

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOYOTA MOTOR CORP.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2022-00710
Patent 9,232,158 B2

Before SCOTT A. DANIELS, FREDERICK C. LANEY, and
MATTHEW S. MEYERS, *Administrative Patent Judges*.

LANEY, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Toyota Motor Corporation (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–20 (the “challenged claims”) of U.S. Patent No. 9,232,158 B2 (Ex. 1001, “the ’158 patent”). Intellectual Ventures II LLC (“Patent Owner”) filed a Preliminary Response (Paper 7, “Prelim. Resp.”). With our authorization, Petitioner also filed a Preliminary Reply and Patent Owner filed a Preliminary Sur-reply. Paper 10 (“Prelim. Reply”); Paper 12 (“Prelim. Sur-reply”).

We have jurisdiction under 35 U.S.C. § 314. Under § 314, an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). The Board determines whether to institute a trial on behalf of the Director. 37 C.F.R. § 42.4(a). A decision to institute is “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition.” *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

For the reasons set forth below, we determine that Petitioner has not demonstrated that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. Accordingly, we do not institute an *inter partes* review of the challenged claims in the Petition.

B. *Real Parties-in-Interest*

Petitioner identifies itself and Toyota Motor North America, Inc., Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Sales, U.S.A., Inc. as the real parties-in-interest. Pet. 75. Patent Owner identifies itself as the real party-in-interest. Paper 4, 2.

C. Related Matters

Petitioner and Patent Owner both identify the '158 patent as currently being involved in the following district court litigations: *Intellectual Ventures I LLC et al. v. Toyota Motor Corp. et al.*, 2:21-cv-00389 (E.D. Tex. October 19, 2021); *Intellectual Ventures I LLC et al. v. General Motors Company*, 6:21-cv-01088 (W.D. Tex. October 19, 2021); and *Intellectual Ventures I LLC et al. v. Honda Motor Company, Ltd. et al.*, 3:22-cv-00761 (N.D. Tex. April 4, 2022). Pet. 75; Paper 4, 2.

D. The '158 Patent

The '158 patent, titled “Large Dynamic Range Cameras,” relates to “[a] digital camera [that] includes a plurality of channels and a processing component operatively coupled to the plurality of channels.” Ex. 1001, codes (54), (57). “Each channel of the plurality of channels includes an optics component and a sensor that includes an array of photo-detectors” and “[t]he processing component is configured to separately control an integration time of each channel,” as well as, “combine data from the plurality of channels to generate an image.” *Id.* at code (57). The '158 patent suggests that this configuration with two or more camera channels enable a camera to have a wide dynamic range that is greater than the dynamic range obtained by a conventional digital camera with a single image sensor channel and one integration time. *Id.* at 4:41–64.

As shown below in annotated Figure 3 provided by Petitioner (Pet. 9), the '158 patent describes a digital camera subsystem 210 (gray) that includes multiple camera channels 260A-260D (blue), each channel including a respective sensor portion 292A-292D (red) and an optics portion 290A-

290D (purple) that receives and transmits light (yellow) to the sensor portions. *Id.* at 7:17–33.

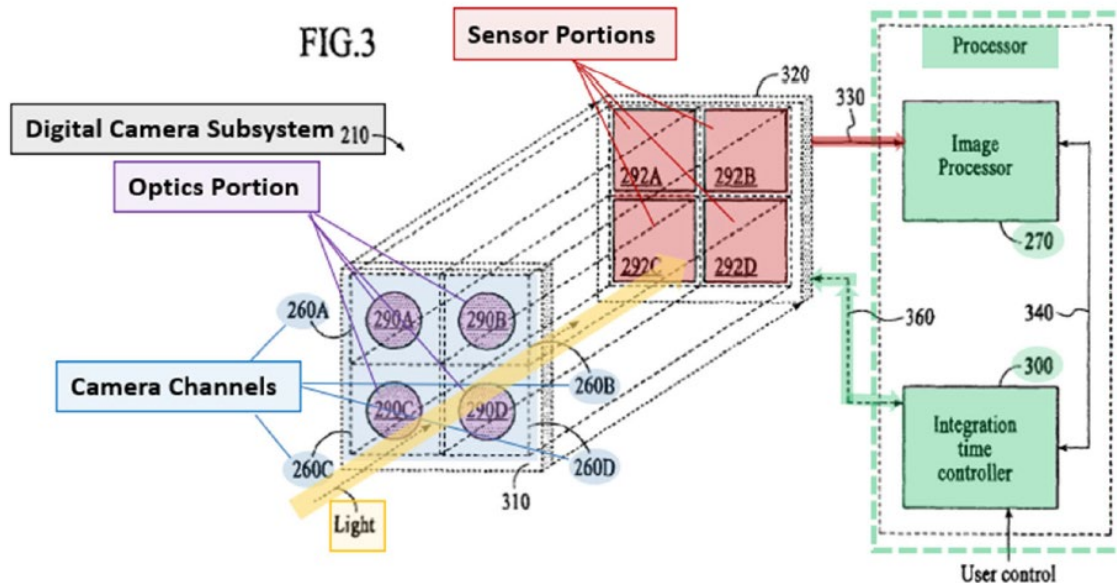


Figure 3 is a block diagram of a digital camera subsystem 210 in accordance with the invention disclosed by the '158 patent. The '158 patent describes subsystem 210 as also including “an image processor portion 270 [green] (referred to as image processor 270) and an integration time controller portion 300,” which are coupled to the sensor portions via communication couplings or links, e.g., signal lines 330 (red arrow) and 360 (green arrow). *Id.* at 8:32–35. The controller “provides integration time control for each of the camera channels” and the image processor “generates a combined image based at least in part on the images from two or more of the camera channels.” *Id.* at 8:32–38, 8:63–66.

E. Illustrative Claim

Petitioner challenges claims 1–20 of the '158 patent. Pet. 1. Claims 1, 9, and 15 are the independent claims. Ex. 1001, 25:31–39, 26:5–14, 25:30–39. Independent claim 1 is directed to an image capture device with a

plurality of sensors and optics components, as well as, a processing component. *Id.* at 25:31–39. Claims 2–8 depend from claim 1. *Id.* at 25:40–26:4. Independent claim 9 is directed to a system similar to the image capture device described in claim 1. *Id.* at 26:5–14. Claims 10–14 depend from claim 9. *Id.* at 26:15–29. Claim 15 is directed to a method of operation for a system similar to the system described in claim 15. *Id.* at 26:30–39. Claims 16–20 depend from claim 15. *Id.* at 26:40–54.

Independent claims 1 and 9 are illustrative and are reproduced below with bracketed labels employed by Petitioner to facilitate analysis and discussion.

1. [preamble] An image capture device comprising:
 - [a] a plurality of sensors;
 - [b] a plurality of optics components, wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors; and
 - [c] a processing component configured to control an integration time of each sensor.

* * * *

9. [preamble] A system comprising:
 - [a] a plurality of channels, wherein each channel of the plurality of channels includes a sensor; and
 - [b] a processing component coupled to the plurality of channels, wherein the processing component is configured to determine an integration time of each channel of the plurality of channels, wherein the processing component is configured to combine data from the plurality of channels received to provide an image.

Ex. 1001, 25:31–39, 26:5–14.

F. Prior Art and Asserted Grounds

Petitioner asserts that one or more of the challenged claims would have been either anticipated or obvious on the following six grounds:

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)
1–5, 8–11, 13–16, 19, 20	102(b)	Ikeda ²
3, 7, 13	103(a)	Ikeda, Booth ³
6, 12, 17, 18	103(a)	Ikeda, Fraenkel ⁴
1–5, 7–11, 13–16, 19, 20	102(b)	Nakajima ⁵
3, 7	103(a)	Nakajima, Booth
6, 12, 17, 18	103(a)	Nakajima, Fraenkel

Pet. 3. Petitioner supports its challenge with the Declaration of Alan Bovik (Ex. 1004).

II. ANALYSIS

Petitioner contends that we should institute an *inter partes* review of the '158 patent because several claims are anticipated by either Ikeda (Ground 1, claims 1–5, 8–11, 13–16, 19, 20) or Nakajima (Ground 4, claims 1–5, 7–11, 13–16, 19, 20); additionally, because several claims would have

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the '158 patent have an effective filing date before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103.

² US 5,801,773, iss. Sept. 1, 1998 (Ex. 1005, “Ikeda”).

³ JP Laid-Open Patent Application No. H11-317905, pub. Nov. 16, 1999 (Ex. 1006, “Nakajima”).

⁴ US 6,943,837 B1, iss. Dec. 31, 1999 (Ex. 1007, “Booth”).

⁵ WO 02/0198112 A2, pub. Dec. 5, 2002 (Ex. 1008, “Fraenkel”).

been obvious in view of the combination Ikeda and Booth (Ground 2, claims 3, 7, 13), the combination of Ikeda and Fraenkel (Ground 3, claims 6, 12, 17, 18), the combination of Nakajima and Booth (Ground 5, claims 3, 7), and the combination of Nakajima and Fraenkel (Ground 6, claims 6, 12, 17, 18). Patent Owner contends that discretionary denial of *inter partes* review under 35 U.S.C. § 314(a) is appropriate because of the alleged inefficiencies created by this proceeding in view of the parallel litigation. *See* Prelim. Resp. 21–41. And even if discretionary denial is not appropriate, Patent Owner asserts that we should deny *inter partes* review because Petitioner’s grounds of unpatentability are deficient. *See id.* at 41–54.

After considering the contentions and evidence submitted by both parties, for the reasons explained below, Patent Owner’s discretionary arguments are moot because we determine that the Petition fails to demonstrate sufficiently that there is a reasonable likelihood Petitioner would prevail in proving at least one of the challenged claims is unpatentable. Specifically, as Patent Owner argues, neither Ikeda nor Nakajima disclose “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” as recited in independent claim 1, or “a plurality of channels,” as recited in independent claims 9 and 15. Prelim. Resp. 41–54. Because Petitioner’s failure to establish Ikeda or Nakajima disclose those claim limitations is dispositive of the Petition, we focus our discussion below accordingly.

A. Principles of Law

Petitioner has the burden of proof. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (“In an IPR, the petitioner has the

burden from the onset to show with particularity why the patent it challenges is unpatentable.”). Except in limited circumstances not present here, this burden of persuasion does not shift to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A prior art reference can only anticipate a claim if it discloses all the claimed limitations “arranged or combined in the same way as in the claim.” *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1361 (Fed. Cir. 2012) (quoting *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370 (Fed. Cir. 2008)). “However, a reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)); *see also Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1343 (Fed. Cir. 2016) (distinguishing *Net MoneyIN* when the reference in question explicitly contemplated the combination of the disclosed functionalities).

Applying these general principles, we consider the evidence and arguments of the parties.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner asserts that a person of ordinary skill in the art at the relevant time would have had a “at least a four-year undergraduate degree in electrical engineering or computer science or a closely related field and at least two years of experience in the field of digital imaging. Additional education could substitute for professional experience and vice versa.” Pet. 9–10 (citing Ex. 1004 ¶ 54). In the Preliminary Response, Patent Owner contends that a skilled artisan would have had “a bachelor’s degree in electrical engineering, computer science, computer engineering, physics, or a related subject, and two to three years of work experience in digital imaging.” Prelim. Resp. 21.

For purposes of this Decision, and based on the current record, we adopt Petitioner’s characterization of the level of skill for one of ordinary

skill in the art, except we decline to adopt “at least,” as that language is vague and open-ended. However, we note Patent Owner’s proposed characterization of a skilled artisan is not meaningfully different than the one proposed by Petitioner without the “at least” language. Because we find the parties’ characterizations to be consistent with the ’158 patent and the asserted prior art, we apply in our analysis below Petitioner’s characterization, as modified by the Board, for the level of ordinary skill in the art.

C. Claim Construction

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2019). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’”).

Petitioner contends that “no terms need construction because the claims read on the prior art identified below under any construction consistent with *Phillips*.” Pet. 10. In the Petition, however, Petitioner notably does not provide anything further regarding how any claim term or phrase would be construed by a skilled artisan at the time of the invention in view of the ’158 patent, despite such a requirement being imposed by 37 C.F.R. § 42.204(b)(3). *Id.*

Patent Owner contends that, applying the canons of claim construction set forth in *Phillips*, (1) “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” as recited in independent claim 1, and (2) “a plurality of channels,” as recited in independent claims 9 and 15, are properly interpreted as “excluding devices with optics that are common to multiple channels.” Prelim. Resp. 13, 15. Petitioner disagrees. Prelim. Reply 1–3. Petitioner argues that neither the claims’ plain language or the Specification require independent optics for each channel or sensor. *Id.* Because our analysis of whether the evidence presented in the Petition establishes sufficiently that either Ikeda or Nakajima anticipates independent claims 1, 9, and 15 turns on the proper interpretation of these two phrases, we address each disputed phrase in order below.

1. *“wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors” (Claim 1)*

Turning first to the claim language itself, the plain meaning of the phrase “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors” requires each optics component to pass light separately to a distinct sensor of the plurality of sensors.⁶ Ex. 1001, 25:34–36. This is so because the phrase expressly singles out “*each* optics component” from “the plurality of optics components” and associates it with passing light to “*a* sensor” that is

⁶ In the context of the ’158 patent, a sensor may be an array of photo-detectors and multiple sensors may be formed on a single semiconductor substrate or chip. Ex. 1001, code (57), 4:18–21, 4:67–5:3, 7:17–39, 11:62–676, 14:45–47, 15:46–65, 16:8–15, Figs. 2, 3, 9, 14, 15.

distinguished from “the plurality of sensors.” *Id.* (emphasis added). As a result, claim 1 requires each optics component to have a configuration that allows it to pass light separately to an individual sensor distinct from the other sensor(s) in the plurality of sensors.

Petitioner argues,

the plain language of claim 1 only requires that “each optics component” “is configured to pass light to a sensor of [a] plurality of sensors.” Thus, the plain language of claim 1 does not preclude, e.g., an optical component passing light to one or more sensors.

Prelim. Reply 1. Although, “[a]s a general rule,” the word “a” in a patent claim carries the meaning of “one or more,” “the question whether ‘a’ or ‘an’ is treated as singular or plural depends heavily on the context of its use” and “[t]he general rule does not apply when the context clearly evidences that the usage is limited to the singular.” *TiVo, Inc. EchoStar Communications Corp.*, 516 F.3d 1290, 1303 (Fed. Cir. 2008).

Here, the context clearly evidences that the usage of “a” in “a sensor” is limited to a singular one of the “plurality of sensors.” In the context of the disputed phrase “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” the article “a” before “sensor” is used to distinguish the configuration of “*each* optics component” as being able “to pass light to” to an individual sensor distinct from the other sensor(s) in the group. Ex. 1001, 25:34–36. Consistent with this interpretation, claim 1 also recites “a processing component configured to control an integration time of *each* sensor,” which similarly distinguishes the processing component’s configuration as being able to control the integration time of an individual

sensor distinct from the other sensor(s) in the group. *Id.* at 25:38–39 (emphasis added).

The Specification is in accord with this interpretation. For example, the Specification states,

The digital cameras described herein overcome this dynamic range limitation through the use of multiple camera channels, including multiple optics and image sensors on a single integrated circuit (IC) or semiconductor Substrate. The multiple camera channels are configured to image the same field of view simultaneously, and *each operates independently* under a different integration time.

Ex. 1001, 4:18–24 (emphasis added). And the Specification states,

Each channel includes an optics component and an image sensor having an active area including multiple picture elements (pixels). Each sensor is controlled under or with an independent signal integration time . . . [and] [t]he images obtained in each channel under the different integration times are obtained simultaneously or nearly simultaneously, so undesirable temporal aliasing from moving scenes or camera motion is minimized.

Id. at 3:43–57 (emphasis added). The Specification further explains that “a digital camera subsystem can have *multiple separate arrays* on a single image sensor, *each with its own lens*,” and by this “simple geometry of smaller, multiple arrays allows for a smaller lenses (e.g., smaller diameter, thickness and focal length), which allows for reduced stack height in the digital camera.” *Id.* at 14:45–50 (emphasis added). And “[e]ach of the optics portions . . . [as illustrated in Figure 15,] may include a lens, and may be associated with a respective one of the sensors arrays.” *Id.* at 15:50–53.

The individual nature of the optics component is evidenced by its description as “each be[ing] the same or different relative to the other optics.” *Id.* at 7:58–59. The Specification states, “*each sensor array and the*

*respective optics portion may define an optical component.” Id. at 15:55–56 (emphasis added). Finally, as Patent Owner correctly notes, “every figure shown in the ‘158 Patent (except the conventional prior art system distinguished by Fig. 1) includes optics specific to a channel, and none include optics that are common to more than one channel.” Prelim. Sur-reply 1; *see also* Ex. 1001, 6:43–7:3, 7:17–39, 11:44–13:10, 15:46–16:27; 17:3–24, 20:4–57.*

Petitioner argues, rather than supporting independent camera channels, that the Specification “describe[es] channels including ‘a shutter assembly’ and ‘a cover glass at the camera entrance (common aperture) to all optics (common to all optical channels),’ demonstrating that the embodiment has neither independent channels nor exclusively independent optical components.” Prelim. Reply 2–3. Petitioner argues that “[t]he ‘158 patent not only fails to clearly and deliberately disclaim shared optical components, but, as noted above, describes ‘a shutter assembly’ and a ‘common aperture’ that is ‘common to all optical channels’ for controlling the passage of light into the digital camera, contrary to the alleged disclaimer.” *Id.* at 3.

Petitioner’s argument is unavailing. In the context of the ‘158 patent, the “shutter assembly” and the “common aperture” of a digital camera are described as controlling the passage of light *into* the digital camera, and the invention addresses the channeling of the light *after* it enters the digital camera. In fact, although the Specification describes the “shutter assembly” and the “common aperture” as conventional parts of a digital camera, the Specification makes clear that the invention is directed to improving over a different conventional part in the camera; specifically, the conventional use

of a lens, color filter, and image sensor(s) assembly that forms a *single* camera channel to capture the light allowed into the camera. *See* Ex. 1001, 6:54–59. In fact, the Specification states that the invention itself may be used with a conventional “shutter assembly” and “common aperture” to control the passage of light *into* the digital camera. Ex. 1001, 5:59–6:12, 6:43–59, 7:10–16, 11:44–56, 12:18–61. But in every embodiment of the invention that the Specification discusses, rather than using the conventional lens, color filter, and image sensor(s) assembly, the embodiment captures the light conventionally allowed into the camera by using multiple camera channels formed with several optical components that each separately pass light to a different sensor. *Id.* at 6:43–7:3, 7:17–39, 11:44–13:10, 15:46–16:27; 17:3–24, 20:4–57. Thus, we agree with Patent Owner that “Petitioner’s arguments . . . wrongly assume that a shutter (a device that opens and closes), a cover or an aperture (a hole) are optics components within the meaning of the patent.” Prelim. Sur-reply 1.

When viewed in context of the intrinsic record from the perspective of a skilled artisan, the plain meaning of the phrase “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors” is properly interpreted to mean that each of the plurality of optics components is configured to pass light separately to a distinct sensor of the plurality of sensors. Therefore, we also agree with Patent Owner that the plain meaning of this claim element excludes from the scope of claim 1 devices that rely on a common optics component to pass light to multiple camera channels.

2. “a plurality of channels” (Claims 9 and 15)

Again, first looking within the context of the claim language itself, the plain meaning of “a plurality of channels” requires two or more distinct structures that each direct light to a specific sensor. Ex. 1001, 26:5–13, 26:31–39. Claims 9 and 15 further limit the respective channel structures to ones that also *include* a sensor. *Id.* at 26:6–7 (“wherein each channel of the plurality of channels includes a sensor”), 26:33–34 (“wherein the plurality of channels includes a plurality of sensors”). Because each claimed channel actually *includes* a sensor, it is clear that each channel structure is intended to have its own respective sensor that it passes light to. Thus, to a skilled artisan and within the context of claims 9 and 15 of the ’158 patent, the recited “plurality of channels” limitation refers to multiple independent structures that separately pass light to a different respective sensor.

The Specification supports this construction. In various ways throughout the Specification, it states clearly that “[e]ach channel of the plurality of channels includes an optics component and a sensor that includes an array of photo-detectors.” Ex. 1001, Code (57), 3:43–45 (“Each channel includes an optics component and an image sensor having an active area including picture elements (pixels)”), 4:66–5:2 (“The digital camera systems include multiple channels. Each channel includes an optics component and a sensor comprising an array of photo-detectors”), 5:15–18 (“Each sensor camera channel has its own optics, photo-detection and readout mechanism that includes a plurality of picture elements (pixels) with independent signal integration time control”), 7:23–25 (“Each of the camera channels 260A–260D includes an optics component or portion and a sensor component or portion”), 14:45–47 (“a digital camera subsystem can have multiple separate

arrays on a single image sensor, each with its own lens”), 15:1–3 (“The above-described devices can include any suitable number of combinations, including as few as two arrays/lenses, and many more than two arrays/lenses”), 15:50–56 (“Each of the optics portions 1504A-1504D may include a lens, and may be associated with a respective one of the sensor arrays 1504A-1504D . . . Each sensor array and the respective optics portion may define an optical channel”).

In each example the Specification discloses to explain the invention, there are multiple independent structures (e.g., lens) that separately pass light to a different respective sensor. Ex. 1001, 6:43–7:3, 7:17–39, 11:44–13:10, 15:46–16:27; 17:3–24, 20:4–57. Figure 15, and its description is representative and reproduced below.

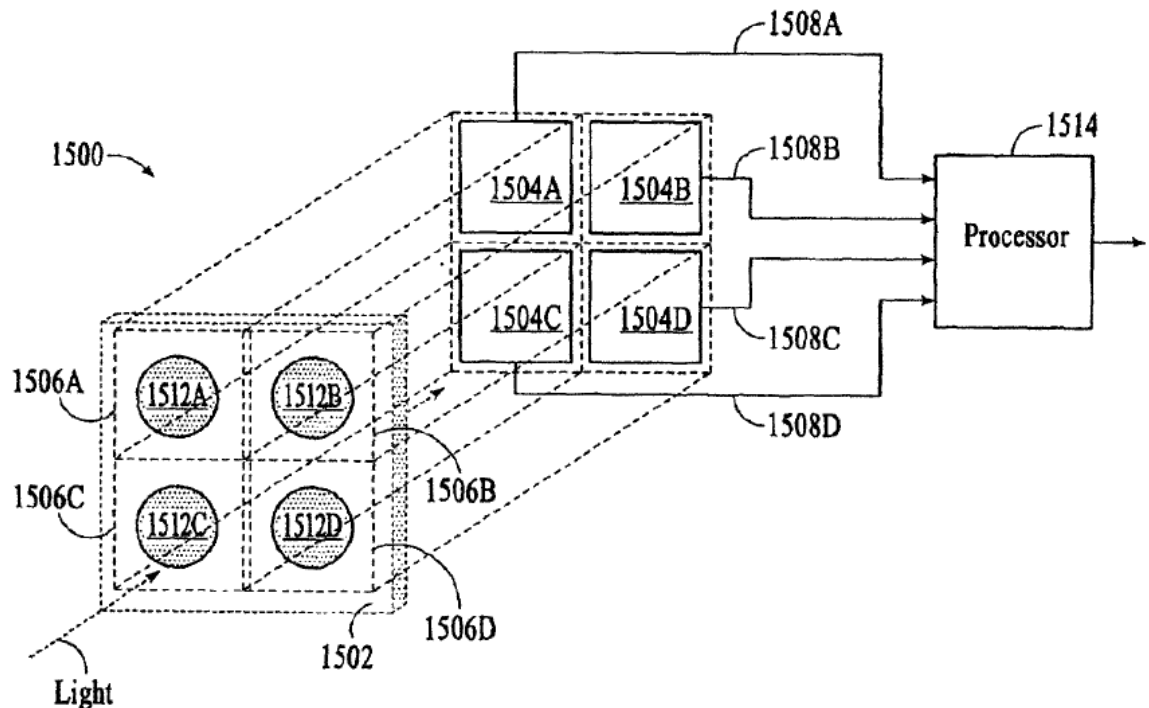


FIG.15

Figure 15 “is an exploded perspective view of a digital camera 1500.” *Id.* at 15:46–47. The Specification explains that Figure 15 illustrates

an optical channel 1506A may be defined by the optics portion 1512A and the sensor array 1504A. An optical channel 1506B may be defined by the optics portion 1512B and the sensor array 1504B. An optical channel 1506C may be defined by optics portion 1512C and the sensor array 1504C. An optical channel 1506D may be defined by optics portion 1512D and a sensor array 1504D.

Id. at 15:57–65. Moreover, the Specification attributes several benefits to having multiple independent structures that separately pass light to a different respective sensor, such as (1) overcoming dynamic range limitations (*id.* at 4:18–21); and (2) allowing for smaller lenses, which allows for reduced stack height in the digital camera (*id.* at 14:45–50).

When viewed in context of the intrinsic record from the perspective of a skilled artisan, the plain meaning of the phrase “plurality of channels” is properly interpreted as multiple independent structures that separately pass light to a different respective sensor. Therefore, we also agree with Patent Owner that the plain meaning of this claim element excludes from the scope of claims 9 and 15 devices that rely on a common optics component to pass light to multiple camera channels.

D. The Challenged Claims In View of Asserted Grounds 1–6

Grounds 1–6 in the Petition, directly or indirectly, depend on Petitioner showing that either Ikeda (Ground 1) or Nakajima (Ground 4) anticipate independent claims 1, 9, and 15. *See generally* Pet. 15–74. Patent Owner contends that Grounds 1–6 are deficient because Petitioner has failed to make such a showing. Prelim. Resp. 1–3. In particular, Patent Owner contends that the evidence in the Petition fails to demonstrate sufficiently that either Ikeda or Nakajima discloses “wherein each optics component of the plurality of optics components is configured to pass light to a sensor,” as

recited claim 1, or “a plurality of channel,” as recited in independent claims 9 and 15. *Id.* Patent Owner correctly notes that the Petition does not reference any of the additional prior art as disclosing either of these two limitations in any of the grounds. *See id.* at 46–48, 53–54; *see also* Pet. 38–50, 69–74. Because we agree that these two limitations are dispositive of the Petition, we address each in turn below in the context of the independent in which the limitation is recited (i.e., claim 1, 9, or 15). But before do, however, we first provide an overview of the Ikeda and Nakajima references.

1. *Ikeda*

Ikeda, titled “Image Data Processing Apparatus for Processing Combined Image Signals in Order to Extend Dynamic Range,” is directed to an “image data processing apparatus” that includes a controller for “match[ing] a dynamic range of image data to be outputted to an output unit to a dynamic range of data and/or to an output characteristic of the output unit so that the data may be processed in the output unit.” Ex. 1005, codes (54), (57).

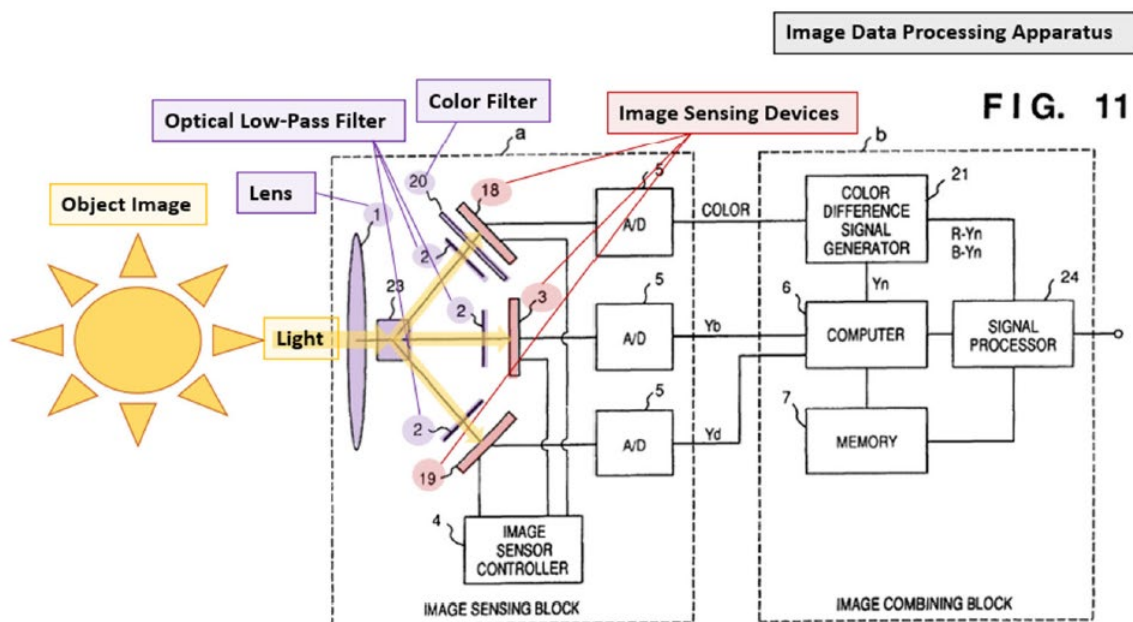
2. *Nakajima*

Nakajima, titled “Digital Camera,” is directed to “digital camera that can photograph pictures with a wider dynamic range.” Ex. 1006, codes (54), (57). In Nakajima, “[a]n image with an appropriate exposure, an overexposed image and an underexposed image are recorded by a single photography” and the image data for the three images “is weighted so as to increase a weight of the overexposed image in [the] dark portions” to “increase a weight of the underexposed image in bright portions in accordance with the luminance recorded with the appropriate exposure.” *Id.*

code (57). “With this process, because a weight of the overexposed image is greatly used for the portions [that] are blackened in the image with the appropriate exposure, the image will become brighter than that with the appropriate exposure and the gradation of the dark portions is reproduced.” *Id.* “[B]ecause a weight of the underexposed image is greatly used for the portions [that] are whiter in the image with the appropriate exposure, the image will become darker than that with the appropriate exposure and the gradation of the bright portions is reproduced.” *Id.*

3. Independent Claim 1

Claim 1 recites an image capture device with a plurality of sensors and a plurality of optics components, “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors.” Ex. 1001, 25:32–36. To show Ikeda discloses this limitation, Petitioner relies on an annotated version of Ikeda’s Figure 11, reproduced below.



Petitioner contends Ikeda's annotated Figure 11 shows

Ikeda's apparatus also includes a plurality of optics components, including a lens 1, a prism 23, optical low-pass filters 2, and a color filter 20 (all purple), which provide a 'light path' to pass light (yellow) from an object image to be "projected upon the first, second, and third image sensing devices 18, 3, and 19 [red].

Pet. 16. Neither the Petition, nor Petitioner's expert Dr. Bovik, provides any further explanation or reasoning for how Ikeda discloses an apparatus "wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors." *Id.* at 16–17; *see also* Ex. 1004 ¶¶ 66–67.

Patent Owner argues that

Ikeda teaches a digital camera where incident light from an image passes through a lens (Reference Numeral 1) and then through a beam splitting prism (Reference Numeral 23). Ikeda explains that *the prism is used "for distributing an image from the lens 1 to the plurality of image sensing devices 3, 18 and 19."* After passing through the prism, the separated light then passes through "the optical low-pass filter 2 and the color filter 20, to be projected upon the image sensing devices 18, 3 and 19." Then the image sensor controller (Reference Numeral 4) causes the image sensing devices to acquire an image and transfer the respective acquired images to the Analog to Digital Converters (Ikeda, Reference Numeral 5) which is subsequently transferred to a computer (Ikeda, Reference Numeral 6) for processing. Ikeda's digital camera that utilizes a lens and a prism to distribute light from an incident light to a group of image sensors is depicted in Figure 11.

Prelim. Resp. 41–42 (citing Ex. 1005, 11:62–12:1, Fig. 11). Because Figure 11, and its description, in Ikeda disclose a plurality of sensors that *all* receive light from a single-common source (in other words, a single-common source is configured to pass light to *all* of the sensors), Patent Owner argues that

Petitioner has failed to show sufficiently that Ikeda discloses a plurality of optics components that are *each* configured to pass light separately to a distinct sensor of the plurality of sensors. *Id.* at 43.

We agree. For the reasons discussed above (*supra* §II.C.1), “each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” as recited in claim 1, requires each of the plurality of optics components to be configured to pass light separately to a distinct sensor of the plurality of sensors and cannot rely on a common optics component to pass light to all of the sensors. Although Petitioner provides little guidance, the only two structures in Figure 11 of Ikeda that can even arguably be optics components “configured to pass light” are lens 1 and prism 23. And Ikeda discloses those structures as functioning as a single unit that is common to the three disclosed sensors. *See* Ex. 1005, 11:62–12:1. As such, Ikeda only discloses a single optical component/unit configured to pass light to a plurality of sensors, rather than a plurality of optical components/units that are *each* able to pass light to their respective sensor(s) out of the plurality of sensors.

In fact, the only structure included in Figure 11 that Petitioner’s expert, Dr. Bovik, suggests is configurable *to pass light* to a sensor is the lens. *See* Ex. 1004 ¶¶ 39–41, 49, 66. For example, Dr. Bovik describes that, during operation of the device Ikeda discloses, the light from an object enters lens 1, which then passes the light through filters to projects the light upon an image sensing device. *Id.* ¶ 39. Although the Petition and Dr. Bovik lump “a lens 1, a prism 23, optical low-pass filters 2, and a color filter 20 (all purple)” together and refer to them collectively as “provid[ing] a ‘light path’ to pass light (yellow) from an object image to be ‘projected upon

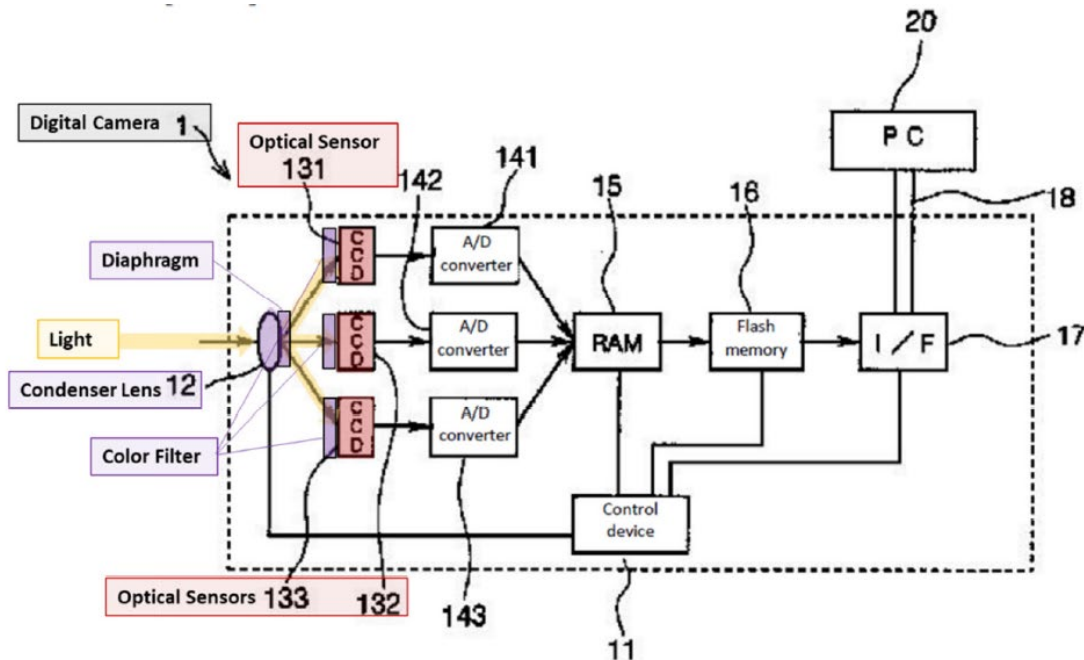
the first, second, and third image sensing devices 18, 3, and 19’” (Pet. 16, Ex. 1004 ¶ 66), Ikeda suggests that lens 1 is the only structure configured to pass light (i.e., establish the light path) to a sensor.

This is evidenced by the fact that Ikeda describes the prism, optical low-pass filters, and a color filter as all being “provided *at the intermediate position of the light path*” that begins at lens 1. Ex. 1005, 13:34–38, 13:59–63 (emphasis added). In order for the prism, optical low-pass filters, and a color filter to be *at an intermediate position* of the light path, the light path must necessarily have been established before reaching them. Consistent with this understanding, Dr. Bovik only describes lenses as being configurable to pass light to a sensor (i.e., to zoom and focus incident light); the diaphragms, irises, and neutral density (ND) filters are described as “varying the amount of incident light” that has been passed; the optical low pass filters are described as “combat[ing] high-frequency moiré patterns” in the light that has been passed; and the color filters and filter arrays are described as “filtering specific wavelengths, or colors” of light that has been passed. Ex. 1004 ¶ 40.

Therefore, because Ikeda only discloses a single optical component (either lens 1 alone or in combination with prism 23⁷) configured to pass light to a sensor, we are not persuaded Petitioner has shown a reasonable likelihood of being able to establish that Ikeda discloses “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” as independent claim 1 recites.

⁷ Consistent with the teachings of the ’158 patent, a single optical component may be comprised of several parts. Ex. 1001, 17:41–48.

Turning now to Nakajima, Petitioner relies on an annotated version of Nakajima's Figure 5 reproduced below.



Petitioner contends Nakajima's annotated Figure 5 shows

Nakajima's digital camera includes a plurality of optics components, including a condenser lens 12 (purple) and primary and/or complementary color filters (also purple) that pass light (yellow) to each of the optical sensors 131, 132, 133 (red) where it "is converted into an electric signal."

Pet. 51 (citing Ex. 1006, ¶¶ 9, 14, 16, 18, 28, 30). But here again, as Patent Owner argues (Prelim. Resp. 49–50), Petitioner has only identified a single structure (i.e., lens 12) that is configurable to pass light to a plurality of sensor. Nakajima only suggests that condenser lens 12 is used to pass light to the image sensors 131–133. Ex. 1006 ¶ 27 ("In the present embodiment [illustrated in Figure 5], as the optical sensors, three CCDs 131, 132 and 133 are mounted, and a light that has passed the condenser lens 11 is collected, respectively"); *see also id.* ¶ 15 ("a light collected by the condenser lens 12 is entered into the CCD 13 and is converted into an electric signal").

Petitioner and Dr. Bovik note that Nakajima discloses that a diaphragm may be incorporated into the disclosed camera, but they describe the diaphragm “as designed to control the amount of peripheral light going through the lens aperture, i.e., *the opening of the lens*.” *Id.* at 52 (citing Ex. 1004 ¶ 151) (emphasis added). Thus, even by their own admission, the diaphragm does not pass light to a sensor; instead, it controls the amount of peripheral light that a lens can pass to a sensor. Similarly, Petitioner and Dr. Bovik describe the color built over or into the image sensor as “modify[ing] the characteristics of light (e.g., the color) exposed to groups of pixels on each sensor.” *Id.* at 52–53. Again, even by their own admission, the color filters do not evidence a structure that is configured to pass light to a particular sensor; instead, it alters to characteristics of the light that a lens passes to a sensor.

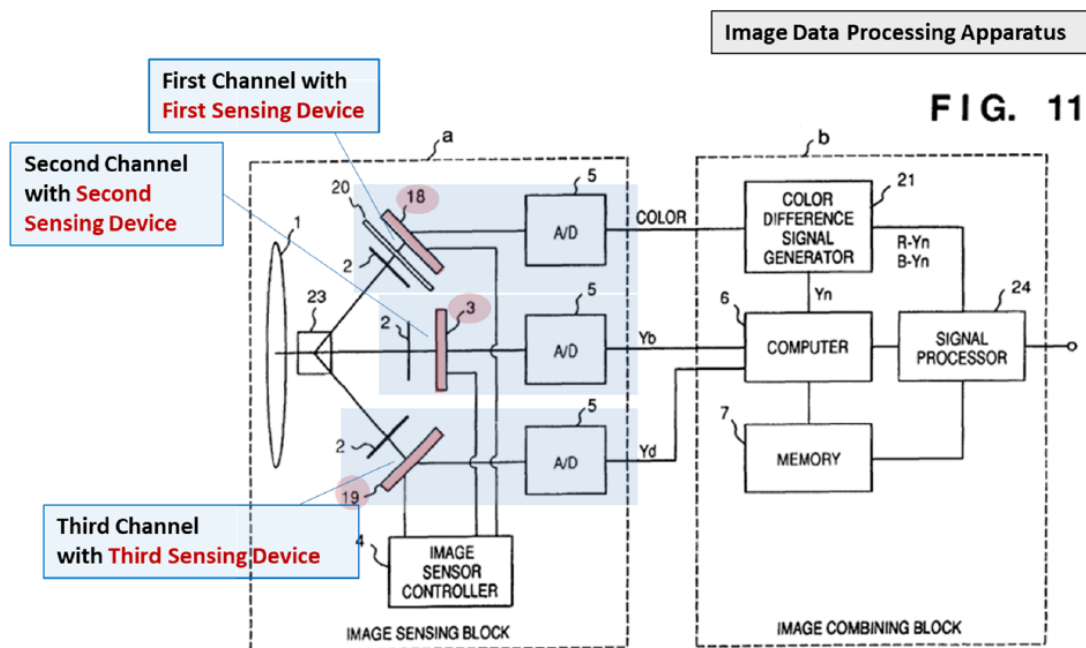
Therefore, because Nakajima only discloses a single optical component (lens 12) configured to pass light to a sensor, we are not persuaded Petitioner has shown a reasonable likelihood of being able to establish that Nakajima discloses “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors,” as independent claim 1 recites.

4. *Independent Claims 9 and 15*

As an initial matter, we note that Petitioner treats as equals the limitations “a plurality of channels, wherein each channel of the plurality of channels includes a sensor,” as recited in independent claim 9, and “identifying an integration time for each of a plurality of channels of an image capture device, wherein the plurality of channels includes a plurality of sensors,” as recited in independent claim 15, by relying on the same

evidence and reasoning for both. *See* Pet. 27–28, 33. Accordingly, like Petitioner, we address whether Nakajima discloses “a plurality of channels” in the context of claim 9.

To show Ikeda discloses “a plurality of channels” that each include a sensor, Petitioner relies on another annotated version of Ikeda’s Figure 11, reproduced below.



Petitioner contends Ikeda’s annotated Figure 11 shows “Ikeda’s system includes a plurality of channels (blue), with each channel including respective first, second, and third ‘image sensing devices’ 18, 3, and 19 (red) (sensors) ‘for receiving light and photoelectric-converting the received light.’” Pet. 27 (citing Ex. 1005, 3:60–61, 4:15–16, 11:56–58, 11:65–12:1; Ex. 1004 ¶ 92). Neither the Petition, nor Petitioner’s expert Dr. Bovik, provides any further explanation or reasoning for how Ikeda discloses an apparatus with “a plurality of channels.” *Id.* at 27–28; *see also* Ex. 1004 ¶¶ 92–93.

Patent Owner states,

As shown in the annotated Figure above, Petitioner omitted the lens (Ikeda, Reference Numeral 1) and the Prism (Ikeda, Reference Numeral 23), which the Petitioner previously had defined as the plurality of optical components (see Petition at 16). Instead, the Petitioner defines the “channels” to include only the low pass filters (Ikeda, Reference Numeral 2), a single-color filter (Ikeda, Reference Numeral 20), and the sensors (Ikeda, Reference Numeral 5). Accordingly, Petitioner alleged that “channels” do not include the lens and the prism that receives the incident light and provides the light to all of the sensors. Instead, the Petitioner proposed that the “channels” are formed without any shared components or any lens. As a result, the Petitioner proffers that Ikeda’s low pass filters, single color filter, and sensors are the alleged “channels” recited in the claims.

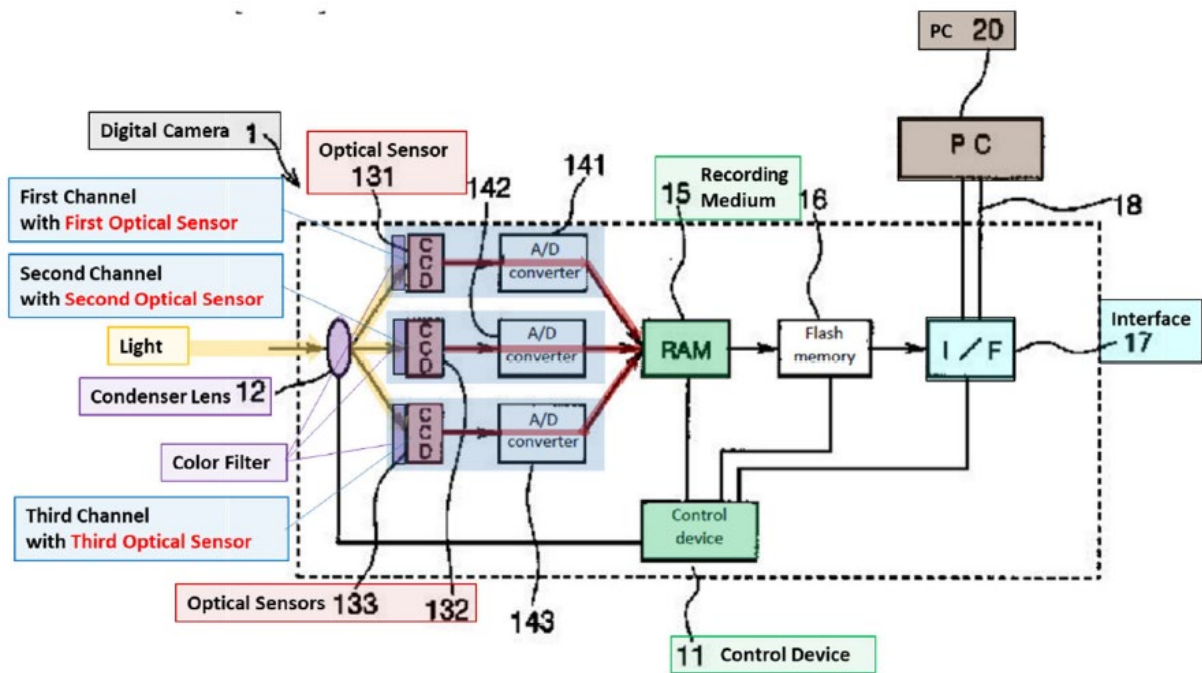
Prelim. Resp. 18–19. Patent Owner argues that Petitioner’s reliance on Ikeda’s annotated Figure 11 is misplaced and cannot show a plurality of channels because “each ‘channel’ requires a respective lens and sensor that allow the incident light to be independently processed and controlled.” *Id.* at 16.

We agree that Petitioner has failed to demonstrate sufficiently how Ikeda discloses a plurality of channels. For the reasons discussed above (*supra* §II.C.2), to a skilled artisan and within the context of claims 9 and 15 of the ’158 patent, the recited “plurality of channels” limitation refers to multiple independent structures that separately pass light to a different respective sensor. Although Petitioner provides little guidance, we do not find Petitioner to have shown in annotated Figure 11 that Ikeda discloses multiple independent structures that separately pass light to a different respective sensor. First, as Patent Owner notes, Petitioner does not rely on

lens 1, alone or in combination with prism 23, to show a channel. Second, Petitioner's suggestion that the combination of a low pass filter 2 and image sensors 3, 18, and 19 in Ikeda discloses a plurality of channels is unavailing because there is not sufficient support to find a low pass filter 2 is a structure that passes light to a sensor. Instead, Petitioner and Dr. Bovik describe the optical low pass filters as "combat[ing] high-frequency moiré patterns" in the light that has been passed. Pet. 4; Ex. 1004 ¶ 40. Furthermore, even considering lens 1, alone and in combination with prism 23, that Ikeda discloses, it is evident that Ikeda only discloses a single component for passing light to multiple sensors, rather than multiple independent structures that separately pass light to a different respective sensor.

Therefore, because Ikeda only discloses a single component (either lens 1 alone or in combination with prism 23) that is configured to pass light to a sensor and because Petitioner has only established that a low pass filter is configurable to modify the characteristics of the light passed by a lens to a sensor, we are not persuaded Petitioner has shown a reasonable likelihood of being able to establish that Ikeda discloses "a plurality of channels," as independent claims 9 and 15 recite.

Turning now to Nakajima, Petitioner relies on another annotated version of Nakajima's Figure 5 reproduced below.



Petitioner contends Nakajima’s annotated Figure 5 shows “Nakajima’s system includes a plurality of channels (blue), with each channel including a color filter (purple) and respective first, second, and third CCD sensors 131, 132, and 133 (red) for collecting light.” Pet. 61. Neither the Petition, nor Petitioner’s expert Dr. Bovik, provide any further any further explanation or reasoning for how Nakajima discloses an apparatus with “a plurality of channels.” *Id.* at 61–62; *see also* Ex. 1004 ¶¶ 175–176.

Petitioner again provides little guidance, nonetheless, we do not find Petitioner to have shown in annotated Figure 5 that Nakajima discloses multiple independent structures that separately pass light to a different respective sensor. First, Nakajima only discloses a single component (i.e., condenser lens 12) for passing light to multiple sensors, rather than multiple independent structures that separately pass light to a different respective sensor. Second, to the extent Petitioner is relying on the color filter/sensor combination in Nakajima to disclose a plurality of channels, it is likewise

unavailing because there is not sufficient support to find a color filter is a structure that passes light to a sensor. Instead, Petitioner and Dr. Bovik describe color filters as “for filtering specific wavelengths, or colors, of incident light” that has been passed by a lens. Pet. 4–5; Ex. 1004 ¶ 40. Thus, similar to Ikeda, because Nakajima only discloses a single component (condenser lens 12) that is configured to pass light to a sensor and because Petitioner has only established that a color filter is configurable to modify the characteristics of the light passed by a lens to a sensor, we are not persuaded Petitioner has shown a reasonable likelihood of being able to establish that Nakajima discloses “a plurality of channels,” as independent claims 9 and 15 recite.

Therefore, for all of the foregoing reasons, Petitioner has not shown sufficiently that either Ikeda or Nakajima anticipates independent claims 1, 9, and 15.

5. *Dependent Claims 2–8, 10–14, and 16–20*

Each of Petitioner’s contentions regarding the patentability of dependent claims 2–8, 10–14, and 16–20 in Grounds 1–6 depends on either Ikeda or Nakajima anticipating independent claims 1, 9, and 15. *See* Pet. 22–27, 30–33, 35–50, 56–61, 64–65, 67–74. Therefore, because Petitioner has not shown sufficiently that either reference anticipates any of the independent claims challenged, we likewise are not persuaded Petitioner has shown a reasonable likelihood of being able to establish any of dependent claims 2–8, 10–14, and 16–20 are unpatentable.

III. CONCLUSION

Our review of the Petition under 35 U.S.C. § 314 is not to determine whether an individual asserted fact is indisputable or whether a preponderance of the evidence supports Petitioner. Our review is to determine whether the totality of the information presented in the Petition and Preliminary Response shows that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition.

For the above reasons, we determine Petitioner has not established a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim of the '158 patent. Therefore, we deny *inter partes* review of the '158 patent on all challenged claims and all grounds asserted in the Petition. *See* 35 U.S.C. § 314(a).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '158 patent is denied.

IPR2022-00710
Patent 9,232,158 B2

FOR PETITIONER:

David Reese
James Barney
Luke McCammon
Nicholas Eitsert
david.reese@finnegan.com
james.barney@finnegan.com
luke.mccammon@finnegan.com
nicholas.eitsert@finnegan.com

FOR PATENT OWNER:

Ryan W. O'Donnell
Jeffrey G. Glabicki
Robert D. Leonard
Dawn C. Kerner
Michael F. Snyder
Daniel H. Golub
Russell J. Rigby
RODonnell@vklaw.com
JGlabicki@vklaw.com
DKerner@vklaw.com
Msnyder@vklaw.com
DGolub@vklaw.com
RRigby@intven.com