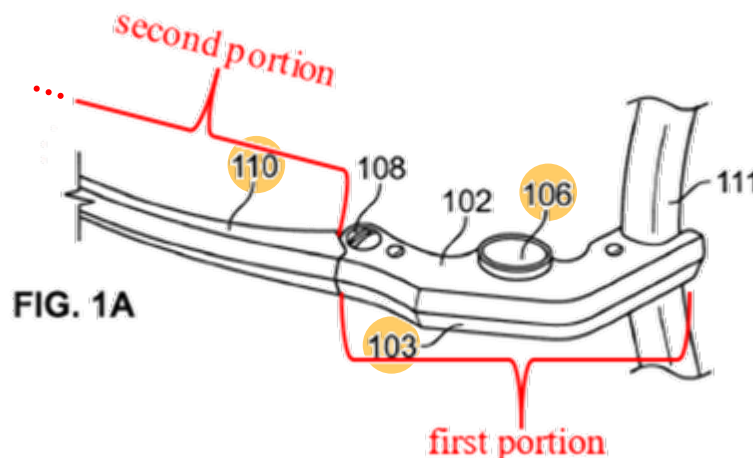
FIG. 11

Ex. 1008, Fig. 11.

178. Kokonaski-166 further discloses that the switch can be a “photo-detector, motion detector, [or] capacitive touch sensor.” *Id.*, ¶98. A POSITA would understand that the “capacitive touch sensor” disclosed in Kokonaski-166 refers to a touch sensitive capacitance switch. Thus, Kokonaski-166 discloses that its sensor can comprise a switch exposed through its frame aperture, where the switch can be a capacitance switch. Kokonaski-166 thus discloses Claims 14 and 15.

K. Claims 16-17

179. Claim 16 depends from Claim 1 and further recites: “wherein the structural member comprises the first temple.” Claim 17 depends from Claim 16 and further recites: “wherein the first temple comprises a first portion and second portion, and wherein the housing module comprises the first portion of the first temple.” A POSITA would recognize that, as shown in Figure 1A, Kokonaski-166 discloses an electronic frame piece 102 and 103 that can comprise a first portion and a temple piece 110 that can comprise a second portion of a full temple:



See Ex. 1008, Fig. 1A, ¶74. The housing module, which houses an electronic module, is located within the electronic frame piece 102 and 103 and connected to the temple piece 110 to form a full temple (the first temple). *Id.* The full temple is part of the frame of Kokonaski-166’s eyewear. *Id.*, Fig. 1A, ¶73-74. Kokonaski-166 thus discloses Claims 16 and 17.

L. Claim 18

180. Claim 18 depends from claim 1 and further recites: “wherein the housing module has a thickness that is less than or equal to approximately 0.7 mm.” As discussed in Ground 1, Claim 18 adds nothing to Claim 1 other than a range for the thickness of a side of the housing module is the result of routine optimization by a POSITA. *Supra* §VI.P.

181. Alternatively, a POSITA would have been long aware that Koknaski-166’s electronic frame piece or Howell-158’s temple (housing module) could have a thickness that is less than or equal to approximately 0.7 mm. As discussed in Ground 1, this would have been part of a POSITA’s background knowledge because, before the priority date, multiple references disclosed temples whose entire widths were less than approximately 0.7 mm thick. *Supra* §VI.P.

M. Claim 19

1. Preamble

182. The preamble recites: “A method of fabricating a device.” A POSITA would understand that Kokonaski-166 discloses methods of fabricating electronic eyeglass frames. For example, Kokonaski-166 discloses that its electronic module can be “preferably placed in a cavity” and “molded therein to form an electronic frame component[.]” Ex. 1008, ¶76.

2. 19[a][1]: device comprises a frame having first and second temples

183. Claim element 19[a][1] recites: “wherein the device comprises a frame having a first temple and second temple.” As discussed for element 1[a], this limitation is obvious over Kokonaski-166. *Supra* §X.A.1.

3. 19[a][2]: device comprises a housing module that comprises first and second ends, wherein the first end comprises an opening; housing module comprises a body between first and second ends, wherein the body comprises a cavity

184. Claim element 19[a][2] recites: wherein the device comprises “a housing module comprising: a first end and a second end, wherein the first end comprises an opening; and a body disposed between the first and second end, wherein the body comprises a cavity.” As discussed for Claim 9, this limitation is obvious over Kokonaski-166. *Supra* §X.H.

4. 19[b]: inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity

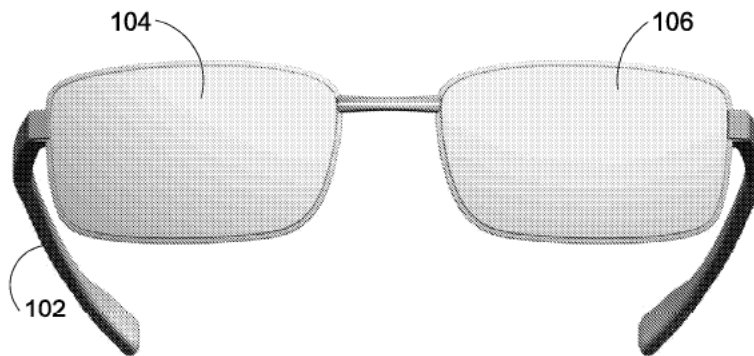
185. Claim element 19[b] recites: “wherein the method comprises inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity of the body of the housing module.” As discussed for Claims 9 and 11, this limitation is obvious over Kokonaski-166. *Supra* §X.H.

**XI. GROUND 6: KOKONASKI-999 AND HOWELL-158 RENDER
CLAIMS 1-9, 11, AND 13-19 OBVIOUS**

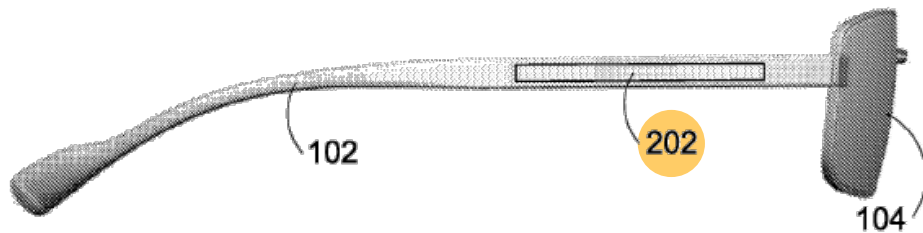
A. Claim 1

1. Preamble and 1[a]: frame comprising temples and a housing module coupled to a structural member

186. Kokonaski-999 discloses electro-active spectacle frames with two temples:



Ex. 1009, Fig. 1, ¶26; *see also id.*, ¶¶23-25, 27-36, Figs. 2, 7-13. As Figure 2 shows, an electronic module 202 “can be positioned within the frame 102 (*e.g.*, in an area or cavity of the frame 102)”:

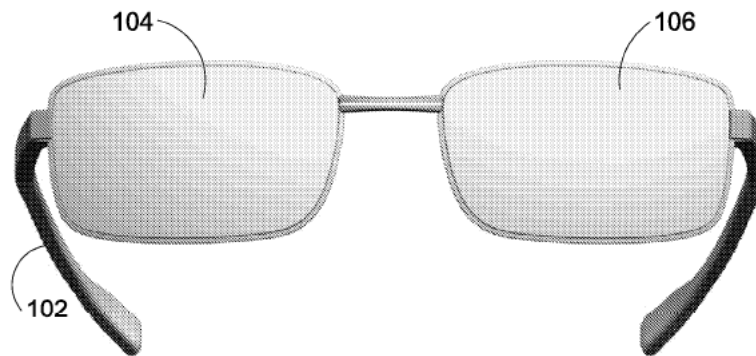


Id., Fig. 2, ¶33; *see also id.*, ¶41. The cavity within frame 102 is a housing module. A POSITA would understand that the portion of the frame (*e.g.*, a temple) that

houses the electronic module must be coupled to another portion of the frame 102 (structural member).

2. 1[b]: first and second lenses coupled to the frame

187. As shown, for example, in Figure 1 below, Kokonaski-999's eyewear has a "first lens [104] and second lens [104] coupled to the frame." A POSITA would thus understand that Kokonaski-999 discloses this limitation.



Ex. 1009, Fig. 1, ¶26.

3. 1[c]-1[d]: electronics module located within the housing module and comprising at least two of a power source, controller, and sensing mechanism

188. A POSITA would recognize that Kokonaski-999 discloses an electronic module 202 that contains a plurality of electronic components. Ex. 1009, ¶¶32, 39, 47, 49-50. For example, electronic module 202 comprises a housing 502 that "can contain the electrical components of the electronic module 202 – e.g., a processor, memory, power source, and/or a gyroscope/accelerometer." *Id.*, ¶39. Kokonaski-999 also discloses that "electronic module 202 can contain ... a press button switch,

a capacitive switch (e.g., comprising a capacitive sense pad), a toggle switch or other manual switch.” *Id.*, ¶47; *see also id.*, ¶¶49-50. As discussed for element 1[a], electronic module 202 is disposed in a cavity (housing module) in frame 102. *Supra* §XI.A.1. Thus, Kokonaski-999 discloses these limitations.

4. 1[e]: insulating layer between electronic component and frame

189. As discussed for element 1[a], Kokonaski-999 describes an electronic module 202 housed within a cavity of frame 102. *Supra* §XI.A.1.

190. Kokonaski-999 discloses frame 102 having “one or more conductive portions.” Ex. 1009 ¶32. Kokonaski-999 also discloses “conductive links embedded within any portion of the frame[.]” Ex. 1009 ¶¶24, 32. This includes the temple, or any portion of the frame housing the electronic module 202. *Id.* ¶32-33.

191. As discussed in Ground 1, Howell-158 discloses disposing an “insulating layer between the electrical components or circuit board and []metallic frames.” Ex. 1006, ¶53; *see supra* §VI.A.4. Like Kokonaski-999, Howell-158 discloses “approaches to embed an electrical component into a pair of glasses.” Ex. 1006, ¶51. For the reasons described above for Ground 1, a POSITA would have been motivated to dispose an insulating layer between the electronics module and housing module in the metal frame of Kokonaski-999 to prevent circuits from being shorted and reduce leakage current with a reasonable expectation of success in

applying Howell-158's teachings. *Supra* §VI.A.4. Claim 1 is thus obvious over Kokonaski-999 in light of Howell-158.

B. Claim 2

192. Claim 2 depends from claim 1 and further recites: "wherein the housing module comprises the insulating layer." Howell-158 discloses disposing its insulating layer within the frame, with one side of the insulating layer "sticking to the temple." *Supra* §VI.A.4; Ex. 1006, ¶53. A POSITA would understand that, in this configuration, the insulating layer could be part of the portion of the temple housing the electronic module (the housing module). Thus, Claim 2 would have been obvious.

C. Claim 3

193. Claim 3 depends from claim 2 and further recites: "wherein the electronics module comprises a conductive material." As discussed for elements 1[c]-1[d], Kokonaski-999's electronic module 202 includes a plurality of "electrical components." *Supra* §XI.A.3; Ex. 1009, ¶¶32, 39, 47, 49-50. A POSITA would know that electrical circuitry requires a conductor to function properly, and thus the electrical components disclosed in Kokonask-999 must comprise a conductive material. Kokonaski-999 thus discloses an electronics module comprising a conductive material. Claim 3 is thus obvious.

D. Claim 4

194. Claim 4 depends from Claim 1 and further recites: “wherein the housing module comprises a conductive material; and wherein the insulating layer is disposed between at least a portion of the housing module and the electronics module. Kokonaski-999 discloses “one or more conductive portions of the frame 102.” Ex. 1009, ¶32. Kokonaski-999 also discloses “conductive links embedded within any portion of the frame[.]” Ex. 1009, ¶¶24, 32. A POSITA would understand that this means that the temple, or any portion of the frame housing the electronic module 202, can comprise conductive material. *Id.*, ¶32.

195. In addition, as discussed for element 1[e], Kokonaski-999 in combination with Howell-158 disclose disposing an insulative layer between at least a portion of the housing and electronics modules. *Supra* §XI.A.4. Claim 4 is thus obvious.

E. Claim 5

196. Claim 5 depends from claim 1 and further recites: “wherein the insulating layer comprises a portion of the electronics module.” Because Howell-158 discloses that its insulating layer can have “one side sticking to the circuit board,” it would have been obvious to a POSITA to adhere Howell-158’s insulating layer to Kokonaski-999’s electrical components. A POSITA would

recognize that, in this configuration, the insulating layer would be part of the electronics module. *Supra* §§ VI.A.4, VI.E; Ex. 1006, ¶53. Claim 5 is thus obvious.

F. Claim 6

197. Claim 6 depends from claim 5 and further recites: “wherein the housing module comprises a conductive material.” As discussed for Claim 4, Kokonaski-999 discloses that frame 102 has conductive portions and embedding conductive links within the frame 102, which includes the portion housing electronic module 202 (housing module). *Supra* §XI.D. A POSITA would understand that this means that the housing module would comprise conductive material.

198. In addition, as discussed in Ground 1, it would have been obvious to a POSITA to apply Howell-158’s disclosure of metal frames to Kokonaski-999’s electro-active spectacles as it was for Howell-596’s eyewear. *Id.* Claim 6 is thus obvious.

G. Claims 7 and 8

199. Claim 7 depends from Claim 1 and further recites: “wherein the electronics module is removably coupled to the housing module.” Claim 8 depends from claim 7 and further recites: “wherein the electronics module is adapted to be removed and recoupled to the housing module.” Kokonaski-999 discloses that “the electronic module 202 can be positioned within the frame 102 (*e.g.*, in an area or

cavity of the frame 102 [housing module]) and can be removable and replaceable.”

Ex. 1009, ¶33; *id.*, ¶¶23, 41, Figs. 2, 5, 7, 9. Claims 7 and 8 are thus obvious.

H. Claims 9 and 11

200. Claim 9 depends from Claim 1 and recites “wherein the housing module comprises a first end, a second end, and a body disposed between the first end and the second end; wherein the first end comprises an opening; and wherein the electronics module is configured to be inserted into the opening.” Claim 11 depends from claim 9 and further recites: “wherein the electronics module is located within the body of the housing module.” Kokonaski-999 discloses the limitations of Claims 9 and 11. For example, as discussed for element 1[a], Kokonaski-999 discloses a frame 102 that includes a front temple with “an area or cavity” (housing module) that houses electronic module 202. *Supra* §XI.A.1. From this disclosure, it would be obvious to a POSITA that the cavity must have first and second ends at either side along its vertical axis, as well as a body disposed between the ends such that an electronic module can be placed inside.

201. Kokonaski-999 also discloses that electronic module 202 can be “inserted into the temple of the frame 102 [housing module].” Ex. 1009, ¶33. It would have been obvious to a POSITA that the electronic module 202 should be inserted into the body of the temple (housing module) via an opening at one of the

ends (the first end) to allow electronics module 202 to be inserted into the temple of frame 102.

I. Claim 13

202. Claim 13 depends from claim 1 and further recites: “wherein the housing module further comprises an aperture disposed on an outer side of the housing module.” As discussed for element 1[a], electronic module 202 is disposed in a cavity (housing module) in frame 102. *Supra* §XI.A.1. Kokonaski-999 further discloses that “[a] capacitive switch can be located on a surface of the electronic module 202 that is exposed or accessible when positioned in the frame 102 [*i.e.*, in the housing module].” Ex. 1009, ¶47. A POSITA would understand that this means the portion of the frame 102 housing the electronic module 202 (housing module) comprises an aperture such that the switch located on the surface of the electronic module 202 is exposed or accessible to a user. Claim 13 is thus obvious.

J. Claims 14-15

203. Claim 14 depends from claim 13 and further recites: “wherein the sensing mechanism comprises a touch sensitive switch exposed substantially through the aperture.” Claim 15 depends from claim 14 and further recites: “wherein the touch sensitive switch is a capacitance switch.” Kokonaski-999 discloses that “the electronic module 202 can include a switch or device to enable a user to interact with the electronic module 202.” Ex. 1009, ¶47. “The switch or device can be a

press button switch, a capacitive switch (e.g., comprising a capacitive sense pad), a toggle switch or other manual switch.” *Id.* A POSITA would understand that a “manual switch” such as a press button, sense pad, or toggle switch would be a touch sensitive switch. It would also be obvious to a POSITA that the touch sensitive switch can comprise the sensing mechanism of Kokonaski-999’s electronic module.

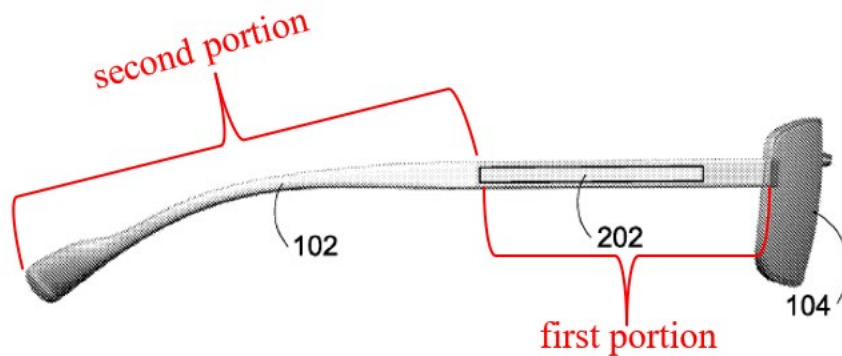
204. Kokonaski-999 further discloses that “[a] capacitive switch can be located on a surface of the electronic module 202 that is exposed or accessible when positioned in the frame 102.” *Id.*, ¶47. As discussed for Claim 13, a POSITA would understand that this means that the housing module contains an aperture for the switch. *Supra* §XI.I.

205. It would have been obvious to a POSITA that the capacitive switch comprising a capacitive sense pad disclosed in Kokonaski-999 would be a touch sensitive capacitance switch. Thus, Kokonaski-999 discloses that its capacitive sense pad (sensing mechanism) comprises a switch exposed through its frame aperture, where the switch can be a capacitance switch. Kokonaski-999 thus discloses Claims 14 and 15.

K. Claims 16-17

206. Claim 16 depends from claim 1 and further recites: “wherein the structural member comprises the first temple.” Claim 17 depends from claim 16 and further recites: “wherein the first temple comprises a first portion and second

portion, and wherein the housing module comprises the first portion of the first temple.” A POSITA would understand that, as shown in Figure 1, Kokonask-999 discloses that the electronic module 202 is housed within a front temple (first portion) of the frame of electro-active spectacles 100, which is coupled to the remainder of the temple (second portion):



Ex. 1009, Fig. 2, ¶33; *see also id.*, Fig. 3, ¶37; *supra* §XI.A.1. Claims 16 and 17 are thus obvious.

L. Claim 18

207. Claim 18 depends from claim 1 and further recites: “wherein the housing module has a thickness that is less than or equal to approximately 0.7 mm.” As discussed in Ground 1, Claim 18 adds nothing to Claim 1 other than a range for the thickness of a side of the housing module is the result of routine optimization. *Supra* §VI.P.

208. Alternatively, POSITAs would have been long aware that Koknaski-999's cavity within a temple of frame 102 (housing module) should have a thickness that is less than or equal to approximately 0.7 mm. As discussed in Ground 1, this would have been part of a POSITA's background knowledge for the reasons discussed, including because before the priority date, multiple references disclosed temples whose entire widths were less than approximately 0.7 mm thick. *Supra* §VI.P.

M. Claim 19

1. Preamble

209. The preamble recites: "A method of fabricating a device." A POSITA would understand that Kokonaski-999 discloses methods of fabricating electronic eyeglass frames. For example, Kokonaski-999 discloses that "[t]he electronic module 202 can be positioned within the frame 102 (*e.g.*, in an area or cavity of the frame 102 The electronic module 202, when inserted into the temple of the frame 102, can be flush with the other portions of the frame 102." Ex. 1009, ¶33. Kokonaski-999 also describes steps for making the electronic eyeglass frames. *See, e.g., id.*, ¶32 ("[The electrical] components can be grouped together[.]"); Fig. 8, ¶68 ("[T]he frame 700 can be assembled by connecting the upper conducting member 712, the insulating member 715 and the lower conducting member 714 to the upper rim portion 702 and the lower rim portion 704."). Thus, it would be obvious to a

POSITA that the disclosure in Kokonaski-999 includes a method of fabricating the electronic eyewear.

2. 19[a][1]: device comprises a frame having first and second temples

210. Claim element 19[a][1] recites: “wherein the device comprises a frame having a first temple and second temple.” As discussed for element 1[a], Kokonaski-999 discloses this limitation. *Supra* §XI.A.1.

3. 19[a][2]: device comprises a housing module that comprises first and second ends, wherein the first end comprises an opening; housing module comprises a body between first and second ends, wherein the body comprises a cavity

211. Claim element 19[a][2][A] recites: wherein the device comprises “a housing module comprising: a first end and a second end, wherein the first end comprises an opening.” As discussed for claim 9, Kokonaski-999 discloses this limitation or the limitation is rendered obvious. *Supra* §XI.H.

4. 19[b]: inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity

212. Claim element 19[b] recites: “wherein the method comprises inserting an electronics module into the opening of the first end of the housing module such that the electronics module is disposed in the cavity of the body of the housing module.” As discussed for Claims 9 and 11, this limitation is obvious over Kokonaski-999. *Supra* §XI.H.

XII. CONCLUSION

For the foregoing reasons, it is my opinion that the claims of the '541 patent would have been obvious in view of the prior art discussed above and the knowledge of one of ordinary skill in the art at the time of the alleged invention.

I reserve the right to supplement my opinions in the future to respond to any arguments or positions that the patent owner may raise, taking account of new information as it becomes available to me.

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 further that these statements were made with the 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.

June 18, 2024


John Feland, Ph.D.