

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BIO IMAGING SAS d/b/a VILBER,

Petitioner,

v.

SPECTRAL INSTRUMENTS IMAGING, LLC

Patent Owner.

Case _____

IPR

EXPERT DECLARATION OF JOSEPH JOHN TALGHADER, Ph.D.

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I. BACKGROUND

I, Prof. Joseph John Talghader, declare as follows:

1. I am over the age of 21 years and am fully competent to make this Declaration. I make the following statements based on personal knowledge and, if called to testify to them, could and would do so.

2. I have been retained on behalf of Schwegman, Lundberg, & Woessner, P.A., counsel for Petitioner Bio Imaging SAS d/b/a Vilber (“Vilber”), to prepare a declaration that will be used to support its petition for an *inter partes* review of U.S. Pat. 8,901,516 (referred to as the “’516 Patent” or EX1001), and to opine on various topics, including: (1) an overview of the technology related to U.S. Patent 8,901,516 (the “’516 patent” or EX1001), the challenged patent in this proceeding; (2) the level of ordinary skill in the art; and (3) the patentability of claims 1-27 (the Challenged Claims) of the ’516 patent.

3. In particular, I have been asked to provide an analysis of the scope and content of the ’516 patent relative to the prior art at the time of the ’516 patent’s filing. I have been asked to use the filing date of the provisional patent leading up to the ’516 patent for purposes of this declaration, which is Sep. 1, 2010.

4. My fee is not contingent on the outcome of any matter or on any of the technical positions that I explain in this declaration. I have no financial interest in Vilber or the ’516 patent.

5. My opinions are from the perspective of a person having ordinary skill in this art at the time of the alleged invention of the '516 patent (a "POSA").

6. If asked to give my sworn testimony in a deposition regarding the contents of this declaration, I will do so.

7. I reserve the right to supplement my opinions in the future, to clarify responses where appropriate, and to take into account new information as it becomes available to me.

II. QUALIFICATIONS

8. I am currently a Full Professor of Electrical and Computer Engineering at the University of Minnesota, Department of Electrical and Computer Engineering, in Minneapolis, Minnesota.

9. A copy of my Curriculum Vitae is being filed (EX1003) and includes details of my education, professional, and employment credentials. Further relevant experience, including, but not limited to, the design of lighting systems for medical imaging is set forth below.

10. I received my Bachelor of Science in electrical engineering from Rice University in 1988. I attended the University of California at Berkeley for graduate studies where I earned a Master of Science degree in 1993 and a Ph.D. in 1995 from

the Department of Electrical Engineering and Computer Sciences. I was awarded an NSF Graduate Fellowship for my graduate studies. My doctoral thesis related to semiconductor lasers.

11. I worked for Texas Instruments as a Process Development Engineer, investigating EEPROM memory design and reliability issues in 1988 and from 1992 to 1993.

12. Following my graduation from Berkeley in 1995, I worked for Waferscale Integration, where I developed microfabrication processes for high-density nonvolatile memory devices.

13. In 1997 I joined the faculty at the University of Minnesota as an Assistant Professor and was promoted to Associate Professor in 2003. In 2008 I was promoted to Full Professor in the Department of Electrical and Computer Engineering of the University of Minnesota.

14. I have taught classes on several engineering topics, such as Introduction to Modern Optics, Infrared Physics and Technology, Optical Electronics, Introduction to Microsystems Technology, Optical Fiber Communication, Advanced MOS Devices, Semiconductor Properties, Semiconductor Devices,

Advanced Semiconductor Devices, Quantum Electronics, Transmission Lines (Electromagnetism), and Linear Systems and Circuits.

15. I have extensive experience in the study and design of light emitting devices (including light emitting diodes, computer and other displays, semiconductor and other types of lasers, and incandescent lights), optics, optical and infrared materials, optical and infrared detectors and focal plane arrays, optical coatings, optical filters, optical diffusers, photovoltaic and solar cells devices, and directed energy component technologies. I have experience in research using lasers to study laser-induced material breakdown. I have performed research on multispectral thermal detectors and heat transfer devices. I have also worked on projects involving the scanning of biological samples, including fluorescent imaging.

16. I have consulted in the following industries: light emitting diode design for tissue oxygenation sensing, computer and other displays regarding blue light emission and toxicity, micromechanical devices for biosensing, microelectronics packaging, microelectronics assembly, and fiber optic telecommunications.

17. I am named as an inventor on 8 issued U.S. patents. I am also named as an inventor on other patent application publications. A list of issued U.S. patents naming me as an inventor is found in my Curriculum Vitae. (EX1003).

18. In 2022 I was retained by Perry and Perry, LLP to provide a report on claim construction for the '516 patent, the relevant prior art, and how the claims would be considered by a person of ordinary skill in the art in a litigation styled *Spectral Instruments Imaging, LLC vs. Scintica, Inc.*, No. 4:22-cv-00043 (the "Spectral Litigation"). I was deposed on my report and my report and deposition transcript are attached to this declaration being filed in this proceeding. See, EX1030, EX1032.

19. The opinions expressed in this declaration are mine and they were developed after studying the '516 Patent, and related documents such as the prior art publications referenced in the file history and in this document.

III. RELEVANT FIELD AND LEVEL OF ORDINARY SKILL IN THE ART

20. In the course of my analysis and the formulation of my opinion, I have reviewed numerous documents produced in this case as well as reviewed publicly available information deemed pertinent. My opinions and analyses are presented

herein and are based on my independent examination of information, and my professional experience. I reviewed and considered all the exhibits and prior art references I discuss in this Declaration.

21. I reserve the right to revise or expand these opinions in the future.

22. A POSA should have an understanding of light sources, structures for holding and electrically connecting the light sources, optical devices such as filters and diffusers, cameras, and control systems to operate the light sources. A POSA would have at least a bachelor's degree in engineering or physics and about two years of experience in imaging systems or studies or research relating to light sources used in imaging systems. Additional education may supplement practical experience and additional practical experience may supplement education

23. Based on my experience described above and contained in my C.V., I have an established understanding of the relevant field in the relevant timeframe, and the knowledge a person of ordinary skill in the art would have in the relevant field during the relevant timeframe under both definitions.

IV. MATERIALS REVIEWED / UNDERSTANDING APPLIED TO THE ANALYSIS

24. I have reviewed all of the claims (1-27) of the '516 patent, as well as the provisional and parts of its file history. I have reviewed the relevant prior art references cited in the '516 patent and its prosecution history. I will use the exhibit numbers listed in the "Petitioner's List of Exhibits" from the Petition. For ease of reference, I have copied Petitioner's exhibit numbers. The list of documents reviewed is in Appendix B.

25. I have no formal legal education and am not a lawyer. I was asked to serve as an expert on behalf of Scintica, Inc. in the case "*Spectral Instruments Imaging, Inc. v. Scintica, Inc.*" [cite], (the "Spectral Litigation"). In the Spectral Litigation I gave the court my opinions on the claims of the '516 patent as a technical expert on October 17, 2022 (the "Expert Report"). I was deposed on that Expert Report by Patent Owner's counsel on December 16, 2022 and that deposition transcript has been included in the Petition filing as EX1032.

26. I reviewed the claim construction section of the Petition, and of my Expert Report, and I believe both are consistent with how a POSA would understand the claims. I used those same constructions for the analysis presented in this declaration and for all other terms I applied the ordinary and customary meaning of the terms as understood by one of ordinary skill in the art in light of the description

of the patent and the prosecution history pertaining to the patent. I reserve the right to supplement my declaration should any claim terms be given different constructions and upon further reflection and understanding of the present subject matter over the course of this proceeding.

27. I understand that a claim is anticipated if a single prior art reference discloses each and every limitation of the claimed invention.

28. I understand that a patent claim may be unpatentable for obviousness if the difference between the claimed subject matter and the prior art is such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. I understand that a finding of obviousness requires a determination of: (1) the scope and content of the prior art; (2) the difference(s) between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) whether the differences are such that the claimed invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made.

29. A combination of old familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Predictable variations of a work from one field are likely to be obvious, even if the variation is

in another field. Similarly, where a technique has been used to improve a device, use of the same technique to improve similar devices is likely obvious. If there existed at the time of invention a known problem for which there was an obvious solution, a patent claim encompassing that solution is not patentable.

30. It is my understanding that the obviousness inquiry is not limited to just the prior art references being applied, but includes the knowledge and understanding of one of ordinary skill in the art.

31. However, I understand that merely demonstrating that each element, independently, was known in the prior art is, by itself, insufficient to establish a claim was obvious. I understand that the test for obviousness is not whether the features of one reference can be incorporated into the structure of another reference, but rather what the combined teachings would have suggested to those of ordinary skill in the art. I further understand that a party seeking to invalidate a patent must show that a person of ordinary skill in the art would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.

32. It is my understanding that each prior art reference must be considered as a whole, including the portions that would lead away from the claimed invention. I have been informed that courts find that some prior art combinations are improper,

or not combinable. In order for a reference to be used to show obviousness, the reference must be analogous art to the claimed invention. That is, it must be from the same field of endeavor or be reasonably pertinent to the problem – logically attracting the attention of a POSA in considering his or her problem. I also understand that when (1) the combination of prior art references teach away from the claimed invention or from each other, (2) the combination makes one invention unsatisfactory for its intended purpose, or (3) when the combination would change the principle of operation of prior art reference, such a combination is improper and does not show obviousness.

33. I also understand that where one or more references in combination teach or disclose a given claim element, there is no motivation to look to an additional reference for that element.

34. I understand that the obviousness analysis also includes contextual considerations, factors usually referred to as "secondary considerations" or "secondary indicia of nonobviousness." Objective evidence of nonobviousness includes copying, long felt but unsolved need, failure of others, commercial success, unexpected results created by the claimed invention, unexpected properties of the claimed invention, licenses showing industry respect for the invention, and

skepticism of skilled artisans before the invention. In general, there must be a connection between the factor and the claimed invention. For instance, the "commercial success" of a product practicing the claimed invention is relevant to the obviousness analysis only if it is attributable to advantages from its use that were not available to the purchasing public before the invention was made.

35. Although the following analysis cites to particular pages, lines, or paragraphs of many of the references discussed, these citations are intended to assist in understanding the various bases of, and prior art teachings used in, my conclusions. They are not intended to be an exhaustive recitation of every page, line number, or paragraph in which these teachings may be found. Similar teachings or disclosures may be found at other pages, lines, or paragraphs, as well as in other references, and it is to be understood that my opinions and statements are made in view of all of the references and teachings I have reviewed.

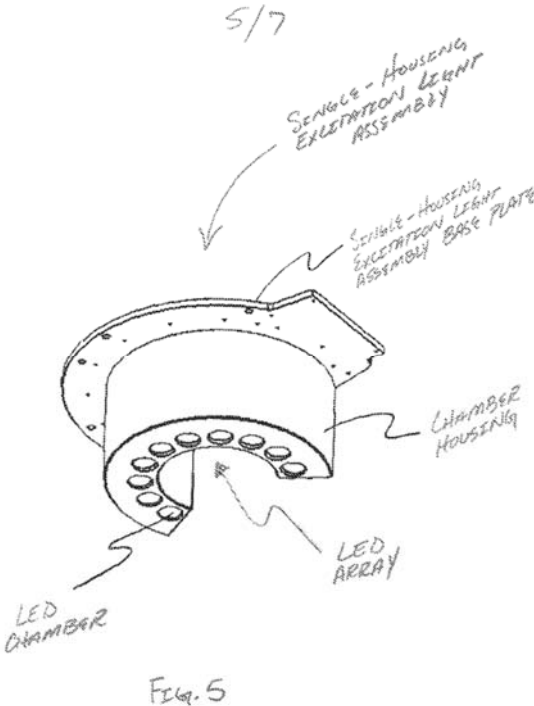
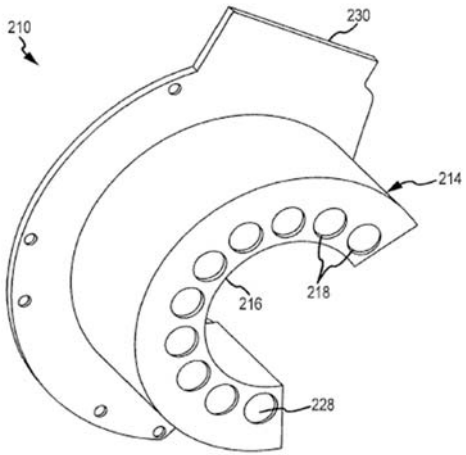
V. THE PROVISIONAL APPLICATION

36. The first page of the '516 patent states that it was filed on August 31, 2011, and that it claims the benefit of a Provisional patent application No. 61/379,282, filed on September 1, 2010 (the "Provisional Application," EX1005).

37. The Provisional Application has 28 numbered paragraphs, several unnumbered photos, and 7 numbered, hand-annotated figures. In contrast, the '516 patent has 71 numbered paragraphs, no unnumbered photos, and 13 numbered figures that appear to be typed and are not hand-annotated. EX1005, pp.6-43.

38. The '516 patent refers to “lamp receptacles 18” in a “housing or main body member 14” and “light sources or lamps 20” (see, for example, '516 patent, 3:26-30), but the Provisional Application does not appear to use the term “lamp receptacles” and instead refers to “elongated holes” in its “C”-shaped housing of its excitation light source assembly. EX1005, p.6, ¶0002, and generally throughout pp.6-43.

39. The Provisional Application states: “the **single housing** of the excitation light source assembly can be used to produce excitation light having wavelengths across any desired band.” EX1005, ¶0020 (bolding added); FIGS. 2-7 (referencing a “**single-housing** excitation light assembly”) (bolding added). FIG. 5 illustrates a C-shaped single-housing assembly for comparison to the C-shaped third embodiment of the '516 patent in FIG. 12:

5/7  Provisional Application (EX1005) FIG. 5 – “C”-shaped Single - Housing Excitation Light Assembly	 ’516 Patent (EX1001) FIG. 12 - “C”-Shaped Housing or Main Body 214
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40. The Provisional Application mentions LEDs “that emit light in various narrow wavelength bands (e.g., bands having widths of about 30-35 nm) are available.” EX1005, ¶0022. It notes that “suitable LEDs that emit or produce light

in each of the desired wavelength bands may not be available.” And if they are not available “it may be necessary to use broader-band LEDs, i.e., that emit light having wavelengths outside the desired wavelength range” and that “such LEDs or broad-band light sources may be used in combination with a filter element to filter or remove the undesired wavelengths, as will be described in greater detail below.” *Id.*

41. The Provisional Application thereafter references filters to remove undesired wavelengths, “such as a ‘notch’ type filter having a relatively narrow wavelength bandpass range of about 30 nm.” EX1005, ¶0026.

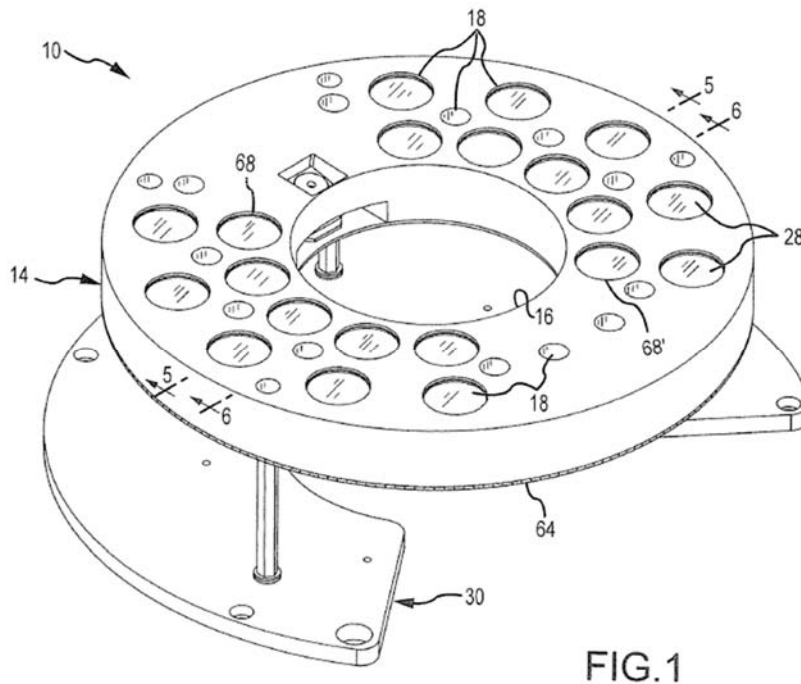
42. A POSA would interpret the Provisional Application’s reference to “broader-band LEDs” and “such LEDs or broad-band light sources” used in combination with a filter element to be references to light sources that have “wavelengths outside the desired wavelength range,” and which are filtered to obtain light within a desired wavelength range. A POSA would understand that the resulting illumination from such sources and filter elements would be narrow-band illumination referred to in the ‘516 patent.

VI. THE '516 PATENT

A. Components of an Imaging System of the '516 Patent

1. Components of Imaging System 12

43. The '516 patent, "Excitation Light Source Assembly," relates to a component 10 (FIG. 1) inside an imaging system 12, which is used to shine light onto an object or specimen on a platform or stage 60 to perform fluorescence imaging. EX1001, 2:49-54, 3:24-39; FIGS. 1-2.



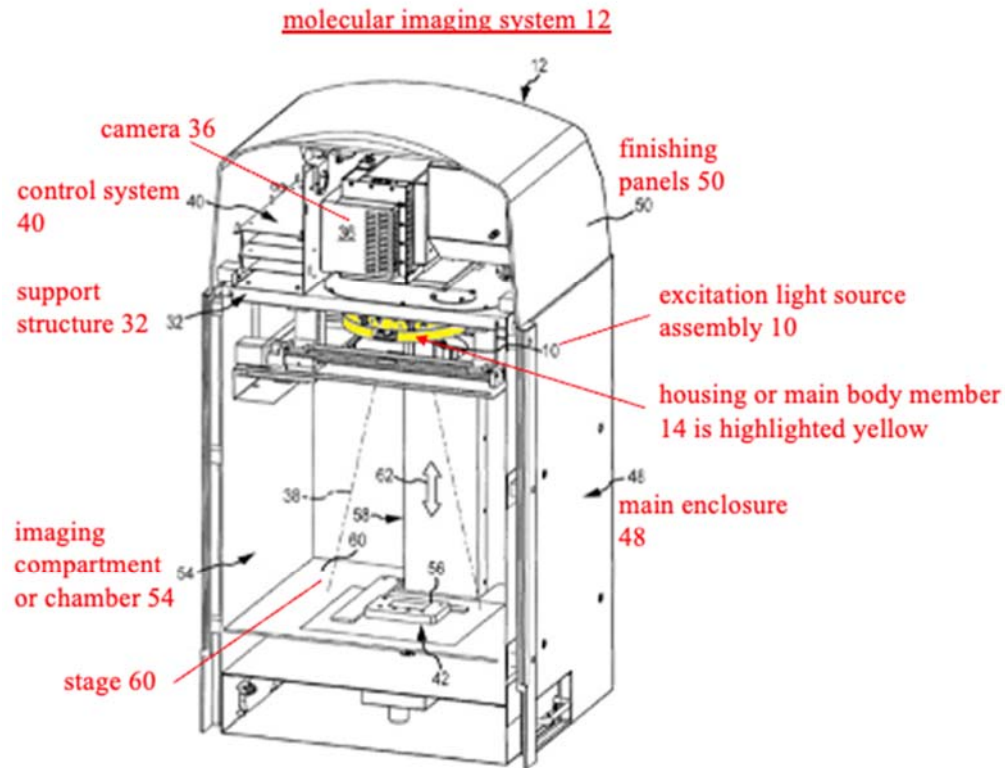
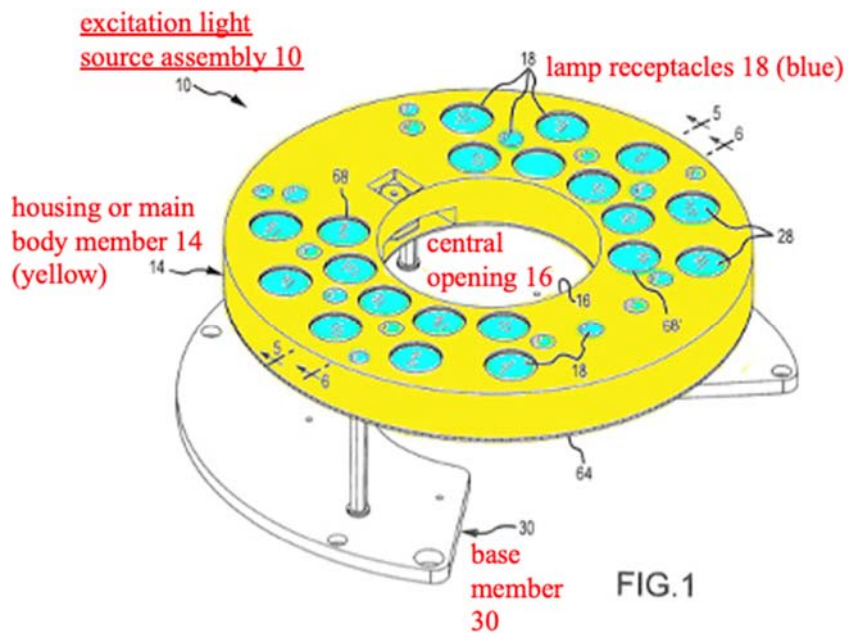


FIG.2

44. The excitation light source assembly 10 includes a housing or main body member 14 (highlighted yellow) defining a central opening 16 and a number of lamp receptacles 18 (blue). The base member 30 of the excitation light source assembly 10 is mounted to support structure 32 inside main enclosure 48, so that the lens assembly 34 of camera 36 is substantially aligned (i.e., concentric) with central opening 16 of a main body 14 of excitation light source assembly 10. EX1001, 4:20-34.



'516 Patent FIG. 1 (annotated)

45. The objects or specimens illuminated with light may respond by fluorescing, and the fluorescent emissions from the objects or specimens are recorded by camera 36. EX1001, 6:11-28. FIG. 2 shows a well plate 56 for samples. The '516 patent states "[o]ther types of objects or specimens 42 may be imaged for other purposes." EX1001, 6:10-17.

46. FIG. 2 shows an imaging system 12 having a main enclosure 48 which may have various finish panels 50 that cover the main enclosure structure 48. EX1001, 5:59-64. The main enclosure 48 may be provided with an access door 52,

as shown in FIG. 4. The main enclosure 48 with its access door 52 defines the imaging compartment or chamber 54. EX1001, 6:3-8.

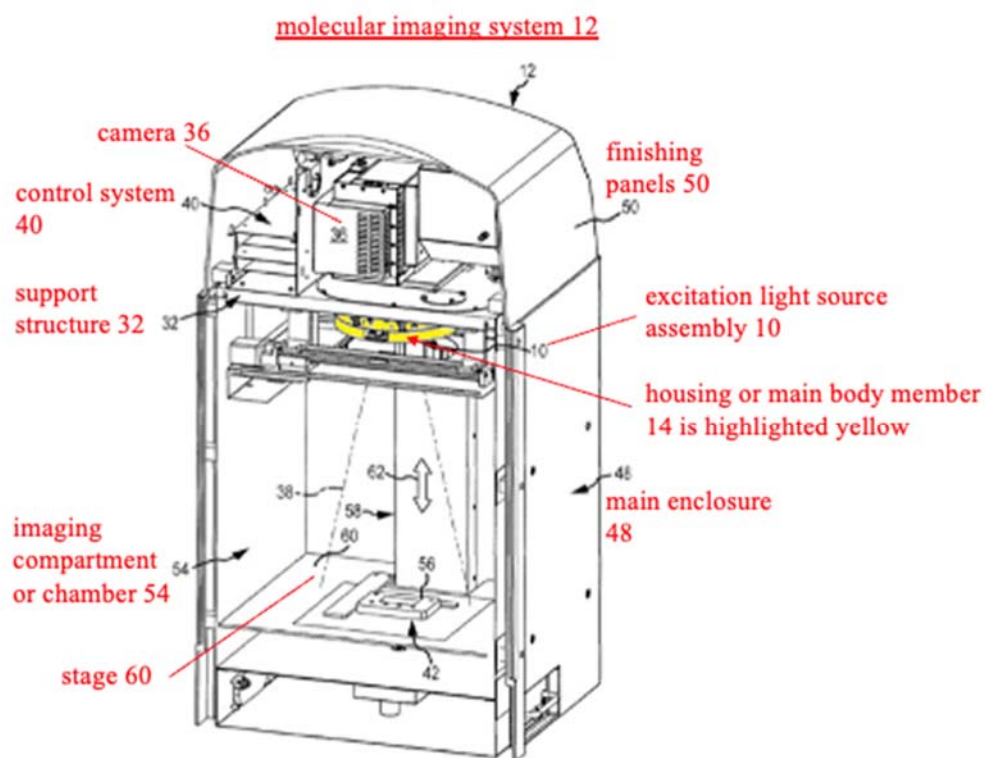


FIG.2

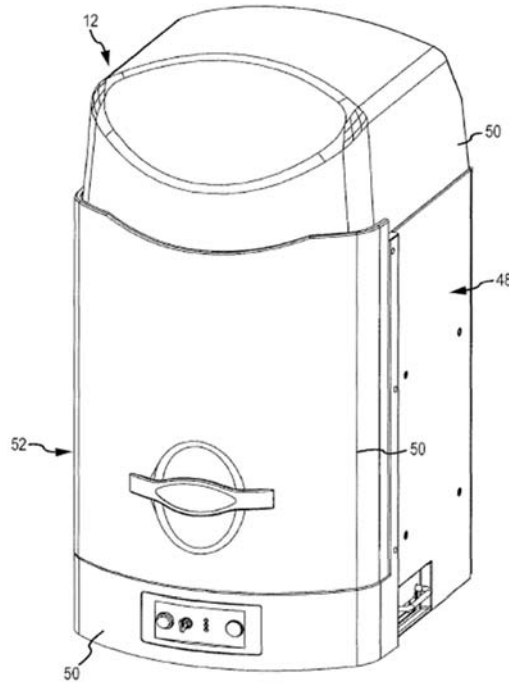
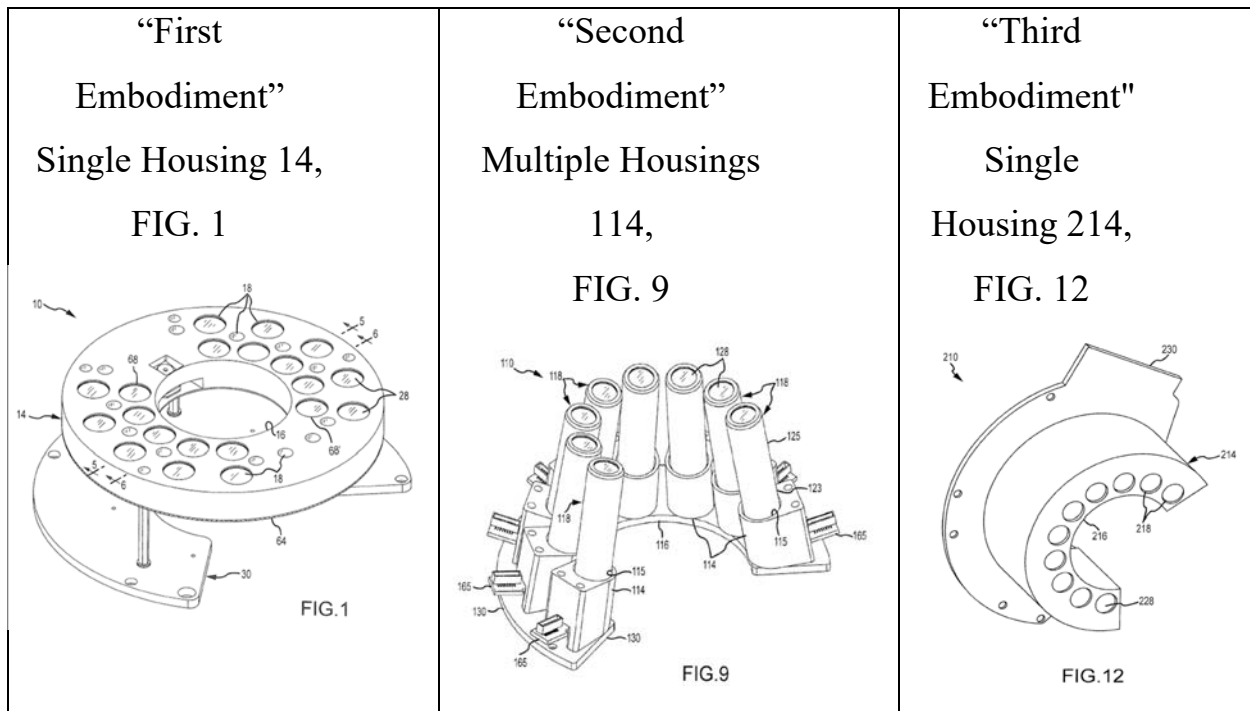


FIG.4

'516 Patent FIGS. 2 (annotated) and 4

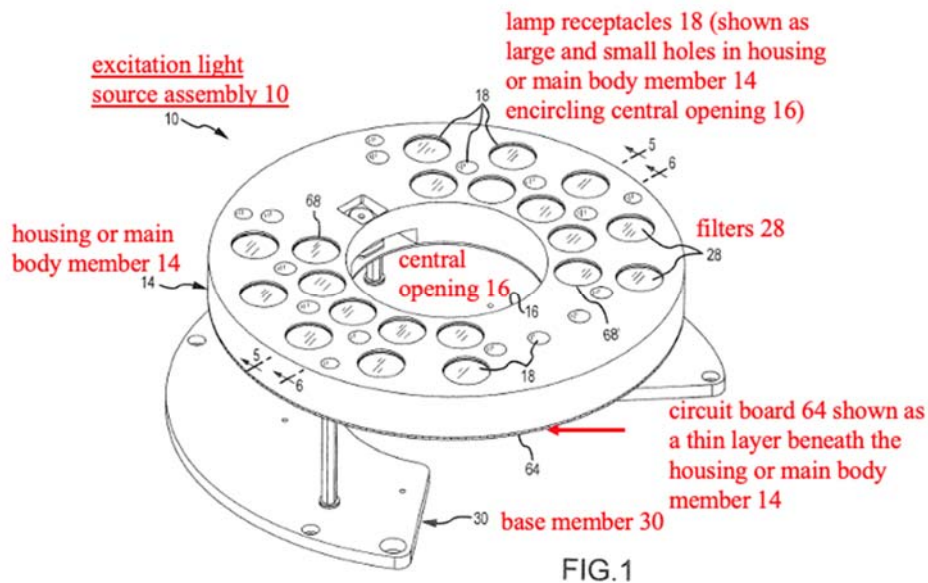
47. In addition to main enclosure 48, molecular imaging system 12 includes a camera 36, a control system 40, and an excitation light source assembly 10 for applying excitation illumination to an object or specimen or other things on stage 60. EX1001, 6:10-17. FIG. 2 shows a well plate 56 which may contain an object to be imaged. *Id.*

48. The '516 patent identifies three excitation light source assembly embodiments 10, 110, and 210, each having different housing designs 14, 114, and 214, which will be discussed in the following paragraphs.



2. Excitation Light Source Assembly 10 (“first embodiment”)

49. FIGS. 1, 5, and 6 of the '516 patent show a “first embodiment”¹ of an excitation light source assembly 10, having a housing or main body member 14 with a central opening 16 and a plurality of lamp receptacles 18. Annotated FIG. 1 identifies the various numbered components of excitation light source assembly.



'516 Patent FIG. 1 (annotated)

¹ The '516 patent references the excitation light source assembly 10 of FIGS. 1, 5, and 6 as the “first embodiment.” EX1001, 11:9, 11:26, 11:31.

50. Annotated FIG. 1 shows the housing or main body member 14 has a central opening 16 and a plurality of holes 18 in the housing or main body member 14 called “lamp receptacles 18” that may receive light sources.

51. The '516 patent states “[t]he various light sources 20, e.g., comprising narrow-band light sources 22 and broad-band light sources 24 may be mounted to circuit board 64, which, in turn, may be mounted or affixed to the main body 14, as best seen in FIGS. 1, 5, and 6.” EX1001, 7:55-59. The '516 patent further states: “...the housing or main body member 14 of the excitation light source assembly 10 may be mounted to a base member 30 that, in turn, may be mounted to a suitable support structure 32 associated with the imaging system 12.” EX1001, 4: 22-25. Thus, the housing or main body member 14 is distinct from the light sources 20, the circuit board 64, the base member 30, the support structure 32, and the imaging system 12.

52. Annotated FIGS. 5 and 6 show cross sections along cut lines 5-5 and 6-6 of FIG. 1, respectively. They demonstrate that the large hole receptacles 18 can receive narrow-band light sources 22 and the small hole receptacles 18 can receive broad-band light sources 24.

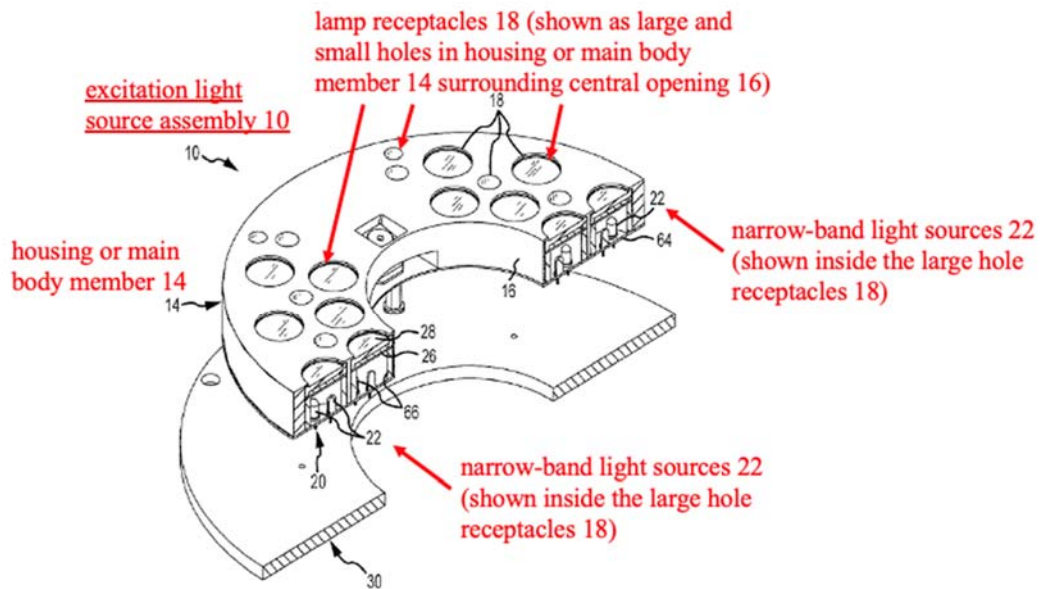


FIG.5

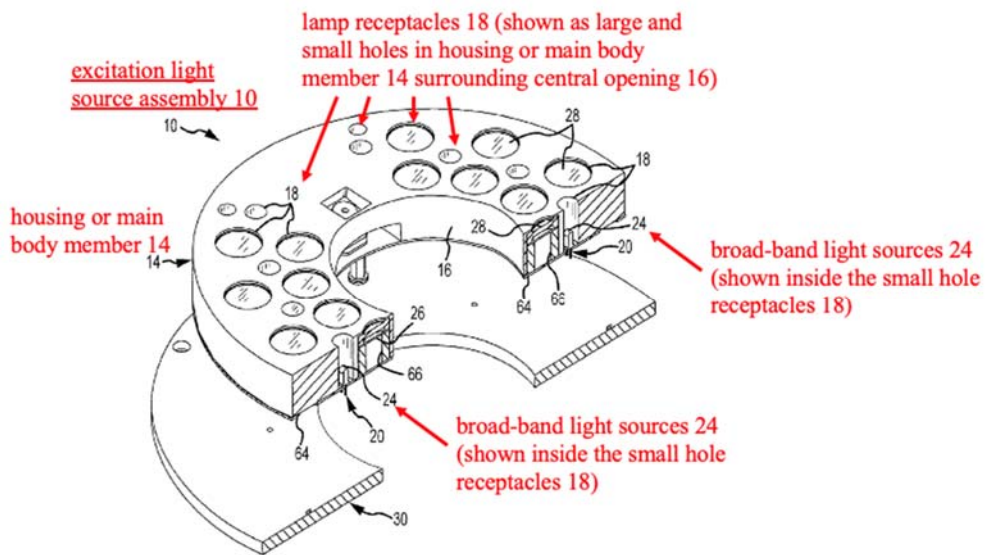


FIG.6

'516 Patent FIGS. 5 and 6 (annotated)

53. The '516 patent states “[e]ach narrow-band light source 22 may comprise a light emitting diode (LED) that emits light in the desired wavelength band, and ideally, with the desired bandwidth (e.g., of about 30-35 nm).” EX1001, 8:66-9:2. It further states that LEDs having such narrow bandwidths are “readily commercially available and can be used as the narrow-band sources 22.” EX1001, 9:2-6.

54. A POSA would agree with the '516 patent's statement that LEDs having a FWHM of about 30-35 nm in the ranges of wavelength of about 400 nm to about 900 nm were readily commercially available before 2010. The prior art literature confirms this. For example, Hart et al. reference (2002) LED bandwidths of FWHM “between 10 nm and 50 nm or more.” EX1050, p.1694. That was in 2002 and LED technology improved over the years leading up to 2010. Another example is from U.S. Patent No. 7,381,972 (filed in 2006), which references LEDs having a FWHM of 25 nm. EX1049, 8:58-59.

55. The '516 patent does not state which method it applies to determine bandwidth. There are different ways to measure bandwidth. For example, one way to measure bandwidth is to take the full width of an LED's spectral intensity peak at half the peak (abbreviated FWHM). A closely related alternative is to measure the

half width (HWHM). Another way to measure bandwidth includes, for near-Gaussian curves, measuring the half-width between the points where the spectral intensity curve is at $1/e^2$ of its peak intensity, where e is the base for natural logarithms, $e = 2.718\dots$. The width of spectral peaks can also be measured using the width of a rectangle having a height of the peak intensity that provides equal area to the spectral intensity curve. Other ways are possible as well, but all of these methods give answers for well-behaved spectra (such as those emitted by high quality LEDs) that vary by only a relatively small factor.

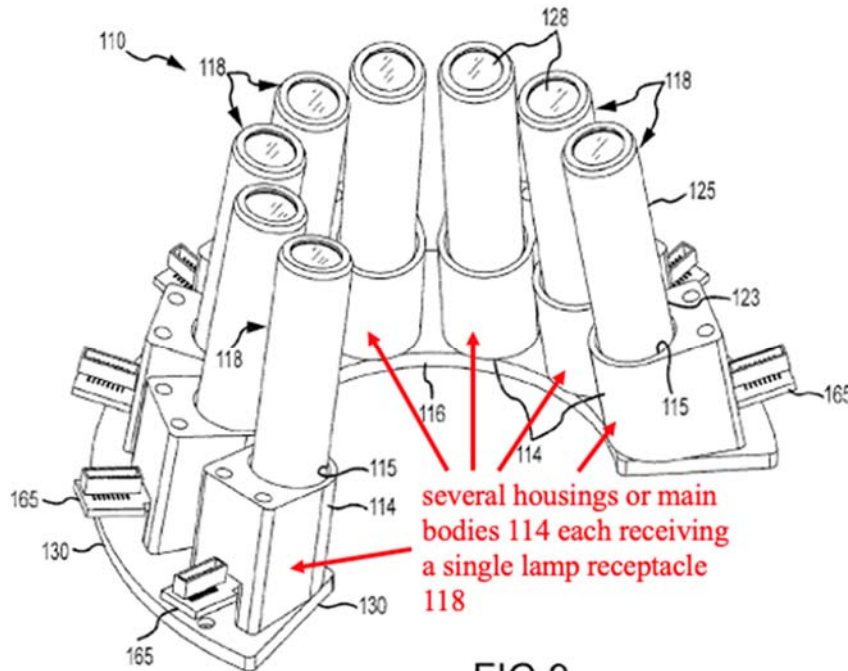
56. Bandwidth measurements can vary depending on the shape of the spectral peak of the light. Thus, different methods of measuring bandwidth can produce different bandwidth measurements.

3. Excitation Light Source Assembly 110 (“second embodiment”)

57. FIG. 9 shows a “second embodiment”² of an excitation light source assembly 110 which shows a plurality of housings or main bodies 114. Each main

² The '516 patent references the excitation light source assembly 110 of FIGS. 9,- 11 as the “second embodiment.” EX1001, 3:3-11, 11:6-10, 11:20, 11:32.

body 114 is connected to base member 130 and receives a single lamp receptacle

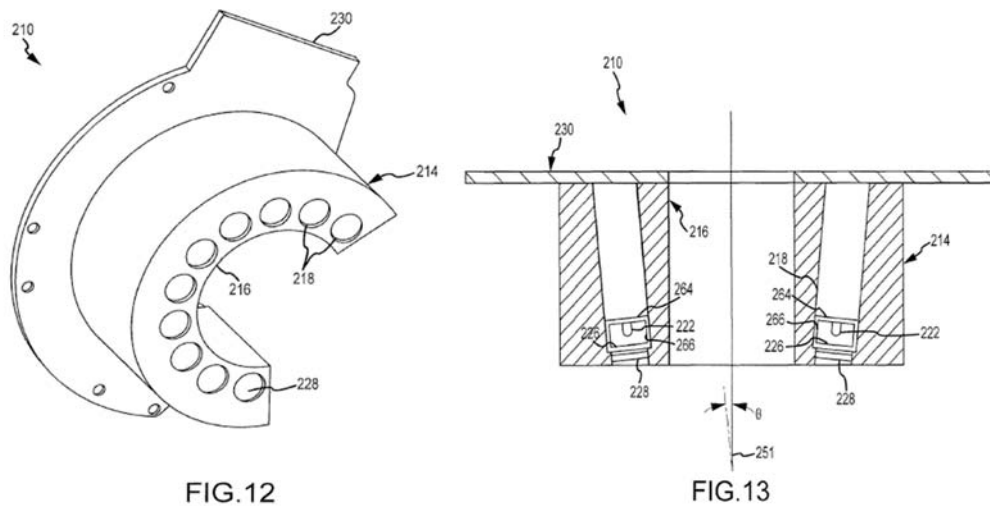


11.

58. The patent owner appears to have used a labeling convention for the second embodiment that appends a “1” to the numbers used in the first embodiment. Therefore, base member 30 in the first embodiment is labeled “130” in the second embodiment, and a diffuser of the first embodiment is labeled “26” and it is labeled “126” in the second embodiment, etc. I did not find any references to broad-band light sources labeled “124.” I was also unable to find a disclosure of a broad-band light source used in the housings 114 of the second embodiment.

4. Excitation Light Source Assembly 210 (“third embodiment”)

59. FIGS 12-13 show a “third embodiment”³ of an excitation light source assembly 210, having a housing or main body member 214 with a central opening 216 and a plurality of lamp receptacles 218. FIGS. 12-13 identify the various numbered components of excitation light source assembly 210.



³ The '516 patent references the excitation light source assembly 210 of FIGS. 12-13 as the “third embodiment.” EX1001, 3:12-15, 12:41-45.

B. Emitted Light Images Compared to Reflected Light Images

60. The '516 patent distinguishes emitted light images from reflected light images in molecular imaging systems. EX1001, 1:20-53. It states: “[t]he light emitted from an object or specimen may be generated by a bio-luminescence process, a fluorescence process, or by a combination thereof.” EX1001, 1:27-29. It explains that “a reflected light image is often combined with emitted light images to form a single, composite image.” EX1001, 1:32-34.

61. The '516 patent states “[a] significant advantage of the excitation light source assembly of the **present invention** is that it may be used **to illuminate an object or a specimen with light in multiple narrow bands or colors**, thereby allowing a **single excitation light source assembly** to be used in imaging applications involving a wide range of fluorescent materials that are excited over a wide range of wavelengths.” EX1001, 5:4-10 (bolding added). It characterizes generating fluorescence from narrow-band illumination differently from “**broad-band illumination** [that] allows for the ready capture of **conventional reflected light images of the object or specimen**.” EX1001, 5:14-18 (bolding added).

62. Thus, the '516 patent associates *narrow-band illumination* with excitation illumination for generating a fluorescence in the object or specimen which

can be captured with an imaging system or camera, and it associates *broad-band illumination* with light used to capture conventional reflected light images of an object or specimen (such as reflected light images captured by conventional photographic devices). The '516 patent also refers to such broad-band illumination as “white light.” EX1001, 4:6-11.

VII. GROUNDS OF UNPATENTABILITY

Ground 1: Claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25 are anticipated by Olympus.

Ground 2: Claims 2, 5, and 20 are obvious in view of Olympus.

Ground 3: Claims 6, 10-12, 18, 21, 22, and 26 are obvious in view of Olympus and Frangioni.

Ground 4: Claims 8, 13, 19, and 27 are obvious in view of Olympus and Hansen and/or Malmros.

Ground 5: Claim 24 is obvious in view of Olympus and Brydegaard.

Ground 6: Claims 1-23 and 25-26 are obvious in view of GBox and Olympus.

Ground 7: Claim 24 is obvious in view of GBox, Olympus, and Brydegaard.

VIII. CLAIM CONSTRUCTION

63. I have been told that the Board will construe only the necessary claims in an inter partes review. My claim construction arguments and findings are attached to this Declaration as Appendix C; however, I do not believe these constructions are necessary to find the claims unpatentable.

IX. SUMMARY OF THE PRIOR ART

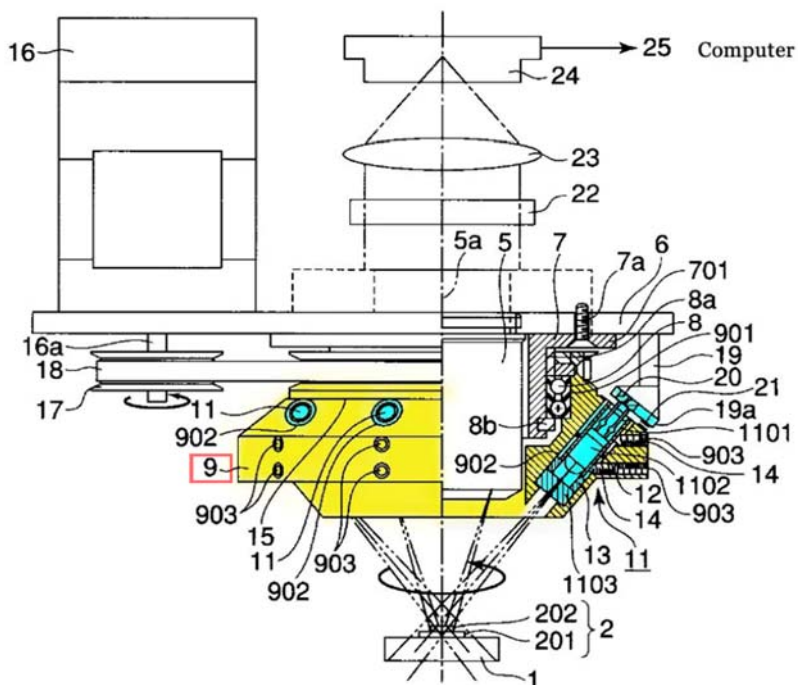
A. References

1. Olympus, JP 2004 325174 A, “Fluorescence Detection Device,” to Olympus Corporation

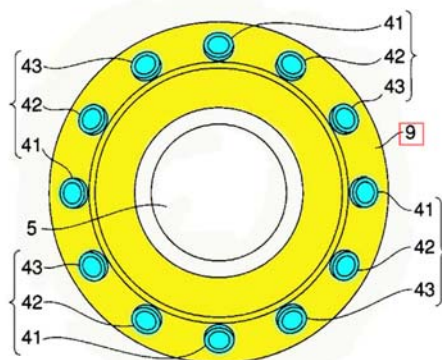
64. Olympus teaches a fluorescence detection system that uses a plurality of “LED light source units 11” housed in a “light source holding member 9 (highlighted yellow)” to illuminate a sample on a table 1 to generate fluorescence in the sample. EX1040, p.10, ¶64. The right side of FIG. 1 shows a cross section of the holding member to show how the LED light source units 11 are positioned in each of a plurality of “LED light source unit storage holes 902” (blue). EX1040, p.9, ¶55. Light source holding member 9 includes a central opening or “hole portion 901 formed along the optical axis 5a.” EX1040, p.9, ¶53. An objective lens 5 is able to

focus on the sample table 1 through the hole portion 901. *See* EX1040, Abstract, p.1, ¶¶0050,0052-0053,0055-0056, FIG. 1.

[Fig. 1]



[Fig. 13]

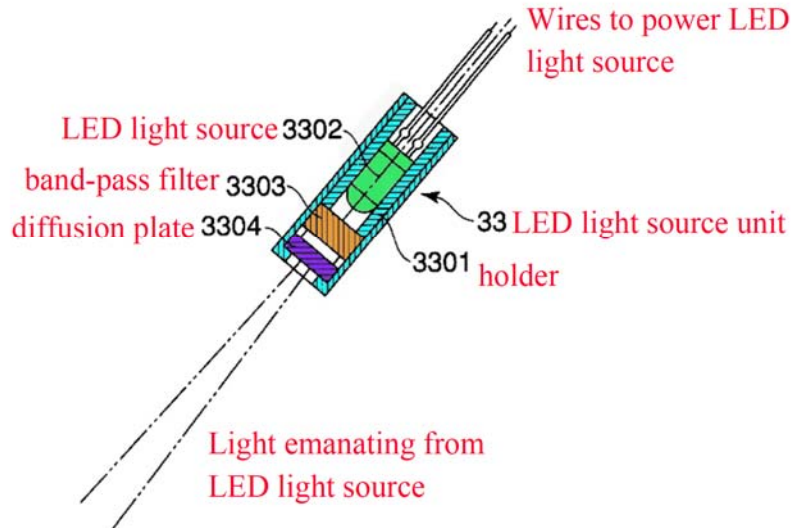


FIGS. 1, 13 of Olympus

65. FIG. 13 shows a view of the light source holding member 9 from the top. *Id.*, ¶¶0128-0133, FIG. 13. Olympus teaches embodiments having a rotatably supported light source holding member 9 (e.g., FIG. 1) and others that are fixed (e.g., FIG. 22). The LED light source unit in housing hole 902 includes an LED light source 1102 and a band-pass filter 1103 that “mainly passes the vicinity of the wavelength region of the light emitted from the LED light source 1102.” *Id.*, p.1(Abstract), ¶¶0045,0058, 0200-0209, FIGS. 1, 22.

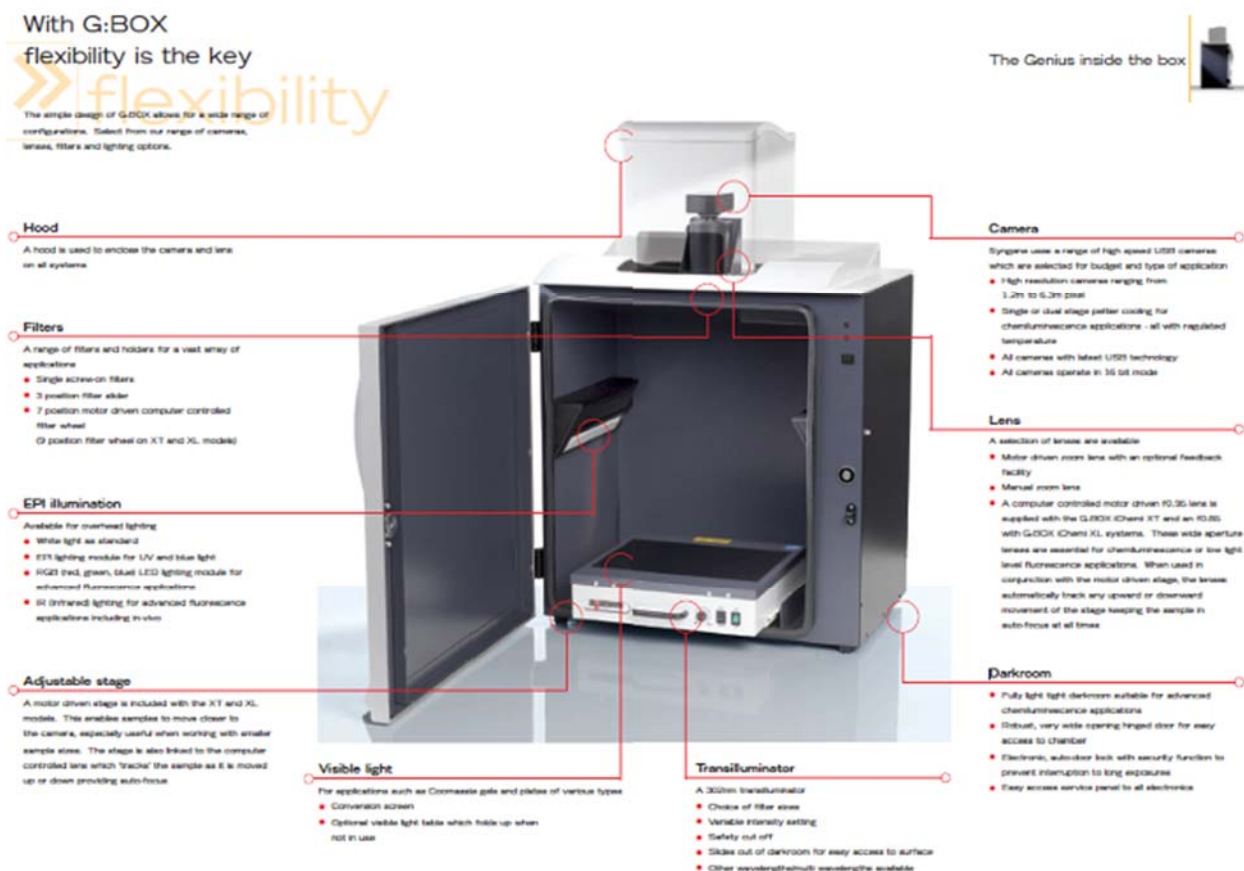
66. Olympus teaches a fluorescence detection system that uses a plurality of “LED light source units 11” housed in a “light source holding member 9 (highlighted yellow)” to illuminate a sample on a table 1 to generate fluorescence in the sample. The right side of FIG. 1 shows a cross section of the holding member to show how the LED light source units 11 are positioned in each of a plurality of “LED light source unit storage holes 902 (blue).” Light source holding member 9 includes a central opening or “hole portion 901 formed along the optical axis 5a.” An objective lens 5 is able to focus on the sample table 1 through the hole portion 901. EX1040, Abstract, p.1, ¶¶0050,0052-0053,0055-0056, FIG. 1.

[Fig. 11]



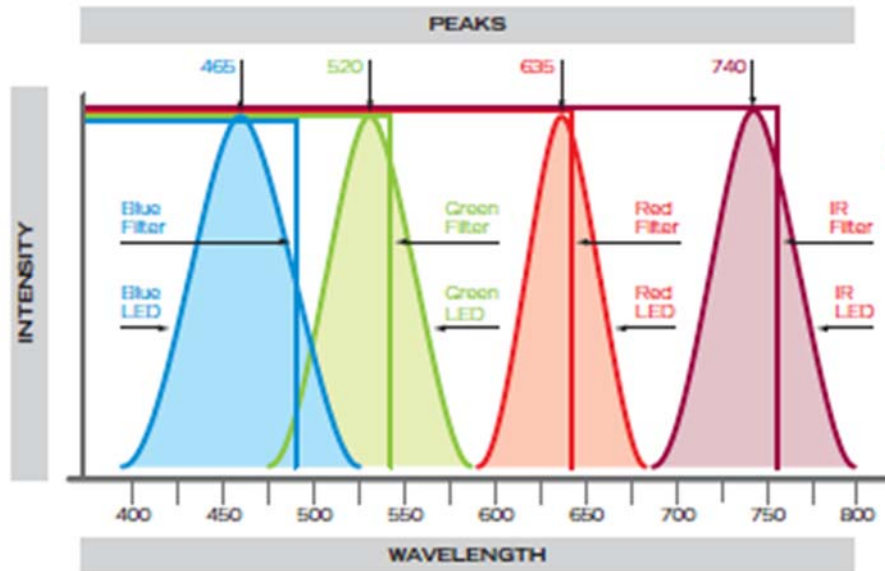
2. GBox

67. The GBox Brochure (“GBox”) publication was stored by Archive.org as of Aug. 24, 2009, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1044, https://web.archive.org/web/20090824075803/http://www.syngene.com/2009_GB_OX2.pdf. GBox states that it can be used for “all fluorescence [] applications” and the user can tailor its system specifically to its needs from a selection of cameras, lenses, filters and lighting options. *Id.*, p.2.



68. The GBox is designed to work with a computer to “control the camera/lenses, lighting and darkroom functions.” *Id.*, p.5. GBox offers users lighting modules for UV, IR, and red, green, and blue LED lighting applications. GBox provides an LED lighting module for “advanced fluorescence applications,” including in-vivo fluorescence applications. *Id.*, p.4. GBox includes lenses that are “essential for low light level fluorescence applications” in a rectangular “fully light

tight darkroom.” *Id.*, p.5. GBox also includes overhead white lighting with optional 254nm and 365nm UV light options. *Id.*, 7.



69. A POSA would understand that GBox covers 400 to 800 nanometer light sources and has an additional 780-940 nm option with a special filter. *Id.*

3. “Frangioni” - WO 2009/009671 A2 (EX1064), “LED Lighting Modules”

70. WO 2009/009671 (“Frangioni”) was published on January 15, 2009, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1064, p.1

71. Frangioni discusses “LED systems” that “may be usefully employed in a wide range of lighting and imaging applications.” EX1064, ¶19. The systems may be “multi-modal imaging systems ... that[] illuminate[] a field with visible white light and an excitation source while capturing a corresponding visible light image and a diagnostic image from fluorescent dye or the like.” *Id.* Accordingly, Frangioni is in the same field of endeavor as Olympus and the '516 patent: lighting systems and their components and applications.

72. Frangioni discusses the use of multiple LED modules that produce more light than individual LEDs, as shown in FIG. 4 of Frangioni. EX1064, ¶26.

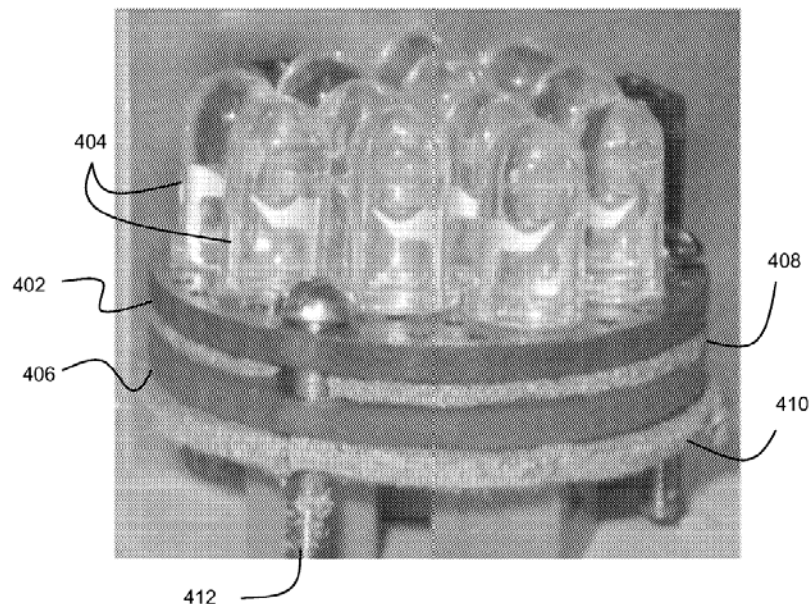


Fig. 4

4. “Hansen”

73. International Publication WO 01/77648 (“Hansen”) was published on October 18, 2001, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1060, p.1.

74. Like the ’516 patent, Hansen discusses “an apparatus and a method for detecting the fluorescence of a sample, wherein the apparatus comprises excitation light source located on the same side of the sample as the detecting means.” EX1060, p.1. Accordingly, Hansen is in the same field of endeavor as Olympus and the ’516 patent: lighting systems and their components and applications.

75. FIG. 1 of Hansen shows light sources 4a and 4b that generates light along the main light paths 5a and 5b. EX1060, p.31. “Fluorescence signals from the sample [at the right of FIG. 1] is emitted to the detection means 6 comprising at least one detector 7.” *Id.*

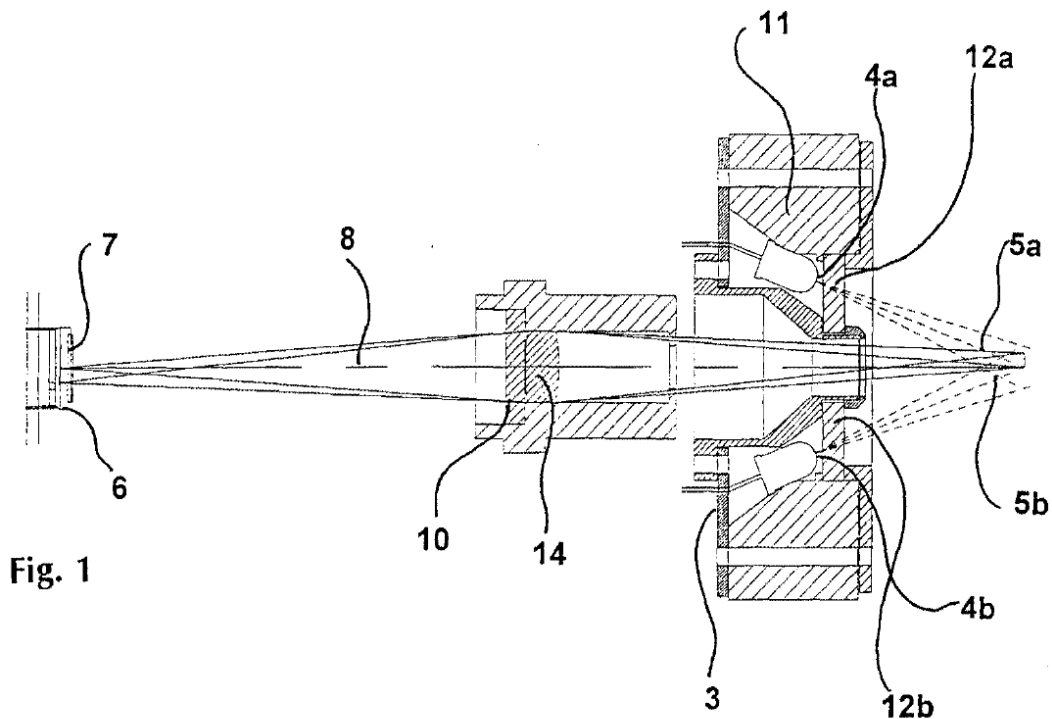


Fig. 1

76. “The light sources 4a, 4b are arranged in a light housing 11.” *Id.*
“Furthermore excitation light filters 12a, 12b are positioned in the excitation light beam.” *Id.*

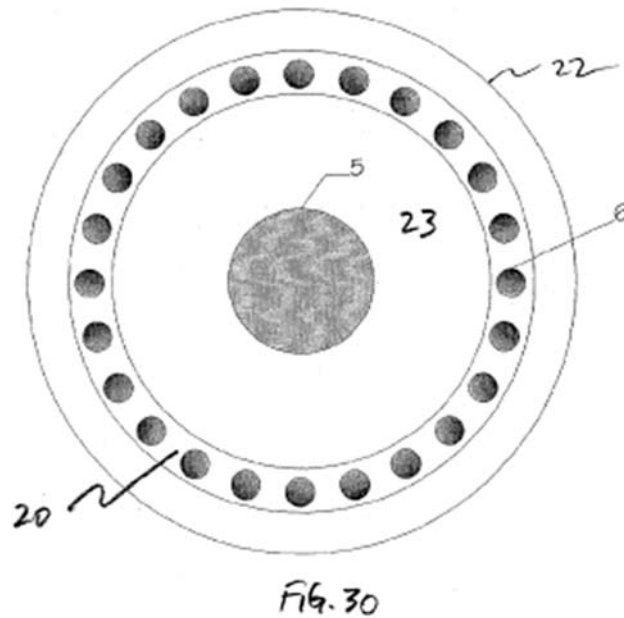
77. The light from the sample passes through a hole in the light housing 11 to reach the detector 7 (e.g., a charge coupled device (CCD)). EX1040, pp.14, 31, FIG. 1.

5. “Malmros”

78. U.S. Patent Application Publication No. 2003/0026762 (“Malmros”) was published on February 6, 2003, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1074, p.1

79. Malmros discusses an “imaging system” that includes an “LED assembly” and “camera lens.” EX1074 ¶¶2, 51-53, FIGS. 28-30. The light sources used may be “broad-spectrum high intensity light sources, a filtered high intensity light source, specific wavelength lasers, or other light sources known to the skilled artisan.” *Id.* ¶94. Accordingly, Malmros is in the same field of endeavor as Olympus and the ’516 patent: lighting systems and their components and applications.

80. In FIG. 30 of Malmros, LED assembly 9 has twenty-four LEDs. The LEDs can be mounted on a printed circuit board. EX1074, ¶111. Like FIG. 13 of Olympus and FIG. 1 of the ’516 patent, FIG. 30 of Malros shows the LEDs arranged in a circle around a central aperture.



6. “Brydegaard”

81. *Broad-band multispectral microscope for imaging transmission spectroscopy employing an array of light-emitting diodes*, Brydegaard *et al.*, AMERICAN JOURNAL OF PHYSICS (February 2009) (“Brydegaard”), was published in February 2009, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1043, p.1.

82. Brydegaard discusses “multispectral imaging” using “several LEDs, which cover the visible range (400 – 700 nm) and extend into the UV and near infrared (NIR) regions.” EX1043, p.2. Brydegaard applies this lighting system to the imaging of an animal retina. EX1043, p.5. Accordingly, Brydegaard is in the

same field of endeavor as Olympus and the '516 patent: lighting systems and their components and applications.

83. The light sources of Brydegaard are mounted in a Delrin cone.

EX1043, p.4, FIG. 2.

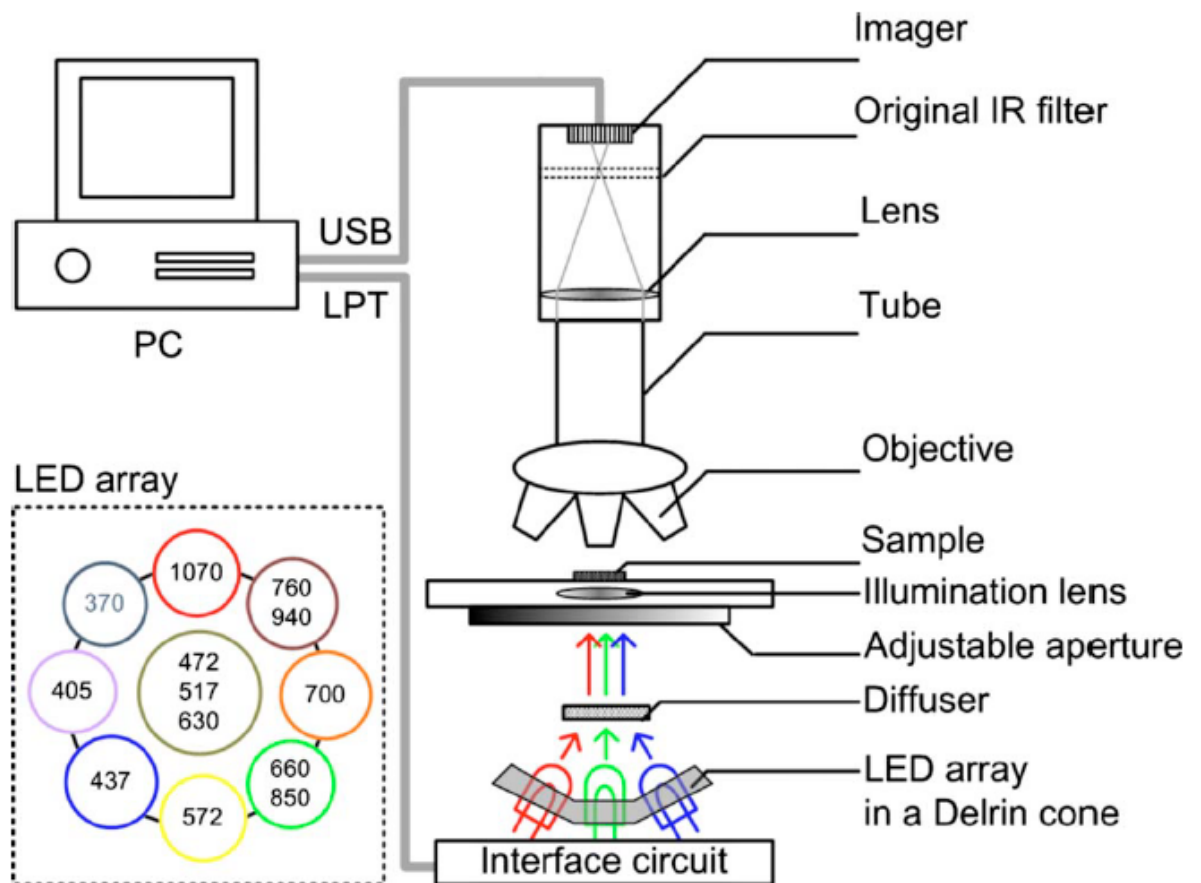


Fig. 2. Arrangement for multispectral transmission microscopy employing multiple LED illumination. Different wavelengths are emitted from a computer controlled LED array and the rays are combined by a diffuser. The light interacts with the sample differently for each wavelength, resulting in a unique picture for each wavelength.

X. GROUNDS OF UNPATENTABILITY

84. I have been told that the Board will construe only the necessary claims in an *inter partes* review. My claim construction arguments and findings are attached to this Declaration as an appendix; however, I do not believe the claims need construction to find them unpatentable.

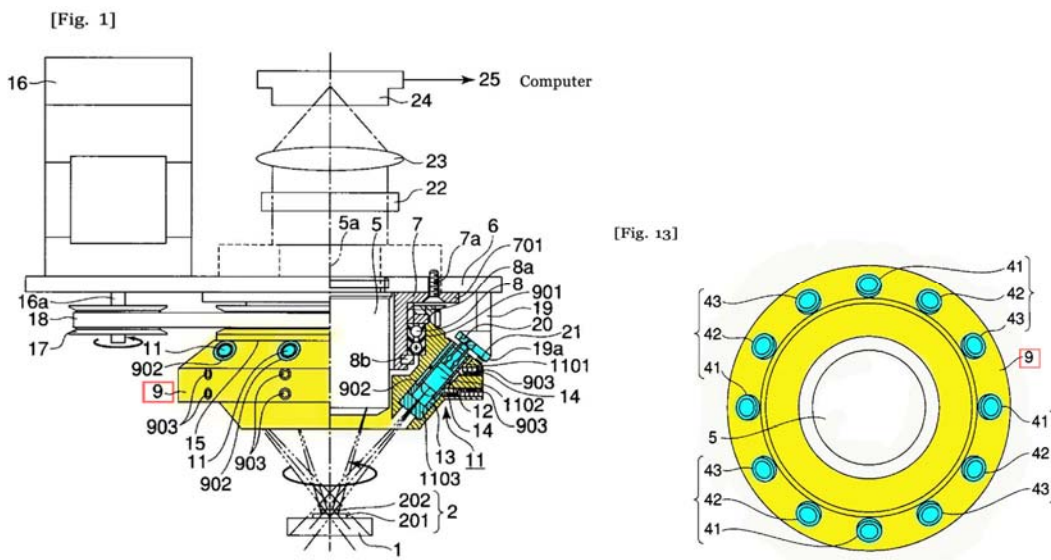
A. Ground 1: Claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25 are anticipated by Olympus

85. Speaking from the perspective of a POSA, Olympus teaches all of the elements of claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25, as follows.

a. CLAIM 1

1. *[Preamble] An excitation light source assembly, comprising: [Element 1a] a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening, said housing being mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;*

86. Regarding the analysis of claim 1, a POSA would understand that Olympus is a fluorescent detection device with a light source assembly, comprising the “light source holding member 9” which is very similar to housing 14 of the ’516 patent. It is a “housing defining a central opening therein and a plurality of lamp receptacles.”



87. Compare the housings (yellow) and light source holes (blue) FIGS. 1, 13 of Olympus to FIG. 1 of the '516 patent:

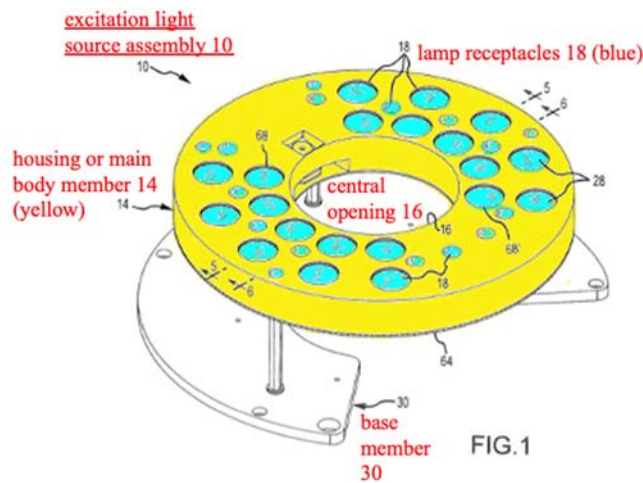


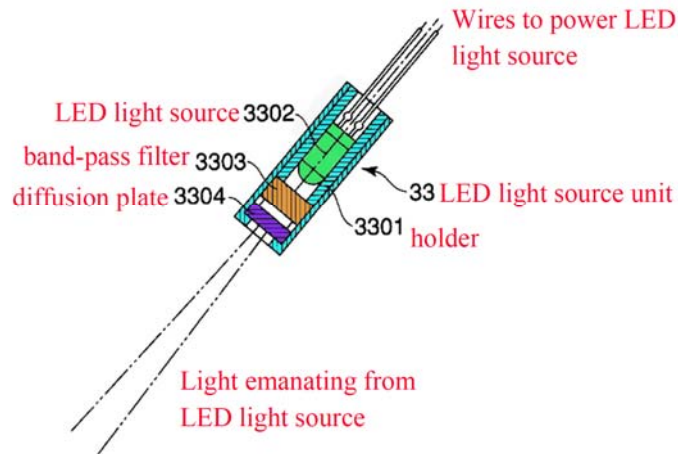
FIG. 1 of '516

[Element 1b] a light source positioned within each of the plurality of lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and

[Element 1c] a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said light sources; and

88. Olympus also has a light source that fits into the receptacle of the housing and has a diffuser in the receptacle:

[Fig. 11]



89. A POSA would know that the “diffusion plate” 3304 is a diffuser, because a diffuser is a very common optical component and it makes sense that Olympus would use one to spread out or diffuse light from its LED light sources.

90. Moreover, compared to white light sources like xenon lamps, semiconductor light emitters like light emitting diodes will exhibit much lower spectral bandwidths.

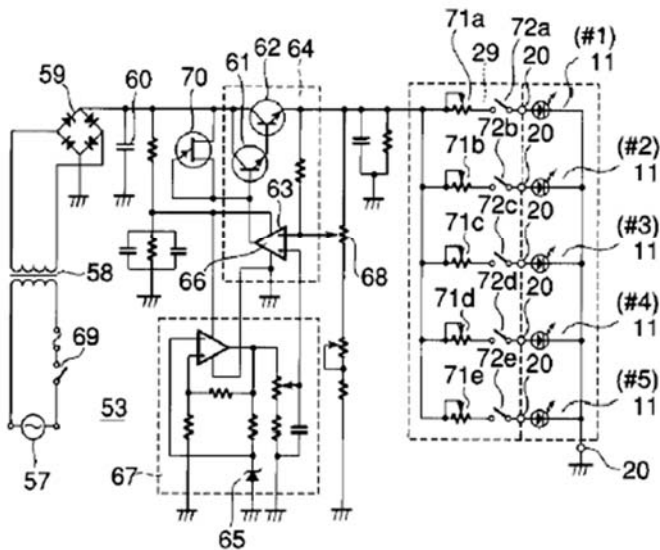
91. A POSA can tell that the light emitting diodes shown in of Olympus are through-hole devices because they have wires extending from them as opposed to surface mount devices which would be bonded directly to the surface of a support or circuit board.

[Element 1d] a control system operatively connected to each of said light sources said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of said camera, the object fluorescing in response to the excitation illumination provided by said light sources

92. Olympus discloses an LED light source unit driving circuit 29 connected to a power supply 53 and various circuitry to control output light intensity of the LED light source units 11. EX1040, ¶¶0064, 0072-0081, 0087-0098, 0101, 0103-0153; FIGS. 1, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 22. The system can therefore independently turn on and off the LED light source units 41, 42, and 43, and such control can be performed manually or electronically with a computer. *Id.*, ¶¶0079-0080, 0087, 0147-0150. When light from selected light sources (for example, light from selected LED light source units) illuminates an object, fluorescence can be received by the camera (photodetector or CCD camera 24). *Id.*, ¶¶0081, 0087, 0091, 0092, 0116, 0151-0155.

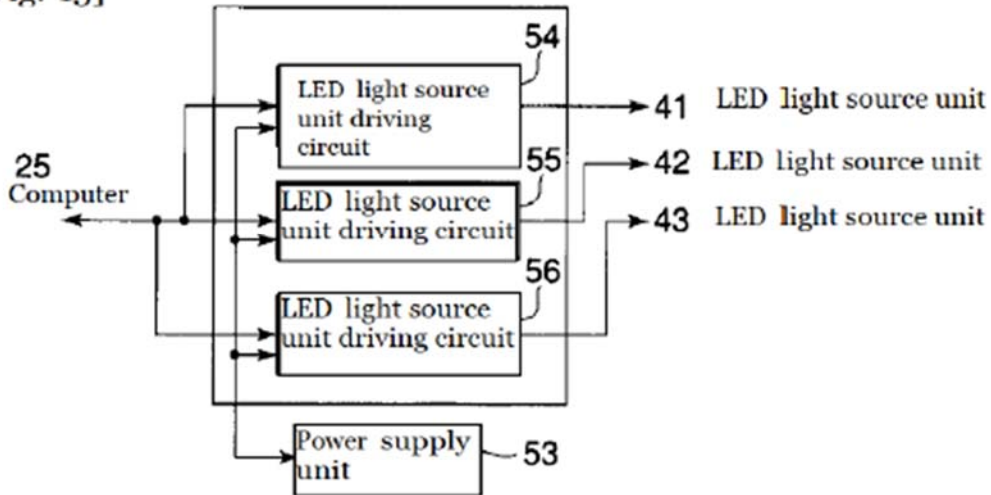
93. A POSA would understand that Olympus provides circuitry such that power supply unit 53 may be used to selectively power one more of LED light source units 11 (e.g., labeled #1-#5).

[Fig. 8]

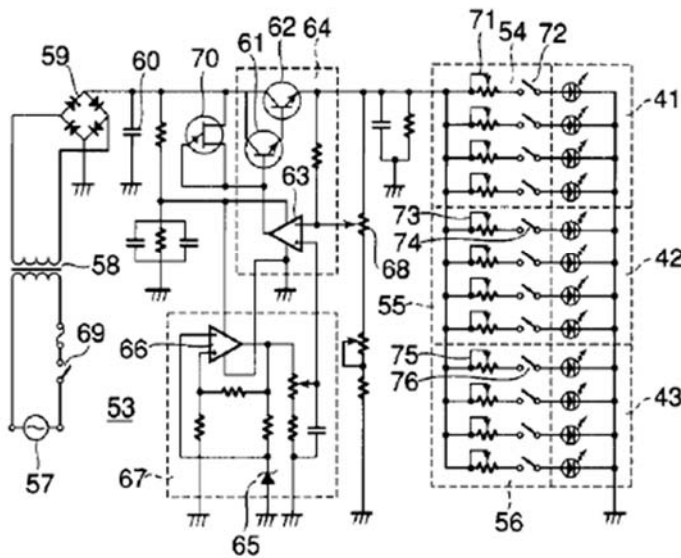


94. EX1040, ¶¶ 0074-0081, FIGS. 7, 8; Such control is applicable to several embodiments, including but not limited to the embodiments of FIG. 1 and FIG. 22. A POSA would understand that the circuits of FIGS. 15 and 16 demonstrate that light sources 41, 42, and 43 (such as shown in FIG. 13) are individually controllable:

[Fig. 15]



[Fig. 16]



EX1040, ¶¶0142-0144, 0146-0155, FIGS. 9, 15, 16.

95. This approach allows for independent excitation of 3 different wavelengths, such as for 3 different dyes; however, Olympus is not limited to a

particular number of fluorescent dyes, images, or light source wavelengths. EX1040, ¶¶0154-0155.

96. Olympus explicitly states that its disclosure is not limited to the example embodiments and that “various modifications can be made without changing the gist of the invention.” Olympus also states that its samples are not limited to DNA microarrays, and that “the present invention is widely applicable not only to DNA but also to various other types of biological materials....” EX1040, ¶¶0209,0210.

97. Thus, a POSA would understand that Olympus demonstrates a control system operatively connected to each of the light sources to operate them individually or in groups to provide desired excitation illumination to an object within the field of view of the camera to capture light from the object fluorescing in response to light provided by the light sources.

98. Olympus teaches all elements of **claim 1, rendering it unpatentable.**

b. CLAIMS 3-4, 7, 9-11, 14-15, 23, and 25

99. The analysis for claim 3 is straightforward because Olympus teaches light emitting diodes, which are narrow-band devices in the context of the '516 patent.

100. The analyses for claims 4, 7 and 9-11 are straightforward as well as they relate to simple filter placement, and lamp receptacle and light source configurations.

101. Independent claims 14 and 25 are substantially the same as independent claim 1, and thus are unpatentable for the same reasons. Independent claim 14 recites a “support structure” to which are mounted “a camera” and the “excitation light source assembly.” These features are taught by FIG. 22 of Olympus, showing a support structure in the form of cylindrical fixed shaft 7 and associated hardware. The camera and housing are mounted to the shaft 7.

102. Claim 15 is substantially the same as claim 4, and unpatentable for the same reasons.

103. Claim 23 is substantially the same as claim 3, and unpatentable for the same reasons.

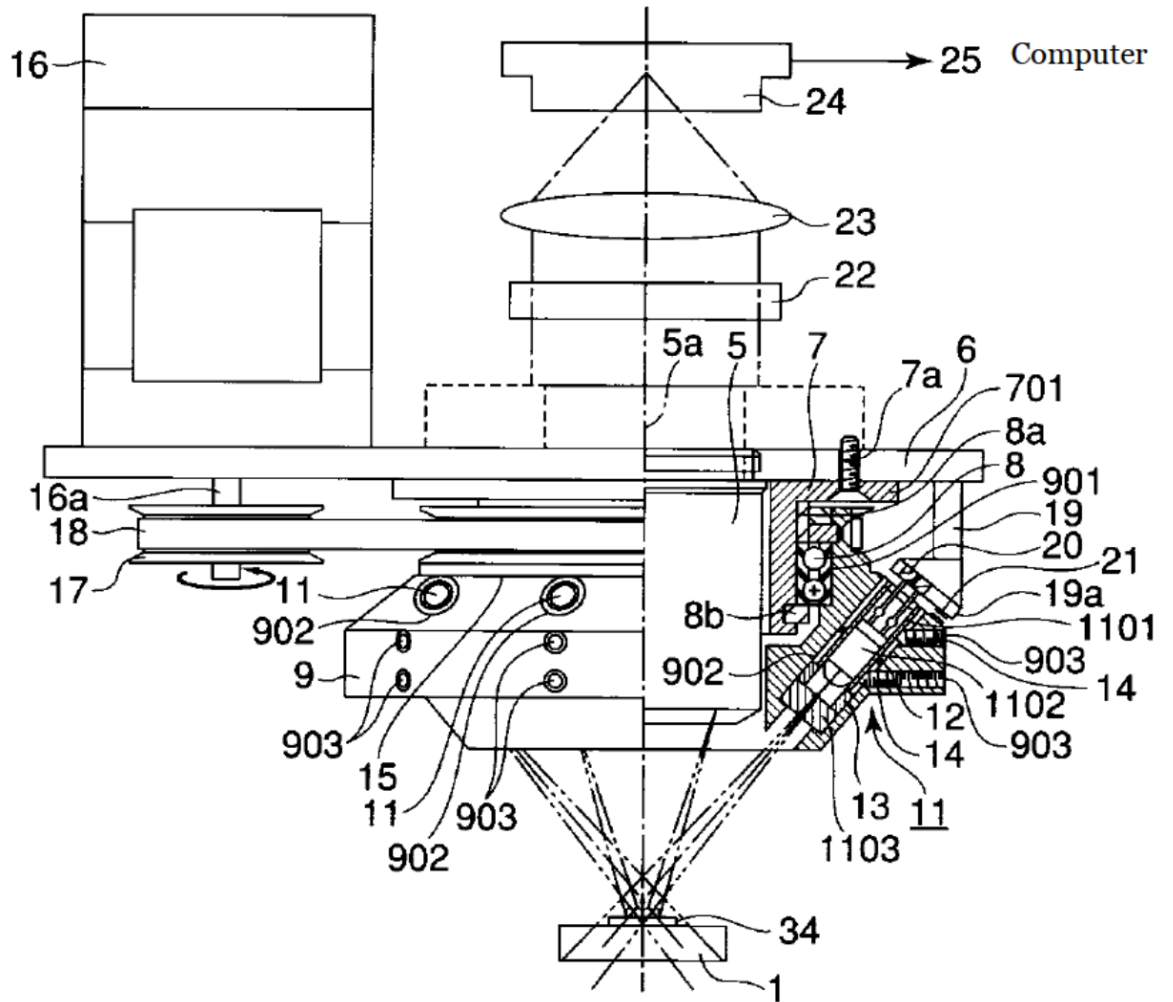
c. CLAIM 16

The assembly of claim 14, wherein each of the lamp receptacles defined by said housing are angled with respect to a central axis of said housing so that light emitted from each of said narrow-band light sources is directed to a desired area within the field of view of said camera.

104. Olympus shows lamp receptacles defined by a housing that are angled with respect to a central axis of the housing so that light emitted from the LEDs in the lamp receptacles is directed to an area within the field of view of a camera. FIG. 12 of Olympus shows the “LED light source unit storage holes 902” being “inclined toward the surface of the sample 202 on the sample table 1.” EX1040, ¶55. Camera 24 captures the image of the sample 202 through the central hole, as discussed above.

105. Olympus teaches all elements of **claim 16, rendering it unpatentable.**

[Fig. 12]



d. CLAIM 17

The assembly of claim 14, wherein each of said narrow-band light sources is selected to provide desired number of illumination bands over a desired

spectral range.

106. A POSA necessarily selects light sources to provide desired illumination, such as a desired number of illumination bands over a desired spectral range. Furthermore, Olympus discusses selecting LEDs with 490 nm, 520 nm, and 630nm peak illumination, a specific example of a desired number of illumination bands, 3, over a desired spectral range, 490nm-630nm. EX1040, ¶¶131, 133, 136.

107. Olympus teaches all elements of **claim 17, rendering it unpatentable.**

B. Ground 2: Claims 2, 5, and 20 are rendered obvious by Olympus

a. CLAIMS 2 and 20

The excitation light source assembly of claim 1 wherein said narrow-band light source emits light having a bandwidth of about 35 nm.

The assembly of claim 17, wherein each desired illumination band has a bandwidth ranging from about 30 nm to about 35 nm.

108. As noted in the '516 patent, "Light emitting diodes having such narrow bandwidths (e.g., about 30-35 nm) along the desired wavelength range (e.g., 430 nm to about 745 nm) are readily commercially available and can be used as the narrow-band sources." EX1001, 9:2-6. LEDs in the visible and near-infrared naturally have

a spectral bandwidth in the tens of nanometers and well-known commercial designs available prior to 2009 would have made 30-35nm bandwidth LEDs available to Olympus. Accordingly, a POSA would have been aware of such light sources and be able to use them for Olympus's LEDs with 490 nm, 520 nm, and 630nm peak illumination. EX1040, ¶131.

109. Olympus teaches all elements of **claims 2 and 20, rendering them unpatentable.**

b. CLAIM 5

The excitation light source assembly of claim 4, wherein said at least one filter comprises a notch filter having a wavelength bandpass range of about 30 nm.

110. The '516 patent states that "notch type filters" "having a relatively narrow wavelength bandpass range of about 30nm" "are available over a wide range of wavelengths or colors." EX1001, 9:52-57. Accordingly, a POSA would know that a notch filter having a wavelength bandpass range of about 30nm could be used as the filter 1103 so that "light of a predetermined wavelength range is selected through

the band-pass filter 1103 and is irradiated as excitation light toward the sample 202.”
EX1040, ¶89.

111. Olympus teaches all elements of **claim 5, rendering it unpatentable.**

C. Ground 3: Claims 6, 10-12, 18, 21, 22, and 26 are obvious in view of Olympus and Frangioni

a. CLAIM 6

The excitation light source assembly of claim 1, wherein at least one of the light sources comprises a broad-band light source.

112. Frangioni discusses “LED systems” that “may be usefully employed in a wide range of lighting and imaging applications.” EX1064, ¶19. The systems may be “multi-modal imaging systems ... that[] illuminate[] a field with visible white light and an excitation source while capturing a corresponding visible light image and a diagnostic image from fluorescent dye or the like.” *Id.* Accordingly, a POSA would be motivated by the teachings of Frangioni to have at least one of the light sources in Olympus comprise a broad-band light source in order to support a multi-modal imaging system.

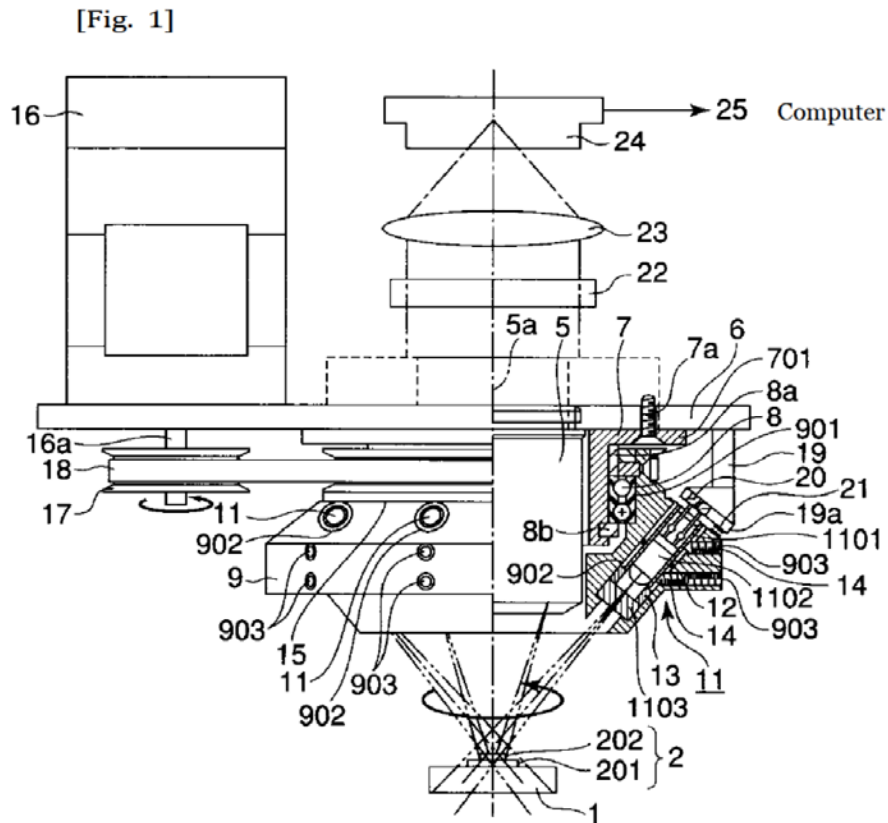
113. Olympus in combination with Frangioni teaches all elements of **claim 6, rendering it unpatentable.**

b. CLAIM 10

The excitation light source assembly of claim 1, further comprising a plurality of light sources positioned within at least some of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles.

114. Olympus discusses the use of “2 or more LEDs as a bundle” to provide sufficient excitation light to a fluorescent substance. EX1040, ¶22. Frangioni discusses the use of multiple-LED modules that produce more light than individual LEDs. EX1064, ¶26, FIG. 4. A POSA would see that both Olympus and Frangioni address problems of providing light using multiple LEDs. A POSA seeking more uniform and sufficient illumination would group 2 or more LEDs for fluorescent imaging applications and would have access to prior art that provides multiple LEDs for imaging illumination applications, such as Frangioni.

115. FIG. 1 of Olympus shows a “light source holding member 9” that defines lamp receptacles in the form of “LED light source unit housing hole[s] 902.” EX1040, ¶55, FIG. 1. As can be seen in FIG. 1, the LED light source unit 11 does not extend beyond the lamp receptacle. EX1040, ¶56, FIG. 1.



116. Even without modifying the depth of the LED light source housing holes 902, the multiple LEDs of Frangioni would not extend beyond the LED light source unit housing holes 902. Bundled LEDs would provide the same amount of light in a simpler housing with fewer holes, a greater amount of light in a housing with the same number of holes, or a greater amount of light in a housing with fewer holes. A POSA would know, based on the teachings of Olympus and Frangioni, ways to design lighting assemblies with increased illumination, reduced cost, reduced size, improved spatial efficiency, and/or easier assembly.

117. A POSA would have appreciated that Frangioni's modules used in lighting and fluorescence imaging were a well-known option from prior art illumination designs. The combination of Frangioni's modules with Olympus's design would yield nothing more than predictable results.

118. A POSA when creating lighting assemblies would understand that when creating a design for lighting, the costs involved in machining a component can be mitigated by more intelligent and programmable lighting options.

119. Another example benefit is that routing of electrical and control wiring is simpler when multiple LEDs are bundled together on a circuit board as in Frangioni.

120. A POSA would understand how to improve efficiency by employing light modules that could provide multiple lighting functions in one compact unit, also thereby making assembly faster and more reliable.

121. Thus, a POSA seeking more uniform and sufficient illumination would consider Frangioni's teachings to group 2 or more LEDs for fluorescent imaging applications.

122. Olympus in combination with Frangioni teaches all elements of **claim 10, rendering it unpatentable.**

c. CLAIM 11

The excitation light source assembly of claim 10, wherein said plurality of light sources is three light sources.

123. Olympus states “the number of LED light source units is not particularly limited.” EX1040, ¶0155. In different embodiments, Olympus shows different numbers of light sources. For example, FIG. 18 shows six light sources 81, FIG. 21 shows five light sources 81, and FIGS. 19-20 show three light sources 81. EX1040, FIGS. 18-21. Therefore, a POSA would understand that Olympus is not limited to any one number of light sources and a POSA would know how to make a light sources holding member with a plurality of light sources having three LED light sources and make them so that they do not extend beyond the housing holes.

124. Olympus in combination with Frangioni teaches all elements of **claim 11, rendering it unpatentable.**

d. CLAIM 12

The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise a plurality of large diameter receptacles and a plurality of small diameter receptacles.

125. Claim 12 does not state a size or proportion of the large and small diameter receptacles. The '516 patent states that large diameter receptacles “may be sized to receive one or more narrow-band light sources 22” and the small diameter receptacles “may be sized to receive a single broad-band light source 24.” EX1001, 6:52-53, 6:54-55, 7:46-47. However, something that “may be sized to receive one or more narrow-band light sources 22” may be sized to receive only one, which does not differentiate from the single broad-band light source 24.

126. A POSA would understand that LED light source units of Olympus could employ different numbers of LEDs to provide adequate illumination and would benefit from housings with a plurality of holes of various diameters. It would be obvious to a POSA to use some hole diameters that were larger to accommodate larger light sources (for example, Frangioni’s multiple LED light modules) compared to a single LED light source. Moreover, a POSA would know that LEDs often have different package sizes and may fit within larger and smaller holes. Thus, it would be a matter of ordinary skill and common sense to make the holes different diameters if the light sources were different in number or in diameter.

127. Moreover, Olympus states “the present invention is not limited to the above embodiment and various modifications can be made without changing the gist

of the present invention.” EX1040, ¶0209. A POSA would therefore understand that the diameter of the Olympus housing holes 902 is a matter of design choice, and that the housing holes 902 of Olympus can be sized to accommodate the various light sources positioned within them without changing the gist of the invention.

128. The housing and light sources of Olympus would not operate differently than a design with large and small diameters.

129. Olympus in combination with Frangioni teaches all elements of **claim 12, rendering it unpatentable.**

e. CLAIM 18

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 745 nm.

130. Frangioni states: “[s]ingle wavelength LEDs may operate within the visible light spectrum or any suitable adjacent spectrum.” EX1064, ¶30. The visible light spectrum is typically associated with about 380nm to about 800nm and the adjacent spectrum (the infrared spectrum) is about 800nm to 1000nm, although one will also see alternative definitions, such as 400-700nm for the visible spectrum and the like. LEDs are commercially available through much or all of these ranges and

have been since at least one year prior to the filing of the '516 provisional application. A POSA would therefore understand that different LEDs and filters can be used to provide a desired number of illumination bands over a desired spectral range.

131. Olympus in combination with Frangioni teaches all elements of **claim 18, rendering it unpatentable.**

f. CLAIMS 21 and 22

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 900 nm.

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 800 nm.

132. The ranges of about 430 nm to about 900 nm and about 430nm to about 800nm are within the ranges of spectral and adjacent infrared light disclosed by Frangioni (see the analysis of **claim 18**). Further, LEDs are readily available, and in many cases even easier to fabricate, in these ranges and therefore **claims 20 and 21 are not patentable.**

g. CLAIM 26

The excitation light source assembly of claim 25, wherein said plurality of lamp receptacles defined by said housing comprise a plurality of large diameter lamp receptacles and a plurality of small diameter lamp receptacles, said large diameter lamp receptacles receiving a plurality of said light sources, said small diameter receptacles receiving a single light source.

133. Claim 26 is substantially the same as claim 12, adding the limitation that the large diameter light sources receive a plurality of the light sources and the small light sources receiving one. It would be a matter of ordinary skill and common sense to place plural sources in larger diameter holes of the housing if the light sources were greater in number or in diameter.

134. Olympus in combination with Frangioni teaches all elements of **claim 26, rendering it unpatentable.**

D. Ground 4: Claims 8, 13, 19, and 27 are obvious in view of Olympus and Hansen and/or Malmros

a. CLAIMS 13 and 27

The excitation light source assembly of claim 1/25, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light

source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically-shaped light receptacles.

135. Claims 13 and 27 are identical except for their independent claims, which are anticipated by Olympus, as discussed in Ground 1. Furthermore, as discussed in Ground 1, the light receptacles of Olympus are generally cylindrically shaped and have first and second open ends.

136. In view of Olympus, a POSA would look at prior art for an effective and efficient approach to select and place excitation light sources in the light receptacles. A POSA would see that other prior art illumination systems integrated the physical and electrical connections of their through-hole mounted LEDs. For example, Malmros took a similar approach to mounting twenty-four LEDs 6 in a plurality of cylindrical lamp receptacles in an assembly with a central aperture 5. EX1074, ¶¶0110-0111, FIGS. 29, 30.

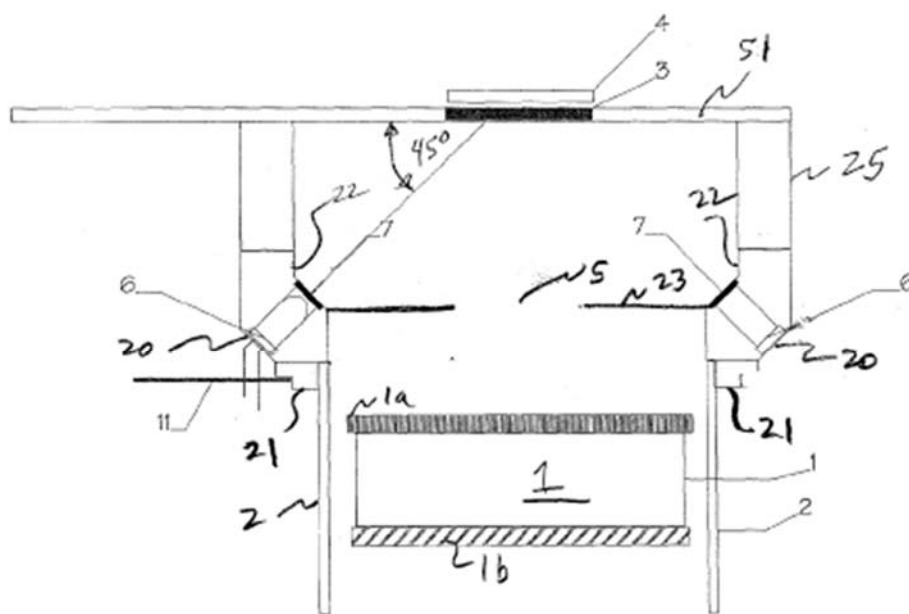


Fig. 29

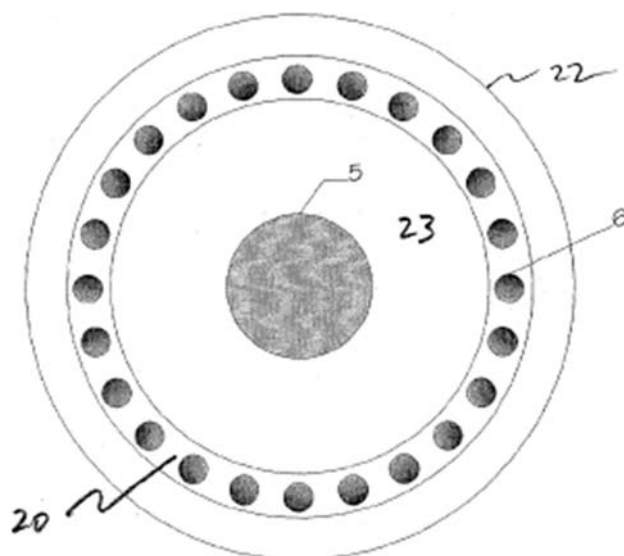
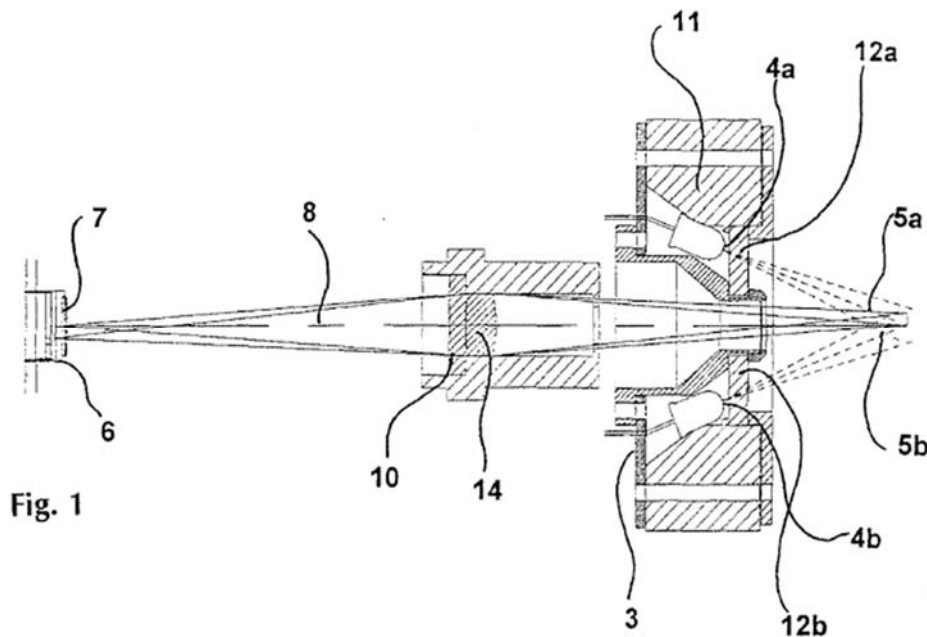


Fig. 30

137. The LED assembly of Malmros is for a bio-spectral imaging system with a camera 28. *Id.*, FIG. 28. Each LED can “be mounted in a portion of a printed circuit board 11,” which may have, for example, a conventional computer connection that interfaces to a computer running software. *Id.*, ¶0111. Furthermore, the “LEDs 6 are preferably mounted on an angled surface 20,” which “is integral with” “surface 22” and the “wall of the unit 25.” *Id.*, ¶0110.

138. Furthermore, Hansen shows LEDs 4a, 4b in assembly 3 that holds the LEDs in place in their openings behind excitation light filters 12a, 12b. EX1060, p.29, lines 6-25, FIG. 1. A POSA would be motivated to use either of these circuit-board mounted LED approaches with the system of Olympus to achieve better connections with fewer loose wires and easier assembly.



139. Olympus, in view of Hansen and/or Malmros, renders **Claims 13 and 27 unpatentable.**

b. CLAIM 8

The excitation light source assembly of claim 7, further comprising ten opposed pairs of lamp receptacles on opposite sides of said central opening.

140. As discussed above with respect to Ground 1, Olympus discloses each and every element of claims 1 and 7, from which claim 8 depends. FIG. 13 of Olympus shows six opposed pairs of lamp receptacles. Olympus states: “the number of LED light source units is not particularly limited” and “the output wavelengths of

the plurality of LED light source units may be [] different.” EX1040, ¶0155. Olympus also states that its invention is not limited to three dyes, and lists six different dyes as non-limiting examples. *Id.*, ¶0154. Therefore, a POSA studying Olympus would understand that the example of six opposed pairs of lamp receptacles for three wavelengths and three dyes would easily be modified to any reasonable number of opposed pairs of lamp receptacles different wavelengths, including 10 opposed pairs as recited in Claim 8.

141. A POSA seeking to increase the number of light sources on a system like Olympus would also look for known methods by others in the field. For example, a POSA reviewing Hansen (discussed with respect to claims 13 and 27, above) would appreciate that Hansen, like Olympus, teaches there is no upper limit to the number of LEDs used, and the light source may provide light of any suitable wavelength. EX1060, p.6. Malmros (also discussed with respect to claims 13 and 27, above) provides a system with 24 LEDs and teaches that they may be used as “twelve matched sets of two LEDs,” with the “two LEDs comprising each set [being] spaced approximately 180 degrees apart.” EX1074, ¶113. As another alternative, Malmros discusses using “sixed matched sets of four LEDs” “spaced approximately 90 degrees apart.” *Id.* As yet another alternative, Malmros discusses using “Three

(or more – as may be desirable to have available for other metaspectral wavelengths) opposing pairs of high luminosity light emitting diodes (LED's) ... mounted in a ring....” *Id.*, ¶199.

142. Based on the foregoing, Olympus in view of Hansen and/or Malmros renders **Claim 8 unpatentable**.

c. CLAIM 19

The assembly of claim 17, wherein the desired number of illumination bands is 10.

143. As discussed above for Ground 1, Olympus teaches each and every element of claim 17. Olympus further states that “a plurality of types of fluorescent dyes are excited using 2 or more LED light sources having different peak emission wavelengths so that a fluorescent signal can be detected.” EX1040, ¶0129. Selecting the specific value of 10 different peak emission wavelengths is a mere design choice.

144. Malmros discusses using “three or more bands for any given stain.” EX1074, ¶207. Accordingly, a POSA who read and understood Olympus would know how configure Olympus to establish ten illumination bands. Moreover, the

analysis of claim 8, above, shows that pairing 10 LEDs (at whatever desired wavelengths) was known from other prior art such as Malmros.

145. Hansen states that “There is no upper limit of the number of LEDs used, but often as many as 30 LEDs are provided, such as up to 20 LEDs.” EX1060, p.8. The light sources may have “a different wavelength band” from each other. *Id.* Alternatively, “a separate filter is provided for each light source” such that “one or more wavelength components” “are transmitted onto the sample.” EX1060, p.10. “This is in particular of interest when the sample contains particles which respond differently to different wavelength components.” *Id.* Furthermore, Hansen notes that “This effect can also be produced by the use of more than one type of light source which have different wavelength characteristics” EX1060, p.11.

146. Based on the foregoing, Olympus in view of Hansen and/or Malmros renders **Claim 19 unpatentable.**

E. Ground 5: Claim 24 is obvious over Olympus and Brydegaard

a. CLAIM 24

The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.

147. As discussed above in Ground 1, claim 14 from which claim 24 depends is anticipated by Olympus. It is well known in the art to use Delrin in the

construction of optical systems as set forth in Brydegaard. “The nine LEDs are mounted in a machined compact circular arrangement ... made of Delrin ...”. EX1043, p.4. Delrin is a tradename for a type of polyoxymethylene thermoplastic, and there are several other variant polyoxymethylene thermoplastics with different tradenames. A POSA would use the Delrin of Brydegaard for light assemblies in the system of Olympus as it is a known material for holding light sources in an optical system.

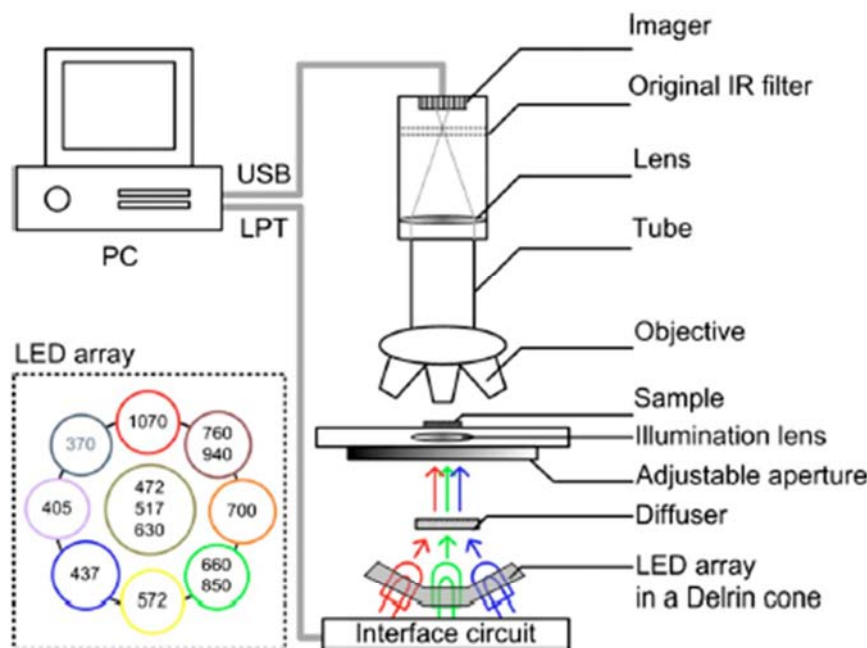


Fig. 2. Arrangement for multispectral transmission microscopy employing multiple LED illumination. Different wavelengths are emitted from a computer controlled LED array and the rays are combined by a diffuser. The light interacts with the sample differently for each wavelength, resulting in a unique picture for each wavelength.

148. Based on the foregoing, Olympus in view of Brydegaard renders **Claim 24 unpatentable.**

F. Ground 6: Claims 1-23 and 25-27 are obvious in view of GBox and Olympus

a. Motivation to Combine Olympus and GBox

149. A POSA would understand that Olympus is designed to produce even and efficient irradiation excitation light for “performing highly reliable fluorescence,” and for “uniformly irradiat[ing] over the entire surface of the sample” to receive “stable and reproducible fluorescence.” EX1040, p.1(Abstract), ¶¶0116. Olympus describes an LED light source unit 33 comprising an LED light source 3302 and a diffuser (diffusion plate 3304) in the housing holes 902 of light source holding member 9 to provide “uniform brightness” over a sample. EX1040, ¶¶0113-0125, FIGS. 11-12.

150. A POSA would be motivated to combine the uniform illumination advantages of Olympus’ circular light source housing member and LED light source units with the fluorescence applications that GBox provides. A POSA would know that the Olympus housing member would be mountable in alignment with the GBox camera to provide light on a sample below and allow for imaging. A POSA would

also know how to integrate the control functions of the Olympus housing so it would integrate with the advanced fluorescence imaging of the GBox.

151. GBox discloses a “light tight darkroom suitable for advanced chemiluminescence applications.” EX1044, p.5. The light-tight darkroom improves the accuracy of light measurement by ensuring that no light other than that generated by the light sources and reflected or emitted by the sample being imaged are detected by the camera. Accordingly, a POSA would be motivated by GBox to modify Olympus to make use of a light-tight darkroom. It can also be noted that the use of a light tight enclosure is a generic feature of many optics applications. It precedes fluorescence imaging by more than a century (e.g. 19th century cameras) and would be applied by POSA to any situation where the number of collected photons is relatively small.

b. CLAIMS 1-5, 7, 9-11, 14-17, 20, 23, and 25

152. As discussed above with respect to Ground 1, Olympus anticipates claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25. As discussed above with respect to Ground 2, Olympus renders obvious claims 2, 5, and 20. However, I understand that the Board may construe the claims differently than I have in my Ground 1 analysis.

153. If the claims are construed in a manner that requires an enclosure of the light sources and the item being illuminated, Olympus in view of GBox renders **claims 1-5, 7, 9-11, 14-17, 20, 23, and 25 obvious.**

c. CLAIMS 6, 8, 12, 13, 18, 19, 21, 22, 26, and 27

154. The subject matter added by dependent claims 6, 8, 12, 13, 18, 19, 21, 22, 26, and 27 is taught by GBox.

155. Claim 6 is shown by the white light sources of the combination of the GBox and Olympus. Claims 8 and 19 are rendered obvious by the increased number of lighting options created from the combination. Also, in addition to what was argued above in Section VIII(A), the GBox/Olympus combination covers the 430nm to -745nm, -900nm, and -800nm, ranges of claims 18, 21, and 22 based on this chart the spectrum and discussion on page 7, EX1044. Furthermore, transilluminators create a number of new lighting combinations where light sources do not extend, LEDs are mounted to circuit boards, and different size holes are employed, rendering claims 12, 13, 26, and 27 unpatentable.

G. Ground 7: Claim 24 is obvious in view of Olympus, GBox and Brydegaard

a. CLAIM 24

The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.

156. As discussed with respect to Ground 6, Olympus in view of DBox teaches all elements of claim 14. As discussed above with respect to Ground 5, Brydegaard teaches the use of a Delrin (a polyoxymethylene thermoplastic material) for holding light sources in an optical system. Accordingly, a POSA would use the Delrin of Brydegaard for light assemblies in the system of GBox as it is a known material for holding light sources in an optical system.

157. Based on the foregoing, Olympus in view of GBox and Brydegaard renders **Claim 24 unpatentable.**

IX. AVAILABILITY FOR CROSS EXAMINATION

158. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.

X. RIGHT TO SUPPLEMENT

159. I reserve the right to supplement my opinions in the future to respond to any arguments that are raised and to take into account new information as it becomes available to me.

Declaration of Joseph John Talghader, Ph.D.

I hereby 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 by me with the knowledge that willful false statements are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and with the knowledge that such willful false statements may jeopardize the results of these proceedings.

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

Executed this 6th day of January, 2023



Digitally signed by Joseph Talghader
DN: cn=Joseph Talghader,
o=University of Minnesota, ou=ECE,
email=joey@umn.edu, c=US
Date: 2023.01.06 16:41:14 -06'00'

Dr. Joseph John Talghader

APPENDIX A – CLAIM LISTING

U.S. Patent No. 8,901,516

Claim or Element #	Claim Language
Claim 1	
[Preamble]	An excitation light source assembly, comprising:
[1a]	a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening,
[1b]	said housing being mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;
[1c]	a light source positioned within each of the plurality of lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and
[1d]	a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said light sources; and
[1e]	a control system operatively connected to each of said light sources said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of said camera, the object fluorescing in response to the excitation illumination provided by said light sources.

Claim 2	The excitation light source assembly of claim 1 wherein said narrow-band light source emits light having a bandwidth of about 35 nm.
Claim 3	The excitation light source assembly of claim 2 wherein said at least one narrow-band light source comprises a light emitting diode.
Claim 4	The excitation light source assembly of claim 1, further comprising at least one filter positioned adjacent at least one diffuser in at least one of the lamp receptacles defined by said housing.
Claim 5	The excitation light source assembly of claim 4, wherein said at least one filter comprises a notch filter having a wavelength bandpass range of about 30 nm.
Claim 6	The excitation light source assembly of claim 1, wherein at least one of the light sources comprises a broad-band light source.
Claim 7	The excitation light source assembly of claim 1, wherein at least some of said plurality of lamp receptacles comprise opposed pairs of lamp receptacles on opposite sides of said central opening, each opposed pair of lamp receptacles producing light of the same color.
Claim 8	The excitation light source assembly of claim 7, further comprising ten opposed pairs of lamp receptacles on opposite sides of said central opening.
Claim 9	The excitation light source assembly of claim 1, wherein the light source positioned within each of the

	plurality of lamp receptacles does not extend beyond the lamp receptacle.
Claim 10	The excitation light source assembly of claim 1, further comprising a plurality of light sources positioned within at least some of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles.
Claim 11	The excitation light source assembly of claim 10, wherein said plurality of light sources is three light sources.
Claim 12	The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise a plurality of large diameter receptacles and a plurality of small diameter receptacles.
Claim 13	The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically-shaped light receptacles.
Claim 14	
[Preamble]	An assembly, comprising:
[14a]	a support structure;
[14b]	a camera mounted to said support structure;

[14c]	an excitation light source assembly mounted to said support structure, said excitation light source assembly comprising:
[14c1]	a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening, said housing being mounted to said support structure so that the central opening is aligned with said camera and so that a field of view of said camera is substantially unobstructed by said housing;
[14c2]	at least one narrow-band light source positioned within at least one of the plurality of lamp receptacles; and
[14c3]	a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said narrow-band light sources; and
[14d]	a control system operatively connected to each of said narrow-band light sources, said control system operating selected ones of said narrow-band light sources to provide a desired excitation illumination to a fluorescent material within the field of view of said camera, the fluorescent material fluorescing in response to the excitation illumination.
Claim 15	The assembly of claim 14, further comprising a light filter positioned adjacent each of the diffusers.
Claim 16	The assembly of claim 14, wherein each of the lamp receptacles defined by said housing are angled with respect to a central axis of said housing so that light emitted from each of said narrow-band light sources is directed to a desired area within the field of view of said camera.

Claim 17	The assembly of claim 14, wherein each of said narrow-band light sources is selected to provide desired number of illumination bands over a desired spectral range.
Claim 18	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 745 nm.
Claim 19	The assembly of claim 17, wherein the desired number of illumination bands is 10.
Claim 20	The assembly of claim 17, wherein each desired illumination band has a bandwidth ranging from about 30 nm to about 35 nm.
Claim 21	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 900 nm.
Claim 22	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 800 nm.
Claim 23	The assembly of claim 14, wherein each of said narrow-band light sources comprises a light emitting diode.
Claim 24	The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.
Claim 25	
[Preamble]	An excitation light source assembly, comprising:
[25a]	a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening, said housing being mountable to a support structure so that the central opening is aligned

	with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;
[25b]	a light source positioned within each of the plurality of lamp receptacles so that said light sources do not extend beyond the lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and
[25c]	a control system operatively connected to each of said light sources, said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of the camera, the excitation illumination causing fluorescent materials in the object to fluoresce, the camera capturing an image of the fluorescing material in the object.
Claim 26	The excitation light source assembly of claim 25, wherein said plurality of lamp receptacles defined by said housing comprise a plurality of large diameter lamp receptacles and a plurality of small diameter lamp receptacles, said large diameter lamp receptacles receiving a plurality of said light sources, said small diameter receptacles receiving a single light source.
Claim 27	The excitation light source assembly of claim 25, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically shaped light receptacles.

Declaration of Joseph John Talghader, Ph.D.

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APPENDIX B - DOCUMENTS CONSIDERED

Court Documents in this Matter:

EX1020 Complaint (ECF No. 1).

EX1021 Complaint Exhibit A-U.S. Patent 8,901,516 (ECF No. 1-2).

EX1022 Complaint Exhibit B-Vilber Newton Marketing Brochure (ECF No. 1-2).

EX1023 Answer (ECF No. 16).

EX1024 Plaintiff's Disclosure of Asserted Claims and Preliminary Infringement Contentions and Document Production dated July 11, 2022.

EX1025 Defendant's Preliminary Invalidity Contentions of Plaintiff's U.S. Patent No. 8,901,516.

EX1031 Exhibits A-M from Expert Report

Patent Documents Reviewed:

EX1001 U.S. Patent 8,901,516 ("516 Patent).

EX1002 U.S. File History for '516 Patent (Spectral_0000022-0000991)

EX1005 Provisional Patent Application No. 61/379,282 ("Provisional Application" claimed for benefit by the '516 Patent).

EX1006 U.S. Patent Application Publication No. US 2009/0268426 A1 ("Pohlert")

- EX1007 U.S. Patent 6,454,437 (“Kelly”)
- EX1008 English Translation of Japanese Patent No. JP 10-040330 A (“Nomura”) in the File History of the ’516 patent at pp.752-759.
- EX1009 U.S. Patent Application Publication No. 2004/0245170 A1 (“Furze”)
- EX1010 U.S. Patent Application Publication No. 2004/0121175 A1 (“Flexman”)
- EX1011 U.S. Patent 5,984,494 (“Chapman”)
- EX1012 U.S. Patent 6,894,289 (“Nilson”)
- EX1013 U.S. Patent 6,033,087 (“Shozo”)
- EX1040 “Olympus,” certified English translation, Japan Patent Application JP 2004 325174 A, “Fluorescence Detection Device,” to Olympus Corporation published Nov. 18, 2004
- EX1043 “Brydegaard,” Broad-band multispectral microscope for imaging transmission spectroscopy employing an array of light-emitting diodes,” American Journal of Physics 77(2) pp. 104-110 (February 2009)
- EX1044 “GBox” dated June 4, 2009, as archived on Archive.Org on August 24, 2009 at
https://web.archive.org/web/20090824075803/http://www.syngene.com/2009_GBOX2.pdf
- EX1045 “GBox Specification,” as accessed from Archive.Org as stored on November 19, 2008 at
https://web.archive.org/web/20081119154705/http://www.syngene.com/GBOX_SPEC_2008.pdf

EX1060 “Hansen,” WO 01/77648 A1 “Method and Apparatus for Detecting Fluorescence of a Sample,” published October 18, 2001

EX1064 “Frangioni”, WO 2009/009671 Frangioni and Gioux – LED LIGHTING MODULES

EX1074 U.S. Patent Application Publication No. 2003/0026762 A1 (“Malmros”)

Other Resources:

EX1014 <https://www.merriam-webster.com/dictionary/surrounding> last visited October 17, 2022.

EX1015 IEEE Standard C37.20.10-2016 IEEE Standard Definitions for AC (52 kV and below) and DC (3.2 kV and below) Switchgear Assemblies at p. 24. Definition of “surface-mounted-device.”

APPENDIX C – CLAIM CONTRUCTION EXPERT REPORT

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	§	
SPECTRAL INSTRUMENTS IMAGING,	§	
LLC	§	
	§	Civil Action No. 4:22-cv-00043
Plaintiff,	§	
	§	JURY TRIAL DEMANDED
vs.	§	
	§	
SCINTICA, INC.	§	
	§	
Defendant.	§	
	§	

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I. BACKGROUND AND QUALIFICATIONS

1. I, Prof. Joseph John Talghader, have been retained by Perry & Perry, PLLP, counsel for Defendant Scintica, Inc. (“Scintica”) in the above-captioned proceeding to opine on issues regarding U.S. Patent 8,901,516 (the “’516 patent” or **Exhibit D**). I have been asked to provide an opinion as to the level of ordinary skill in the art at or about the time the applications for the ’516 patent were filed; and the scope and meaning of certain of the disputed patent claims of the ’516 patent. If called upon as a witness, I could competently testify to the truth of each statement herein.

2. I reserve the right to amend or update this report if additional information becomes available.

3. I am currently a Full Professor of Electrical Engineering and Computer Science at the University of Minnesota, Department of Electrical Engineering, in Minneapolis, Minnesota.

4. A copy of my Curriculum Vitae is submitted as **Exhibit A** and includes details of my education, professional, and employment credentials. Further relevant experience, including, but not limited to, the design of lighting systems for medical imaging is set forth below.

5. I received my Bachelor of Science in electrical engineering from Rice University in 1988. I attended the University of California at Berkeley for graduate studies where I earned a Master of Science degree in 1993 and a Ph.D. in 1995 from the Department of Electrical Engineering. I was awarded an NSF Graduate Fellowship for my graduate studies. My doctoral thesis related to semiconductor lasers.

6. I worked for Texas Instruments as a Process Development Engineer, investigating EEPROM memory design and reliability issues from 1992 to 1993.

7. Following my graduation from Berkeley in 1995, I worked for Waferscale Integration, where I developed microfabrication processes for high-density nonvolatile memory devices.

8. In 1997 I joined the faculty at the University of Minnesota as an Assistant Professor and was promoted to Associate Professor in 2003. In 2008 I was promoted to Full Professor in the Department of Electrical and Computer Engineering of the University of Minnesota.

9. I have taught classes on several engineering topics, such as Introduction to Modern Optics, Infrared Physics and Technology, Optical Electronics, Introduction to Microsystems Technology, Optical Fiber Communication, Advanced MOS Devices, Semiconductor Properties, Semiconductor Devices, Advanced Semiconductor Devices, Quantum Electronics, Transmission Lines (Electromagnetism), and Linear Systems and Circuits.

10. I have extensive experience in the study and design of light emitting devices (including light emitting diodes, computer and other displays, semiconductor and other types of lasers, and incandescent lights), optics, optical and infrared materials, optical and infrared detectors and focal plane arrays, optical coatings, optical filters, optical diffusers, photovoltaic and solar cells devices, and directed energy component technologies. I have experience in research using lasers to study laser-induced material breakdown. I have performed research on multispectral thermal detectors and heat transfer devices. I have also worked on projects involving the scanning of biological samples, including fluorescent imaging.

11. I have consulted in the following industries: light emitting diode design for tissue oxygenation sensing, computer and other displays regarding blue light emission and toxicity, micromechanical devices for biosensing, microelectronics packaging, microelectronics assembly, and fiber optic telecommunications.

12. I am named as an inventor on 8 issued U.S. patents. I am also named as an inventor on other patent application publications. A list of issued U.S. patents naming me as an inventor is found in **Exhibit B**.

13. A list of all the publications I have authored in the previous ten (10) years are found in the copy of my Curriculum Vitae (**Exhibit A**) attached to this report.

14. I have not testified as an expert at trial or by deposition in the last four (4) years.

II. INFORMATION RELIED UPON

15. In the course of my analysis and the formulation of my opinion, I have reviewed numerous documents produced in this case as well as reviewed publicly available information deemed pertinent. My opinions and analyses are presented in Section IV and are based on my independent examination of information, including those items listed in **Exhibit C** to this report, and my professional experience.

16. Information from either Plaintiff or Defendant may also be updated before trial. Therefore, I reserve the right to revise or expand these opinions before trial.

17. The report is to be used for the specific purpose of this litigation and is not to be used for any other purpose without my express prior written consent.

III. APPLICABLE PRINCIPLES

A. Level of Ordinary Skill in the Art and Relevant Time Frame

18. The '516 patent relates to an excitation light source assembly for an imaging system, including a housing for holding light sources and other optical components, such as a diffuser, and a control system connected to each of the light sources to provide an excitation illumination to an object that can be captured by a camera. To understand the patent, a person of ordinary skill in the art should have an understanding of light sources, structures for holding and

electrically connecting the light sources, optical devices such as filters and diffusers, cameras, and control systems to operate the light sources.

19. It is my understanding that factors such as the types of problems encountered in the art, prior art solutions to such problems, how fast innovations are made, sophistication of the technology, and the educational level of active workers in the field are to be considered when determining the level of ordinary skill in the art.

20. After considering such factors, it is my opinion, that a person of ordinary skill in the art would have at least a bachelor's degree in engineering or physics and about two years of experience in imaging systems or studies or research relating to light sources used in imaging systems. Additional education may supplement practical experience and additional practical experience may supplement education.

21. In my opinion, I meet the conditions for a person of ordinary skill in the art of the '516 patent.

22. I understand that the '516 patent has a priority date, as stated on its face, and that this is the relevant time frame for the purpose of determining how a person of ordinary skill in the art would understand the claims of the '516 patent.

23. The '516 patent states that it was filed on August 31, 2011, and that it claims the benefit of a Provisional patent application No. 61/379,282, filed on September 1, 2010 (the "Provisional Application" or **Exhibit E**). I have not conducted a detailed comparison of the contents of the Provisional Application and the '516 patent, but it is plain to see that they are not the same documents. The Provisional Application has 28 numbered paragraphs, 17 unnumbered photos, and 7 numbered, hand-annotated figures, and the '516 patent has 71 numbered paragraphs, no unnumbered photos, and 13 numbered figures that appear to be typed and not hand-annotated. **Exhibit E**, pp.6-43; Spectral_0000026 – 0000067. Furthermore, the '516 patent refers to

“receptacles 18” in a “housing 14” and “light sources 20” (see, for example, ’516 patent, 3:26-30), but the Provisional Application does not appear to use the term “receptacle” and instead refers to “elongated holes” in the housing (Provisional Application, p.6, ¶0002, *see also* pp.6-43, generally). Therefore, the ’516 patent specification and the Provisional Application specification are not identical.

24. Whether the date attributed to claims of the ’516 patent is September 1, 2010 (the Provisional Application filing date) or August 31, 2011 (the filing date of the ’516 patent application), in my opinion a person of ordinary skill in the art would interpret the claim language discussed herein the same way for either date.

B. Claim Construction

25. I understand that the claims of a patent define the alleged invention, and the purpose of claim construction is to understand how a person skilled in the relevant art would have understood disputed claim terms at the time of the alleged invention.

26. I understand that a patent may include two types of claims, independent and dependent. An independent claim stands alone and includes limitations it recites. A dependent claim depends on an independent claim or another dependent claim, and includes the limitations that it recites, in addition to the limitations recited in the claim(s) from which it depends.

27. I understand that the words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art at the time of the invention, when read in the context of the patent, including the claims and specification, and also in the context of the prosecution history.

28. I understand that the patent and its prosecution history are part of what is called “intrinsic evidence.” I understand that the intrinsic evidence only compels departure from the plain meaning of claim terms in two situations, when the patentee acts as his or her own lexicographer

or if the patentee disavows claim scope. I further understand that to act as its own lexicographer a patentee must clearly set forth a definition of a claim term and clearly express intent to define the term. I also understand that disavowal requires that the intrinsic evidence makes clear that the invention does not include a particular feature or requirement.

29. I understand that, in certain circumstances, the Court may need to look beyond the intrinsic evidence and consider “extrinsic evidence” in order to understand, for example, the meaning of a term in the relevant art at the time of the invention, or to understand the background of the technology. I understand that extrinsic evidence can include things like, for example, expert opinions, dictionaries, treatises, statements by the parties, other patents, and publications.

IV. CLAIM CONSTRUCTION OPINIONS

A. **“a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening” (Claim Term #1)**

30. One of the claim phrases about which I have been asked to render an opinion on is “a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening,” recited in independent claims 1 and 14, and referenced as “said housing” in dependent claims 4, 12¹, 13², 16, 24. (Claim Term #1.)

31. In my opinion, after reading the ’516 patent and its prosecution history a person of ordinary skill in the art would conclude that the housing defines **both** the central opening **and** the plurality of lamp receptacles surrounding the central opening.

1. **’516 Prosecution History Shows Plaintiff Argued that the Claims Require the Housing to Define a Plurality of Lamp Receptacles**

32. To overcome rejections of the claims of the ’516 patent application, Plaintiff argued the housing defines the plurality of lamp receptacles. For example, in response to the Examiner’s

¹ Claim 12 is not one of the Asserted Claims in this case.

² Claim 13 is not one of the Asserted Claims in this case.

obviousness rejection combining three prior art references (Pohlert, Kelly, and Nomura, **Exhibits F, G, and H**, respectively)³, Plaintiff argued “...the resulting combination [of Pohlert, Kelly, and Nomura] would still fail to meet at least the limitations of the claims that **require the housing 14 to define a plurality of lamp receptacles 18.**” (Amendment of April 30, 2013, at Spectral_0000828-0000829 (bolding added for emphasis), responding to an Office Action of January 30, 2013, at Spectral_0000775-0000788.)

33. In that same Amendment, Plaintiff also argued “**Independent claim 1 requires that housing 14 define a plurality of lamp receptacles 18.**” Spectral_0000829 (italics in original, bolding added for emphasis). Plaintiff asserted that Pohlert was distinguishable from claim 1, stating “[n]owhere does Pohlert [US Patent Pub. No. US 2009/0268426 A1] disclose, or even suggest, an embodiment having a **housing that defines both a central opening therein as well as a plurality of lamp receptacles.**” Spectral_0000829 (bolding added for emphasis). Plaintiff further argued: “...Kelly’s [U.S. Patent 6,454,437 B1] **housing 2 also does not define a plurality of lamp receptacles.**” *Id.* (bolding added for emphasis).

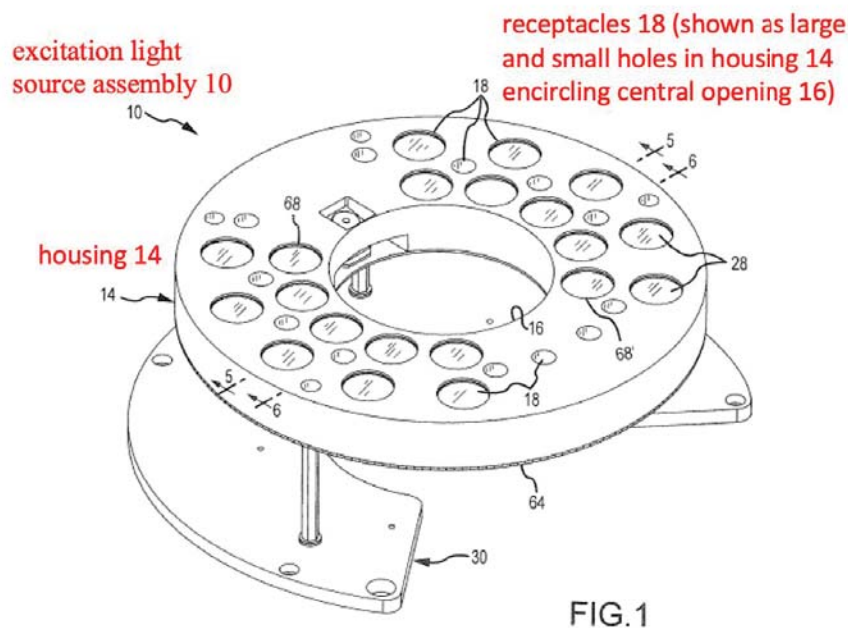
34. A person of ordinary skill in the art would understand from the prosecution history that Plaintiff represented that the claims “**require the housing 14 to define a plurality of lamp receptacles 18.**” Amendment of April 30, 2013, at Spectral_0000828-0000829 (bolding added for emphasis).

2. ’516 Patent Specification Confirms the Housing Defines the Lamp Receptacles

35. A person of ordinary skill in the art would consult the ’516 patent to understand what the “housing 14 to define a plurality of lamp receptacles 18” means. *Id.* The ’516 patent

³ Certain other dependent claim rejections used combinations of Pohlert, Kelly, and Nomura with additional references, such as Furze, U.S. Patent Appln. Pub. 20040245170 A1 (**Exhibit I**), for claim 5, and Flexman, U.S. Patent Appln. Pub. 20040121175 A1 (**Exhibit J**), for claim 27.

shows that housing 14 is part of the excitation light source assembly 10 as illustrated in different views by Figures 1, 2, 3, 5, and 6. Figure 1 shows a plurality of lamp receptacles 18 as large and small diameter holes in the housing 14:



'516 Patent, FIG. 1, Housing 14 Defining Lamp Receptacles 18 and Central Opening 16

'516 patent 2:49-51.

36. A person of ordinary skill in the art observing the lines 5 and 6 on Figure 1 would refer to the '516 patent which states that FIG. 5 is a "sectional view in perspective of the excitation light source assembly taken along the plane 5-5 of FIG. 1," showing a cross section of housing 14 having narrow-band light sources 22 in the large hole receptacles 18:

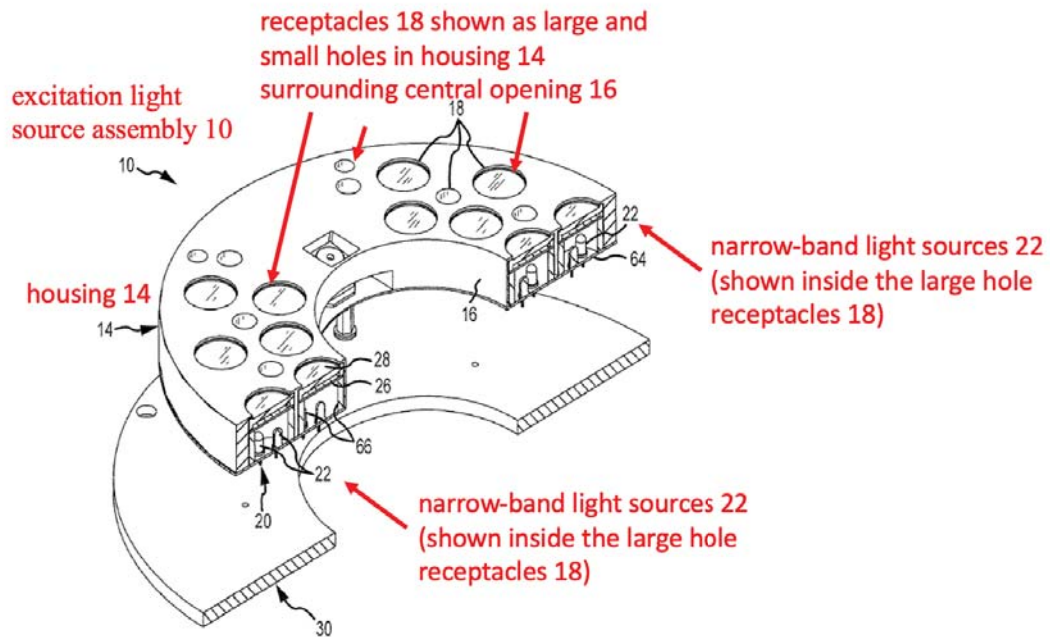


FIG.5

'516 Patent, FIG. 5, Housing 14 Large Receptacles 18 Sectional Drawing

'516 patent, 2:61-62.

37. Figure 6 shows a sectional view of housing 14 showing a cross-section of the small hole receptacles 18 that have broad-band light sources 24:

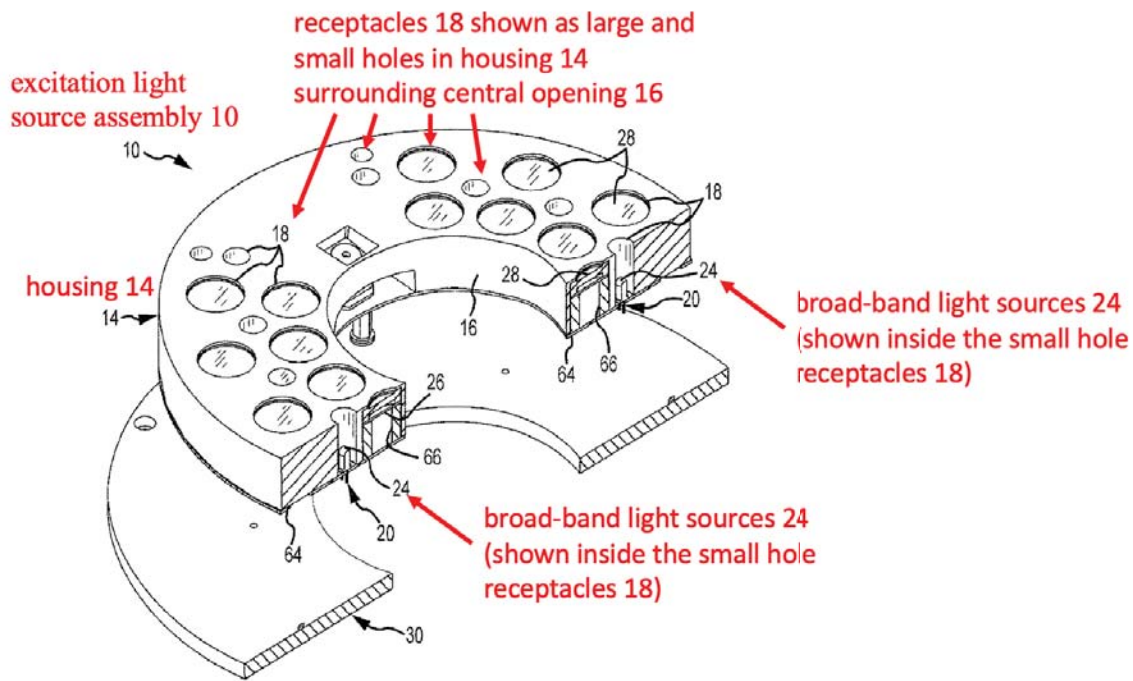


FIG.6

'516 Patent, FIG. 6, Housing 14 Small Receptacles 18 Sectional Drawing

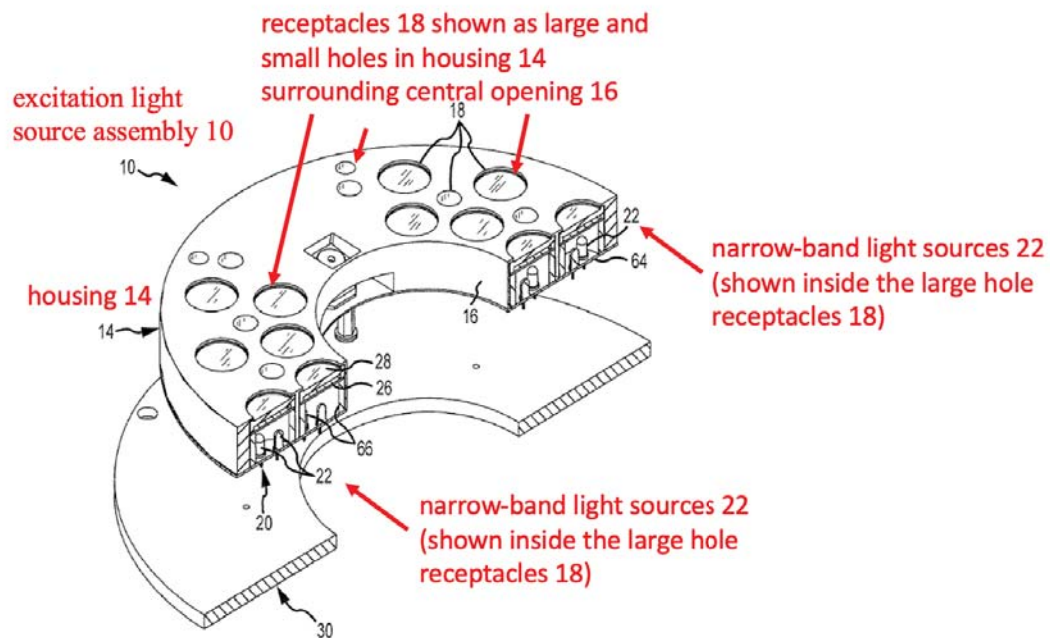
'516 patent, 2:63-64.

38. The '516 patent specification also states that housing 14 defines a plurality of receptacles, stating: "Referring now primarily to FIGS. 3, 5, and 6, the main body member 14 of excitation light source assembly 10 also **defines a plurality of lamp receptacles 18 therein that are arranged around the central opening 16.**" '516 patent, 6:46-49 (bolding added for emphasis).

39. Certain of the dependent claims of the '516 patent also explicitly reference "lamp receptacles **defined by said housing.**" '516 patent claim 4 (which depends on independent claim 1), claim 16 (which depends on independent claim 14), and claims 26 and 27 (which depend on independent claim 25); at '516 patent, 13:49-50, 14:47-48, 16:4-5, 16:11-12 (bolding added for emphasis).

3. The Plurality of Lamp Receptacles are Holes

40. A person of ordinary skill in the art would refer to the '516 patent to understand the structure of a "receptacle" as used in the '516 patent. The '516 patent states: "The housing or main body member 14 may also define a plurality of lamp receptacles 18 that are arranged around the central opening 16, as best seen in FIGS. 1 and 3. The various lamp receptacles 18 are configured to receive various light sources or lamps 20." '516 patent, 3:26-30. The '516 patent further states: "the light sources or lamps 20 may comprise one or more narrow band light sources 22 and/or one or more broad-band light sources 24, as best seen in FIGS. 5 and 6." '516 patent, 3:31-34. A person of skill in the art would inspect Figures 5 and 6 to see cross sectional drawings of the lamp receptacles.



'516 Patent, FIG. 5, Housing 14 Large Receptacles 18 Sectional Drawing

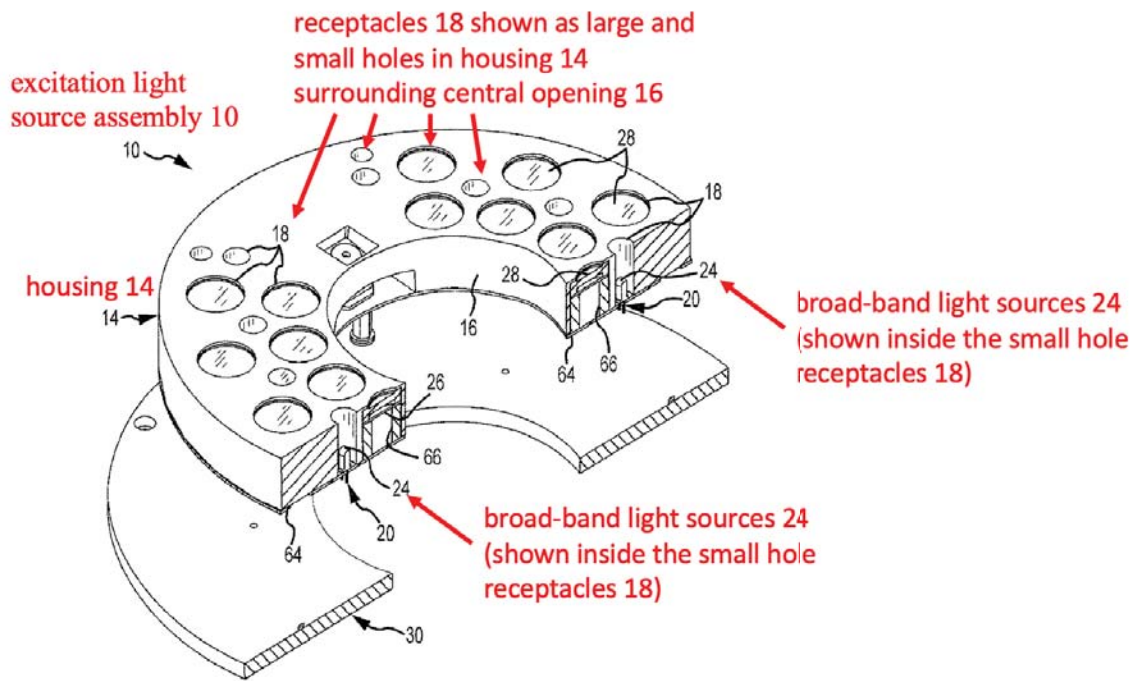
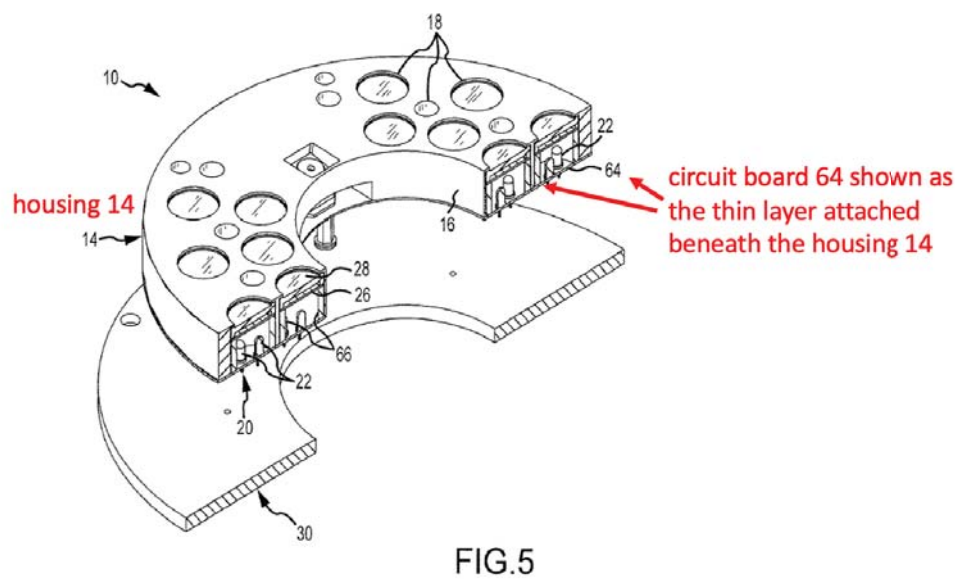
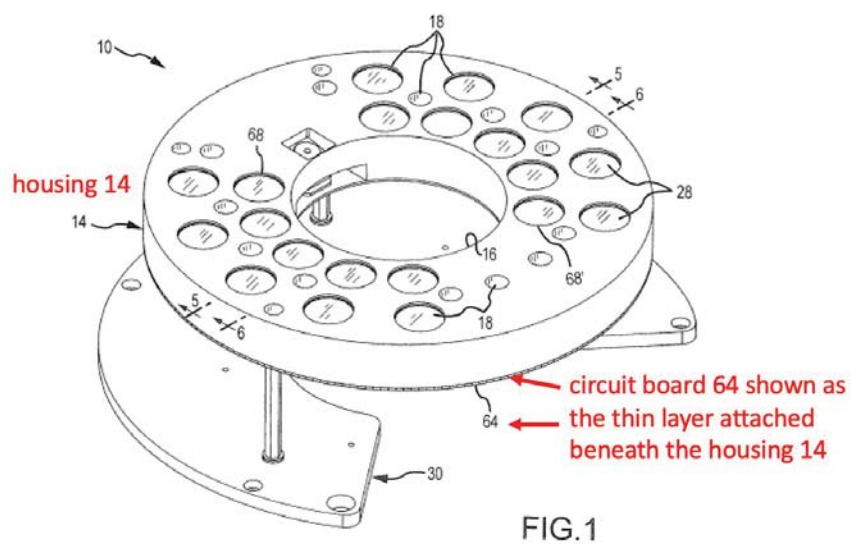


FIG.6

'516 Patent, FIG. 6, Housing 14 Small Receptacles 18 Sectional Drawing

41. A person of skill in the art would observe that the receptacles are holes (in other words, voids) that encircle the opening at the center of the main body member or housing 14.

42. A person of skill in the art would also conclude that the '516 patent does not refer to the term "receptacles" of the main body member (or housing 14) for electrical connections. The '516 patent instead refers to a separate circuit board 64 that light sources 20 are mounted to and the circuit board is "mounted or affixed to the main body 14" as shown in Figures 1, 5, and 6. '516 patent, 7:55-58, FIGS. 1, 5, 6.



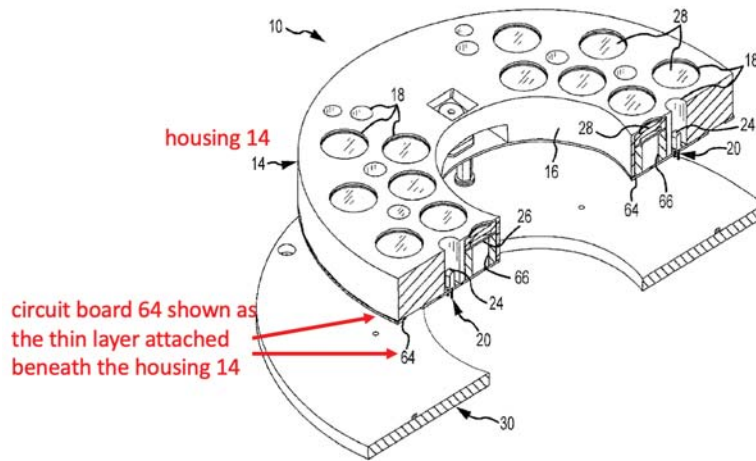


FIG.6

43. A person of ordinary skill in the art would understand that the '516 patent references circuit board 64 as the “means for physically supporting various light sources 20 within the lamp receptacles 18 and for electrically connecting the light sources 20 to the control system 40.” '516 patent 7:59-62.

44. Accordingly, the '516 patent uses the term “receptacle” of housing 14 to mean a hole, a void or a space in the housing. A person of ordinary skill in the art would understand that the '516 patent “housing” and “receptacle” is substantially different than an electrical power receptacle (for example), which provides (1) electrical connection, (2) mechanical retention, and (3) a vacancy or space such as for an electrical plug or a light bulb (as examples) to fit in.

45. Based on the foregoing, a person of skill in the art would understand that plain and ordinary meaning for a housing defining a plurality of lamp receptacles (suggesting an electrical connection) would be misleading and not representative of the housing of the '516 patent because the “receptacles” of the '516 patent are holes in the housing and not electrical connections.

4. Provisional Application Confirms that the Plurality of Lamp Receptacles are Holes

46. The '516 patent incorporates by reference U.S. Provisional Patent Application No. 61/379,282 (the "Provisional Application") "for all that it discloses." '516 patent, front page, 1:5-9.

47. A person of ordinary skill in the art would review the disclosure of the Provisional Application and observe that it refers to the holes in its housing as "elongated holes" instead of "receptacles." For example, the Provisional Application states: "A light source is positioned within each of the plurality of **elongated holes defined by the housing**." Provisional Application, p.1 (bolding added for emphasis).

5. Claim Construction of Claim Term #1

48. In my opinion, a person of ordinary skill in the art would read the '516 patent specification and the file history and conclude that the "housing" defines **both** the plurality of receptacles **and** a central opening because the entire housing phrase read as a whole characterizes **the housing** by its opening in the center (the "central opening") and the plurality of holes in the member that encircle the opening (the "receptacles" or "elongated holes").⁴

49. Based on the foregoing, I propose the following construction for Claim Term #1:

No.	Claim Term or Phrase	Claim	Defendant's Proposed Construction or Position
1.	"a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening"	1, 14	a main body member having an opening through its center, the member having a plurality of holes in the member that encircle the opening

⁴The Merriam-Webster Dictionary states that "surround" means to "enclose on all sides, envelop," or "to extend around the margin or edge of, encircle." <https://www.merriam-webster.com/dictionary/surrounding> last visited October 17, 2022 (Exhibit L).

B. “a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening” (Claim Term #2)

50. I have been asked to render an opinion on the phrase “a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening,” recited in independent claim 25, and referenced as “said housing” in dependent claims 26⁵ and 27⁶. (Claim Term #2.)

51. The only difference in Claim Term #2 from Claim Term #1 is the word “therein” following “lamp receptacles.” As discussed above, the prosecution history and patent specification analyses of Claim Term #1 demonstrate that the plurality of lamp receptacles are holes in the main body member or housing. Consequently, the addition of the word “therein” does not change the analysis.

1. Claim construction of Claim Term #2.

52. Therefore, my proposed construction for Claim Term #2 is the same as the construction for Claim Term #1.

No.	Claim Term or Phrase	Claim	Defendant’s Proposed Construction or Position
2.	“a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening”	25	a main body member having an opening through its center, the member having a plurality of holes in the member that encircle the opening

⁵ Claim 26 is not one of the Asserted Claims in this case.

⁶ Claim 27 is not one of the Asserted Claims in this case.

C. “a light source positioned within each of the plurality of lamp receptacles” (Claim Term #3)

53. Claim Term #3 recites “a light source positioned within each of the plurality of lamp receptacles.” Claim Term #3 is recited in independent claims 1 and 25.

54. In the prosecution of the ’516 patent application there were multiple office actions. The Office Action of January 30, 2013 included an obviousness rejection combining three prior art references (Pohlert, Kelly, and Nomura, **Exhibits F, G, and H**, respectively), Office Action of January 30, 2013, at Spectral_0000775-0000788.

55. Plaintiff filed an Amendment with remarks in response to the Office Action. Amendment of April 30, 2013, at Spectral_0000812-0000838. Plaintiff argued that Pohlert was distinguishable from claim 1, stating “[n]owhere does Pohlert [US Patent Pub. No. US 2009/0268426 A1] disclose, or even suggest, an embodiment having a **housing that defines both a central opening therein as well as a plurality of lamp receptacles.**” Spectral_0000829 (bolding added for emphasis). Plaintiff further argued: “...Kelly’s [U.S. Patent 6,454,437 B1] **housing 2 also does not define a plurality of lamp receptacles.**” *Id.* (bolding added for emphasis). Thus, Plaintiff argued that Pohlert and Kelly were different than the claimed subject matter, saying that their structures don’t provide a housing defining a plurality of receptacles.

56. Pohlert’s figures, such as FIG. 4, show surface mounted light sources, such as lamp segments 306 comprising a plurality of low power lamps 305, which comprise light emitting diodes (LEDs) and in various embodiments include surface mount LEDs. Pohlert, ¶¶0098, 0155, FIG. 4.

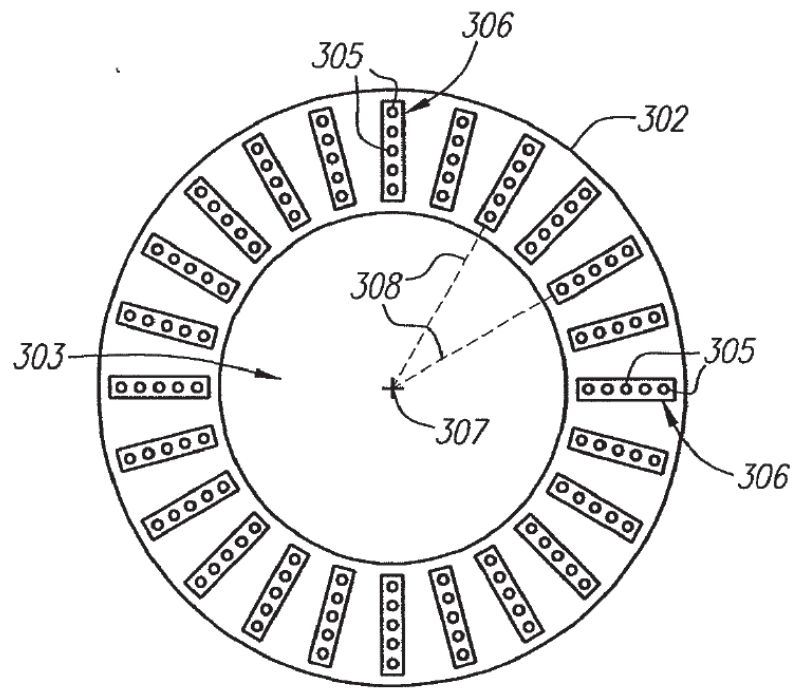


FIG. 4

57. Figures 11 and 12 of Pohlert show a plurality of lamps 1112 mounted on lighting frame 1101, which may be covered with other structures, such as a diffusion filter 1205, a color filter 1215, and a cover 1218. Pohlert, ¶¶0144, 0149, FIGS. 11, 12.

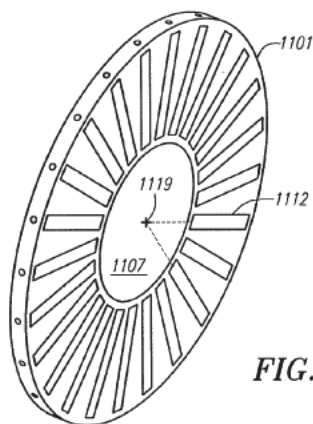


FIG. 11

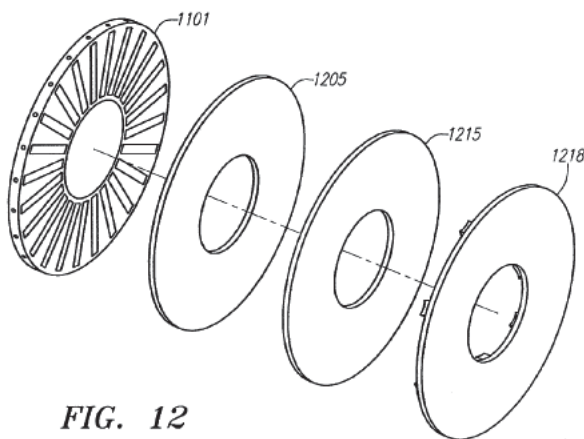


FIG. 12

58. A person of ordinary skill in the art would be able to access a definition of a surface mounted device. For example, the IEEE definition of “surface-mounted-device”: “A device in which the entire body of which projects in front of the mounting surface, with no portion penetrating the mounting surface.”⁷ Surface-mounted devices were well known prior to the filing dates of the ’516 patent as demonstrated by Pohlert, and “surface mount” or “surface mounted” as used in Pohlert (for example, at paragraph 155 of Pohlert) is a ubiquitous term of art that has the same meaning as set forth in IEEE Standard C37.20.10. **Exhibit M**, p.24.

⁷ IEEE Standard C37.20.10-2016 IEEE Standard Definitions for AC (52 kV and below) and DC (3.2 kV and below) Switchgear Assemblies at p. 24. Definition of “surface-mounted-device,” (**Exhibit M**).

59. A person of ordinary skill in the art would understand that Pohlert has numerous references relating to surface mount LEDs throughout its specification and that Pohlert's disclosure of surface mount devices is consistent with the IEEE definition. I searched and found over 30 instances of the phrase "surface mount" in Pohlert. See, for example, Pohlert, ¶155.

60. In addition to arguing that Pohlert's surface mounted light sources do not teach the recited "housing" and do not teach "light sources positioned within each of its receptacles," Plaintiff argued that "Kelly's housing 2 also does not define a plurality of lamp receptacles." Amendment of April 30, 2013, at Spectral_0000829.

61. Pohlert and Kelly are prior art examples of surface mounted light sources used in a rejection by the Examiner in prosecution. Plaintiff argued that a light source positioned *within* receptacles (as recited in claim 1) is different than the surface-mounted light sources of Pohlert and Kelly:

"Independent claim 1 requires that housing 14 define a *plurality* of lamp receptacles 18. Claim 1 also requires at least one light source 20 to be positioned *within* each of the plurality of lamp receptacles 18. These limitations are not met by any of Pohlert, Kelly, and Nomura. For example, while Pohlert discloses several different lighting frame embodiments (e.g., 202, 302, 1101, etc., shown in Figs. 1-4, 11, and 12), none of Pohlert's lighting frames define a plurality of lamp receptacles within which are received the light sources. To the contrary, Pohlert mounts his light sources directly *on* the surfaces of his lighting frames. See, for example, Figures 2, 4, 11, 12, 15c, 30a, 30b, and 30c of Pohlert. Nowhere does Pohlert disclose, or even suggest, an embodiment having a housing that defines both a central opening therein as well as a plurality of lamp receptacles. Pohlert further fails to disclose a lighting system wherein the light sources are positioned *within* each of its receptacles. "

Spectral_0000829 (emphasis in original).

62. In the next Office Action dated July 10, 2013, the Examiner withdrew the prior rejection based on Plaintiff's arguments from the prior Amendment. Spectral_0000844. The Examiner acknowledged Plaintiff's exclusion of surface mounted devices (for example, the surface mounted LEDs of Pohlert), stating for example, Pohlert "fails to explicitly state that said light source is positioned within each of a plurality of lamp receptacles." Spectral_0000847. The Examiner continued: "Nevertheless, those skilled in the art appreciate that such a configuration was known and would have been a matter of design choice since there were a finite number of predictable configurations (i.e., **surface mount**, recessed receptacle)." *Id.* (bolding added for emphasis). The Examiner made a new rejection using a new reference, Chapman (**Exhibit K**), to provide the recessed receptacle: "Substituting the **surface mount configuration taught by Pohlert** with the receptacles taught by Chapman would have been obvious" *Id.* (bolding added for emphasis). The Examiner thus differentiated surface mount devices from recessed devices based on Plaintiff's arguments in prosecution.

1. **Claim construction of Claim Term #3.**

63. Based on the foregoing, I propose the following construction for Claim Term #3:

No.	Claim Term or Phrase	Claim	Defendant's Proposed Construction or Position
3.	"a light source positioned within each of the plurality of lamp receptacles"	1, 25	a non-surface-mounted light source in each of the plurality of holes in the member

D. **"a narrow-band light source positioned within at least one of the plurality of lamp receptacles" (Claim Term #4)**

64. Claim Term #4 recites "a light source positioned within at least one of the plurality of lamp receptacles." Claim Term #4 is recited in independent claim 14.

65. Claim Term #4 differs from Claim Term #3 in that it requires the light source to be a narrow-band light source whereas Claim Term #3 recites “a light source.” Claim Term #4 also recites that its narrow-band light source is “positioned within at least one of the plurality of lamp receptacles” instead of in “each” of its plurality of receptacles, as stated in Claim Term #3.

1. Claim construction of Claim Term #4.

66. Based on the foregoing, I propose a slightly different claim construction for Claim Term #4, which takes into account Plaintiff’s disavowal of surface-mounted devices and the “at least one” recitation of the number of light sources positioned within receptacles:

No.	Claim Term or Phrase	Claim	Defendant’s Proposed Construction or Position
4.	“a narrow-band light source positioned within at least one of the plurality of lamp receptacles”	14	a non-surface-mounted narrow-band light source in at least one of the plurality of holes of the member

E. “diffuser” (Claim Term #5)

67. Claim Term #5 is “diffuser.” Claim Term #5 is referenced as “a diffuser positioned within at least some of the plurality of receptacles” in independent claims 1 and 14, it is referenced as “at least one diffuser” in dependent claim 4, and it is referenced as “the diffusers” in dependent claim 15.

68. The ’516 patent states that optical diffusers are “well known in the art.” ’516 patent, 9:29-30. I agree.

69. The ’516 patent specification states that a “diffuser 26 diffuses or spreads light produced by the light source 20, thereby generally providing for more even illumination than would be provided by light source 22 alone.” ’516 patent, 9:22-25. While I generally agree with this characterization, in my opinion a person of skill in the art would understand that a diffuser

diffuses or spreads light by randomizing rays of light passing through it to make the light passing through it more even.

1. Claim construction of Claim Term #5.

70. Based on the foregoing, I propose the following construction of “diffuser”:

No.	Claim Term or Phrase	Claim	Defendant’s Proposed Construction or Position
5.	“diffuser”	1, 4, 14, 15	an optical component that spreads and randomizes rays of light passing through it to provide more even illumination than would be without the optical component

F. “a diffuser positioned within at least some of the plurality of lamp receptacles” (Claim Term #6)

71. Claim Term #6 refers to the diffuser “positioned within at least some of the plurality of receptacles” in independent claims 1 and 14.

72. The ’516 patent specification states:

In a typical application, those lamp receptacles 18 that are provided with narrow band light sources 22 may also be provided with diffusers 36 and filters 28, whereas those **receptacles 18 that are provided with broad-band light sources 24 will not be provided with diffusers 26** and filters 28. Alternatively, other arrangements are possible, as will be described herein.

’516 Patent, 3:40-51 (bolding added for emphasis).

73. Therefore, the ’516 patent specification states that “in typical applications” receptacles provided with broad-band light sources will not be provided with diffusers, and that, “[a]ternatively, other arrangements are possible, as will be described herein.” Id.

74. I studied the ’516 patent specification for how it describes the use of diffusers. In Figures 5 and 6, the diffusers 26 are positioned within receptacles only with narrow-band light

sources 22, consistent with the '516 patent's limitation of diffusers adjacent narrow-band light sources only.

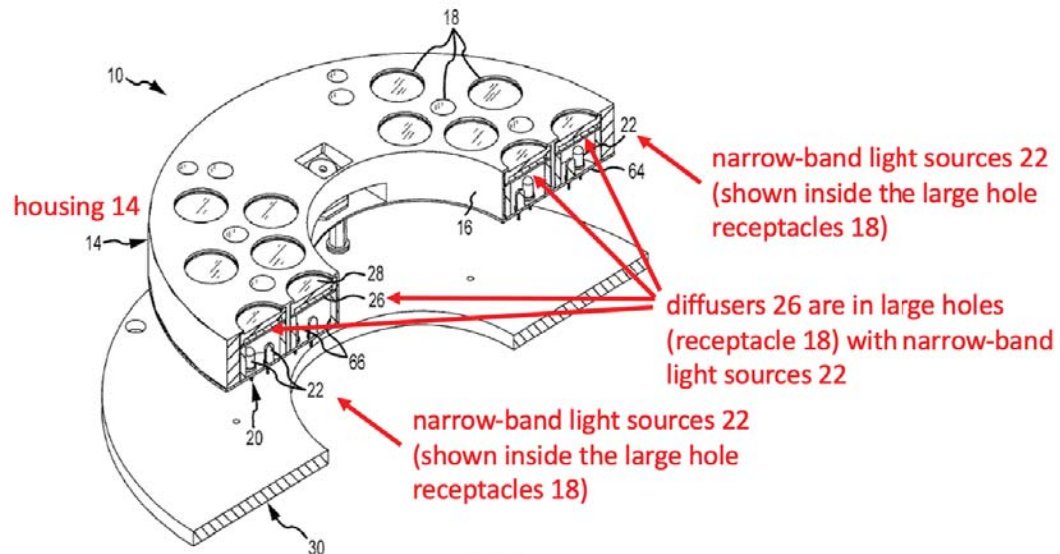


FIG.5

'516 Patent FIG. 5 Showing Diffusers for Narrow-Band Light Sources Only

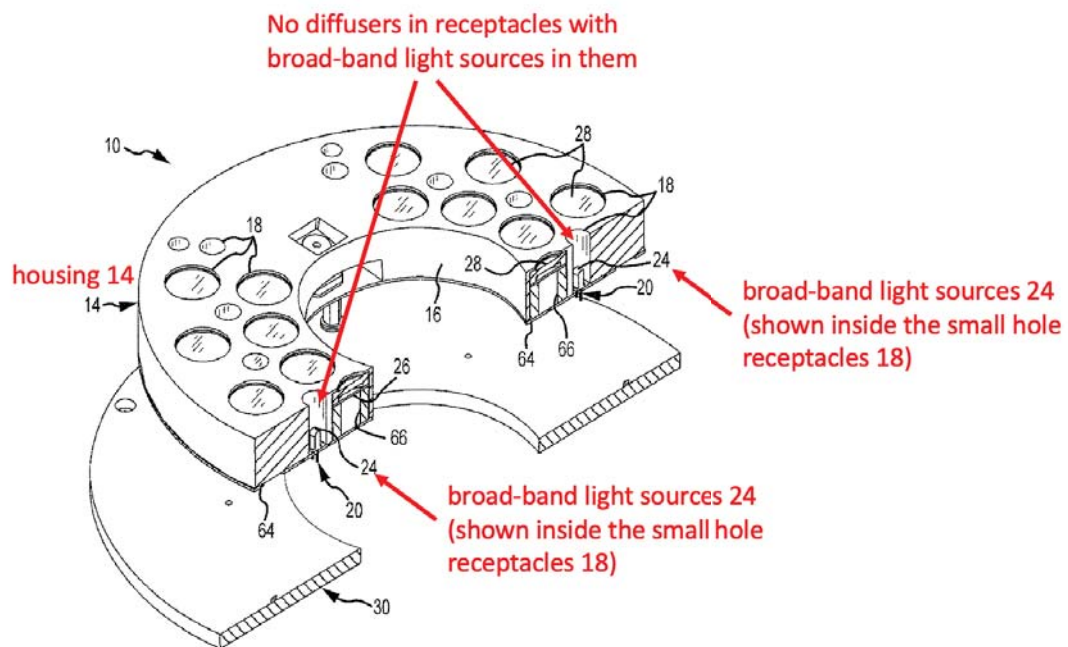


FIG.6

'516 Patent FIG. 6 Showing No Diffusers for Broad-Band Light Sources

75. I searched for examples of diffusers in receptacles having broad-band light sources 24 in the '516 patent specification, and I was unable to find any.

76. I searched for examples of diffusers in the embodiment of FIGS. 9-11, which the '516 patent names "a second embodiment 110." '516 patent, 3:3-5, 11:6, etc. I observed that the '516 patent uses like numbering for the second embodiment, adding a "1" prior to an existing label number to designate it in the second embodiment. For example, in the first embodiment, a diffuser is labeled "26" and in the second embodiment, a diffuser is labeled "126." '516 patent, 12:26.

77. Since the first embodiment uses label 24 for a broad-band light source, I searched for a reference to a label 124 in the '516 patent specification, but I did not find one. I was also unable to find a discussion of a broad-band light source with regard to the second embodiment.

78. I also searched for examples of diffusers in the embodiment of FIGS. 12-13, which the '516 patent names "a third embodiment 210." '516 patent, 3:12, 12:42. I searched for a reference to a label 224 in the '516 patent specification, but I did not find one. I was also unable to find a discussion of a broad-band light source with regard to the third embodiment.

1. Claim construction of Claim Term #6.

79. Based on the foregoing, in my opinion the '516 patent requires that diffusers be used only in receptacles having narrow-band light sources. Based on the foregoing, I propose the following construction for Claim Term #6:

No.	Claim Term or Phrase	Claim	Defendant's Proposed Construction or Position
6.	"a diffuser positioned within at least some of the plurality of lamp receptacles"	1, 14	a diffuser positioned within at least some of the holes of the member that contain narrow-band light sources

V. DATA AND OTHER INFORMATION CONSIDERED

80. The information I considered in forming my opinions to date is listed in **Exhibit C** to this report.

VI. EXHIBITS AND SCHEDULES TO BE USED AS A SUMMARY OF SUPPORT FOR MY OPINIONS

81. This report includes some exhibits and schedules that may be used to support my opinions. I reserve the right, however, to supplement these materials with additional summaries or exhibits to be used for claim construction.

VII. TESTIMONY

82. None.

VIII. COMPENSATION FOR THE STUDY AND TESTIMONY

83. Compensation for the study and testimony in this case have been or will be charged at an hourly billing rate of \$250 per hour. Out-of-pocket expenses are billed as incurred. My work on this case is anticipated to be ongoing. I have no financial interest in the outcome of this case and the compensation received from this case is not contingent upon my opinions or performance.

IX. PROFESSIONAL ASSISTANCE

84. None.

X. SIGNATURE

85. I declare under penalty of perjury of the laws of the United States that the forgoing is true and correct to the best of my knowledge.

Dated: October 17, 2022



Digitally signed by Joseph Talghader
DN: cn=Joseph Talghader, o=University of
Minnesota, ou=ECE, email=joey@umn.edu,
c=US
Date: 2022.10.17 17:36:47 -05'00'

Joseph John Talghader, Ph.D.

EXHIBIT INDEX

Exhibit A	Curriculum Vitae of Prof. Joseph J. Talghader
Exhibit B	Issued U.S. Patents
Exhibit C	Documents Considered
Exhibit D	U.S. Patent 8,901,516 (“’516 Patent)
Exhibit E	Provisional Patent Application No. 61/379,282 (“Provisional Application”) which the ‘516 Patent claims for benefit
Exhibit F	U.S. Patent Application Publication No. US 2009/0268426 A1 (“Pohlert”)
Exhibit G	U.S. Patent 6,454,437 (“Kelly”)
Exhibit H	English Translation of Japanese Patent No. JP 10-040330 A (“Nomura”) in the File History of the ‘516 patent at Spectral _0000752-0000759
Exhibit I	U.S. Patent Application Publication No. 2004/0245170 A1 (“Furze”)
Exhibit J	U.S. Patent Application Publication No. 2004/0121175 A1 (“Flexman”)
Exhibit K	U.S. Patent 5,984,494 (“Chapman”)
Exhibit L	https://www.merriam-webster.com/dictionary/surrounding last visited October 17, 2022.
Exhibit M	IEEE Standard C37.20.10-2016 IEEE Standard Definitions for AC (52 kV and below) and DC (3.2 kV and below) Switchgear Assemblies at p. 24. Definition of “surface-mounted-device.”