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Paper No. ____

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY CORPORATION,
Petitioner,

v.

OPTIMUM IMAGING TECHNOLOGIES, LLC,
Patent Owner.

Case No. IPR2024-01046
Patent No. 10,877,266

**PETITION FOR INTER PARTES REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.1 et seq**

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<i>Markforged v. Continuous Composites</i> , IPR2022-00679, Paper 7 (Oct. 25, 2022)	94
<i>Samsung Elecs. v. Netlist</i> , IPR2022-00063, Paper 13 (May 5, 2022)	93
<i>Sand Revolution II v. Continental Intermodal Group–Trucking</i> , IPR2019-01393, Paper 24 (June 16, 2020)	93, 94

REGULATIONS

37 C.F.R. § 42.100(b)	3
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STATUTES

35 U.S.C. § 102	1
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35 U.S.C. § 103(a)	1
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APPENDIX LISTING OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 10,877,266
1002	Prosecution History of U.S. Patent No. 10,877,266
1003	Declaration of Leonard Laub
1004	Curriculum Vitae of Leonard Laub
1005	Japanese Patent No. 2004-192178 (Cert. Translation) (“Watanabe-JP”)
1006	U.S. Patent Application Publication 2002/0135688A1 (“Niikawa”)
1007	U.S. Patent No. 6,301,440 (“Bolle”)
1008	International Application Publication WO 2006/039486A2 (“Ng”)
1009	U.S. Patent No. 5,477,264 (“Sarbadhikari”)
1010	Japanese Patent No. 2004-186917 (Cert. Translation) (“Kokubu”)
1011	U.S. Patent Application Publication 2006/0050158A1 (“Irie”)
1012	U.S. Patent Application Publication 2002/0149683A1 (“Post”)
1013	U.S. Patent Application Publication 2005/0280877A1 (“Watanabe-US”)
1014	U.S. Patent No. 7,494,293 (“Arimoto”)
1015	U.S. Patent Application Publication 2006/0274170A1 (“Azuma”)
1016	U.S. Patent Application Publication 2005/0001024A1 (“Kusaka”)
1017	Kodak EasyShare-One User’s Guide (“Kodak EasyShare”)
1018	U.S. Patent Application Publication 2003/0065805A1 (“Barnes”)
1019	U.S. Patent Application Publication 2004/0080621A1 (“Fisher”)
1020	U.S. Patent Application Publication 2003/0142215A1 (“Ward”)
1021	International Application Publication WO 2005/065283A2 (“Walker”)
1022	U.S. Patent Application Publication 2006/0268357A1 (“Vook”)
1023	U.S. Patent Application Publication 2010/0002091A1 (“Dutta”)
1024	U.S. Patent No. 9,063,982 (“Bestgen”)
1025	U.S. Patent No. 6,798,449 (“Hsieh”)
1026	U.S. Patent Application Publication 2003/0223007A1 (“Takane”)

1027	U.S. Patent No. 7,224,397 (“Sasaki”)
1028	U.S. Patent No. 7,355,748 (“Arai”)
1029	U.S. Patent Application Publication 2004/0208114A1 (“Lao”)
1030	“A Guide to Mastering the Basics,” Capture the Atlas (e-Book)
1031	U.S. Patent Application Publication 2006/0050335A1 (“Dorrell”)
1032	U.S. Patent No. 7,677,818 (“Akiyama”)
1033	U.S. Patent Application Publication 2006/0158546A1 (“Hirai”)
1034	U.S. Patent Application Publication 2006/0245075A1 (“Lee”)
1035	U.S. Patent No. 7,616,877 (“Zarnowski-2”)
1036	U.S. Patent No. 7,593,634 (“Terada”)
1037	U.S. Patent No. 7,292,370 (“Iwaki”)
1038	U.S. Patent No. 6,665,009 (“Dong”)
1039	U.S. Patent No. 7,602,426 (“Sato”)
1040	U.S. Patent Application Publication 2004/0145664A1 (“Kobayashi”)
1041	U.S. Patent Application 2005/0010621A1 (“Pinto”)
1042	U.S. Patent No. 7,590,305 (“Steinberg-1”)
1043	U.S. Patent No. 7,738,015 (“Steinberg-2”)
1044	Certified Translation Of Japanese Patent No. JPA 2002-190979 (“Kuniba”)
1045	U.S. Patent No. 5,999,330 (“Goosey”)
1046	GUAN et al., <i>Digital Image Correcting Method for Digital Camera</i> (December 2005) (“Ricoh”)
1047	Dkt. No. 1, Complaint, <i>Optimum Imaging Technologies LLC v. Sony Corp.</i> , No. 4:23-cv-00928 (E.D. Tex. Oct. 18, 2023) (“Complaint”)
1048	Docket report in <i>Optimum Imaging Technologies LLC v. Sony Corp.</i> , No. 4:23-cv-00928 (E.D. Tex. Oct. 18, 2023) as of June 21, 2024
1049	Eastern District of Texas, U.S. District Court—Judicial Caseload Profile, as of June 21, 2024
1050	U.S. Patent Application Publication 2006/0054782A1 (“Olsen”)

1051	Comprehensive Dictionary of Electrical Engineering (2d ed. CRC Press 2005)(excerpt)
1052	U.S. Patent No. 6,362,513 (“Wester”)
1053	U.S. Patent Application Publication 2004/0160634A1 (“Watanabe-634”)
1054	U.S. Patent No. 6,920,443 (“Cesare”)
1055	Newton’s Telecom Dictionary (CMP Books, 2005) (excerpt)
1056	U.S. Patent No. 6,765,617 (“Tangen”)
1057	EP Patent Application Publication 0 457 522 A2 (“Murayama”)
1058	U.S. Patent No. 5,990,949 (“Haruki”)
1059	U.S. Patent Application Publication 2003/0017846A1 (“Estevez”)
1060	U.S. Patent Application Publication 2004/0189825A1 (“Kawashima”)
1061	U.S. Patent Application Publication 2005/0008236A1 (“Hachiyama”)
1062	Certified Translation Of Japanese Patent Application Publication JP 2004-328506A (“Kita”)
1063	Certified Translation Of Japanese Patent No. JPH (1999)-313250 (“Yamagata”)
1064	Certified Translation Of Japanese Patent No. JPA 2000-184247 (“Imai”)
1065	U.S. Patent No. 5,444,482 (“Misawa”)
1066	U.S. Patent No. 5,905,530 (“Yokota”)
1067	U.S. Patent No. 7,206,136 (“Labaziewicz”)
1068	U.S. Patent No. 7,245,319 (“Enomoto”)
1069	U.S. Patent Application Publication 2004/0150732A1 (“Yamanaka”)
1070	U.S. Patent Application Publication 2003/0095197A1 (“Wheeler”)
1071	U.S. Patent No. 7,587,085 (“Steinberg-3”)
1072	U.S. Patent No. 5,713,020 (“Reiter”)
1073	U.S. Patent No. 6,208,993 (“Shadmon”)
1074	U.S. Patent No. 6,412,004 (“Chen”)
1075	Dictionary of Computing, 5 th Edition (pg. 88)

MANDATORY NOTICES

A. Real Party-In-Interest

Sony Corporation (“Sony” or “Petitioner”) is the Real Party-in-Interest.

B. Related Matters

A decision in this proceeding could affect or be affected by the following:

1. United States Patent & Trademark Office

The application from which U.S. Patent No. 10,877,266 issued is a Continuation of U.S. Patent Application No. 13/691,805 (U.S. Patent No. 10,873,685), which is a Continuation of U.S. Patent Application No. 12/586,221 (U.S. Patent No. 8,451,339), which is a Continuation to U.S. Patent Application No. 11/825,521 (U.S. Patent No. 7,612,805), which claims priority from provisional application 60/807,065.

2. U.S. District Court for the Eastern District of Texas

(i) *Optimum Imaging Technologies LLC v. FUJIFILM Corporation*, Case No. 4-23-cv-00922; (ii) *Optimum Imaging Technologies LLC v. Nikon Corporation*, Case No. 4-23-cv-00923; (iii) *Optimum Imaging Technologies LLC v. Olympus Corporation, et al.*, Case No. 4-23-cv-00924; (iv) *Optimum Imaging Technologies LLC v. Panasonic Corporation*, Case No. 4-23-cv-00926; (v) *Optimum Imaging Technologies LLC v. Samsung Electronics Co., Ltd.*, Case No. 4-23-cv-00927; (vi) *Optimum Imaging Technologies LLC v. Sony Corporation*, Case No. 4-23-cv-00928 (“the Litigation”).

3. U.S. District Court for the Western District of Texas

Canon Inc. v. Optimum Imaging Technologies LLC, Case No. 1-20-cv-01238 (Terminated April 28, 2021).

4. U.S. District Court for the Northern District of California

Panasonic Entertainment & Communication Co. v. Optimum Imaging Technologies LLC, Case No. 3-24-cv-02466.

C. Counsel and Service Information - § 42.8(b)(3) and (4)

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A power of attorney is submitted with the Petition. Counsel for Petitioner consents to service of all documents via electronic mail.

I. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies that the '266 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review as to the challenged claims. 37 C.F.R. § 42.104(a).

II. TABLE OF GROUNDS

Petitioner requests cancellation of claims 1-27, 29-30 (the “challenged claims”) as follows.

Ground	Reference(s)	Claim(s)	Basis
1	Niikawa, Watanabe-JP	1, 2, 4, 5, 8, 11, 13-20, 22, 23, 25, 27, 30	§103(a)
2	Niikawa, Watanabe-JP, Bolle	1-3, 5-11, 16, 19, 22-25	§103(a)
3	Niikawa, Watanabe-JP, Ng	1, 11, 12, 21, 22, 25, 26	§103(a)
4	Niikawa, Watanabe-JP, Irie	1, 29, 30	§103(a)
5	Niikawa, Watanabe-JP, Watanabe-US	1, 17, 22	§103(a)

The above-identified references are prior art (at least) under pre-AIA 35 U.S.C. §102 based on the following filing and publication dates:

Reference	Filing Date	Publication Date	Pre-AIA
Niikawa	2002-03-19	2002-09-26	§102(b)
Watanabe-JP	2002-12-10	2004-07-08	§102(b)
Bolle	2000-04-13	2001-10-09	§102(b)
Ng	2005-09-30	2006-04-13	§103(a),(e)
Irie	2005-08-18	2006-03-09	§103(a),(e)
Watanabe-US	2005-06-18	2005-12-22	§103(a),(e)

III. THE '266 PATENT

A. Overview

The '266 patent describes performing image corrections in-camera that were, according to the patent, conventionally performed by optical filters or by external software. 6:42-54, 7:27-40, 8:14-19, 13:19-23.

The specification discloses various image corrections, e.g., lens aberration corrections (30:58-31:32), color enhancing (15:20-33), tonal range correction (14:15-67, 33:12-19) and depth of field optimization correction (13:31-14:14, 33:6-11) that were well-known and conventionally performed in-camera. 16:43-17:15, 26:54-27:3, 32:50-34:4.

The '266 patent also discloses well-known features of updating a camera's program data and wirelessly transferring images stored on the camera to external locations. 29:10-20, 36:61-37:5.

B. Prosecution History

The '266 patent issued without rejection from Track 1 application 16/692,972 filed as a continuation of applications of U.S. Patent Nos. 10,873,685, 8,451,339 and 7,612,805 (whose claims Sony challenges in co-pending IPRs). EX1002, 149-165, 452-464, 1204-1215.

C. Person of Ordinary Skill in the Art (POSA)

A POSA would have had a bachelor's degree in electrical engineering, physics, or a related field, with at least two years of industry experience and/or research, both concerning digital camera system design and image processing. EX1003 ("Laub"), ¶54.

IV. CLAIM INTERPRETATION

Claim terms are construed herein using the standard used in civil actions under 35 U.S.C. § 282(b), in accordance with the ordinary and customary meaning as understood by a POSA and the patent's prosecution history. 37 C.F.R. § 42.100(b).

V. GROUND 1: CLAIMS 1, 2, 4, 5, 8, 11, 13-20, 22, 23, 25, 27, 30 WOULD HAVE BEEN OBVIOUS OVER NIIKAWA IN VIEW OF WATANABE-JP

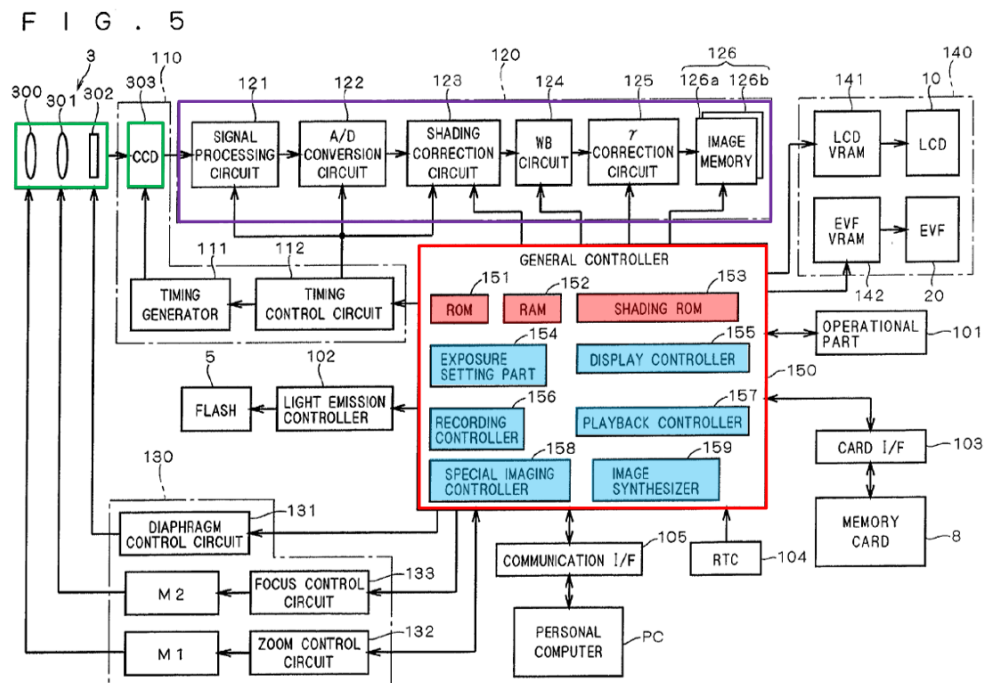
A. Niikawa (EX1006)

Niikawa discloses a "gradation control process" for correcting the "narrow dynamic range" of a digital camera's imaging sensor by combining image data from two images captured with different exposure settings to obtain a synthesized image "whose dynamic range is substantially widened" ([0061]). Niikawa, [0062], [0074], [0111]-[0120]; Laub, ¶¶146-148.

A user can choose to operate the camera in a "normal exposure mode" in usual way or can choose to operate the camera in a "gradation control processing mode" that captures two images and performs dynamic range correction. Niikawa, [0074]. Niikawa's camera performs shading correction ([0084]), white balance and γ

correction ([0086]) on captured images in both operation modes using correction tables stored in the camera's memory. Niikawa, [0074], [0083]-[0086], [0108]-[120], [0123]; Laub, ¶149.

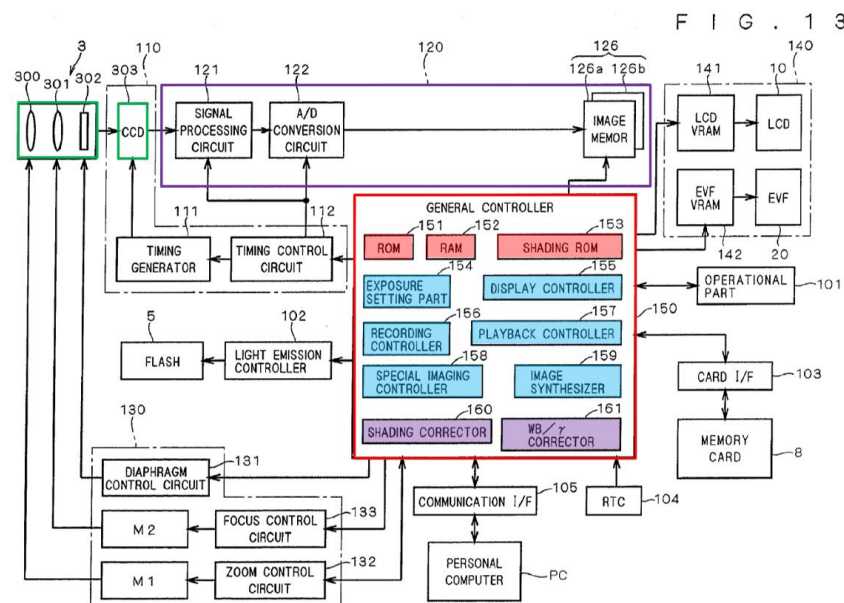
FIG. 5 (annotated below) illustrates a first configuration of a digital camera 1 comprising: (1) an optical portion (outlined in **green**) formed by imaging lens 3 having zoom lens 300, focus lens 301 and diaphragm 302 (aperture), and CCD sensor array 303 ([0076]-[0077]); and (2) signal processor 120 (outlined in **purple**) for converting image signals from CCD 303 into digital image data and performing shading, white balance and γ correction. Niikawa, [0077]-[0081], [0083]-[0086], [0095]-[0096], [0108]-[0110]; Laub, ¶151-152.



Digital camera 1 is controlled by general controller 150 (outlined in **red** above) “implemented by a microcomputer” that provides “centralized control” of

the camera ([0095]) by executing “processing programs” ([0096]) that perform functions represented by the “functional blocks” ([0097]) shaded **blue** in FIG. 5 above ([0096]), including performing: (1) the above-mentioned image correction processes by providing stored correction tables to the respective correction circuits ([0083]-[0086], [0108]-[0110]); and (2) an image synthesis process to increase dynamic range ([0111]-[0120]), etc. Niikawa, [0095]-[0104]; Laub, ¶157.

FIG. 13 (annotated below) illustrates a second configuration of digital camera 1 in which shading, white balance and γ correction computations are performed “by software” ([0129]) rather than via dedicated circuits—i.e., general controller 150’s processing programs perform “shading corrector 160” and “WB/ γ corrector 161” functions (shaded in **purple** in FIG. 13 below) that access stored correction tables and perform the respective correction computations. Niikawa, [0127]-[0131], [0138], [0140], [0158]; Laub, ¶155.



B. Watanabe-JP (EX1005)

Watanabe-JP discloses an image data and version management system for transferring stored images and updating the camera's software via a wireless connection. Watanabe-JP, [0004], [0009], [0020]-[0030], [0060]-[0076].

1. Watanabe-JP's Software Version Management

Watanabe-JP explains that conventional digital-camera software updates that receive a "version upgraded program" ([0004]) via a physical connection were inconvenient, requiring a specific connector to be provided to upgrade the camera. Watanabe-JP, [0009], [0028], [0073]; Laub, ¶¶163-164.

Watanabe-JP additionally notes that physical connections can be inadvertently disconnected before an update process completes, potentially leaving the camera with an incomplete program update that cause problems operating the camera, whereas wireless connections will not be lost unless the camera is moved out of range. Watanabe-JP, [0009], [0028], [0073]; Laub, ¶¶164-165.

To further ensure stable software updates, Watanabe-JP discloses wirelessly transmitting updated program data sequentially in program "segments" and ensuring that each segment is transmitted successfully before transmitting the next segment. Watanabe-JP, [0024]-[0025], [0068]-[0073]. In the event of interruption, the update process can be resumed from the last successfully transmitted segment. *Id.* Further, received program segments are stored by the camera and only applied to upgrade the

camera's program data after all segments have been successfully received to avoid leaving the camera in an unstable state should interruption occur. Watanabe-JP, [0009], [0068]-[0073], [0075]. Laub, ¶¶167-168.

Watanabe-JP's version management process automatically checks the version of the camera's software and prompts the user when updates are available. Watanabe-JP, [0062], [0065], [0075]-[0076]; Laub, ¶¶166.

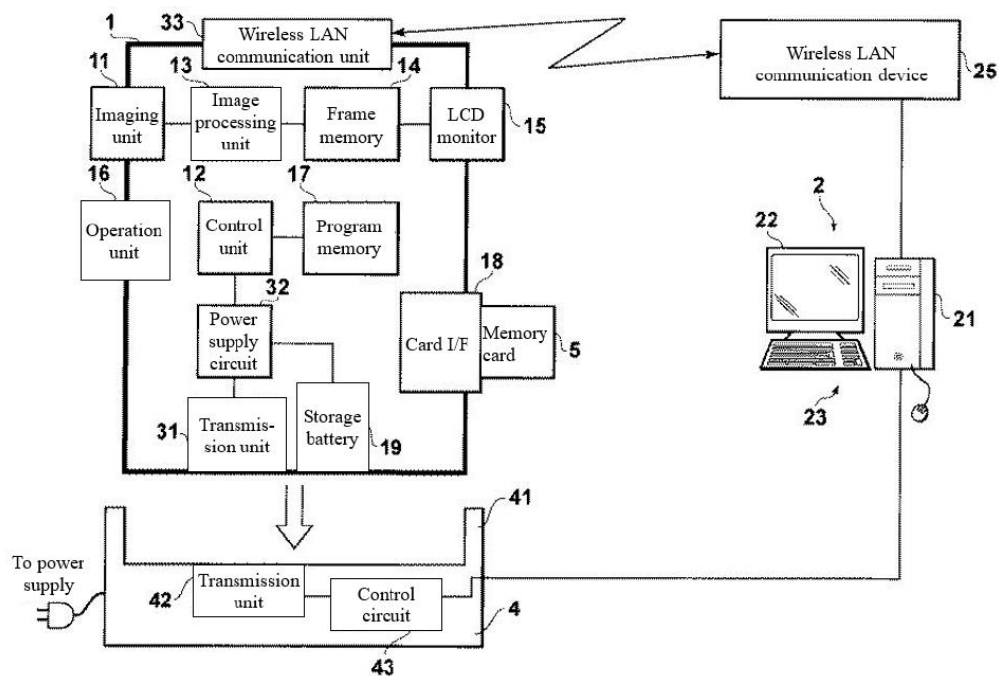
2. Watanabe-JP's Image Management

Watanabe-JP also discloses wirelessly transferring images stored on the camera to a personal computer. Watanabe-JP, [0057]-[0059]. To simplify the download process and reduce download times, Watanabe-JP's image management process transmits only new images captured by the camera since the last download. Watanabe-JP, [0030], [0053]-[0059], [0074]; Laub, ¶¶169-170.

3. Watanabe-JP's Wireless Charging

Watanabe-JP discloses employing a wireless charging cradle, e.g., a "flat plate" ([0051]) on which the camera can be placed for charging without requiring the user to physically connect the camera to the charger. Watanabe-JP, [0050]-[0051]. Data can also be exchanged over the wireless charging channel, providing a convenient way to initiate image and version management processes automatically. Watanabe-JP, [0050]-[0057], [0062], [0073]-[0076]; Laub, ¶¶171-172.

FIG. 1 illustrates a digital camera 1 implementing Watanabe-JP's image and version management system. Control unit 12 controls camera 1's image capture components and communications via wireless LAN communication unit 33 to (1) receive updates to the camera's program data stored on program memory 17, and (2) transfer images stored on memory card 5 to personal computer. Watanabe-JP, [0036]-[0044], [0050]-[0059], [0068]-[0073]. Control unit 12 also controls communications via transmission unit 31 configured for wireless charging and data exchange with transmission unit 42 of charging cradle 4. *Id.*; Laub, ¶173.

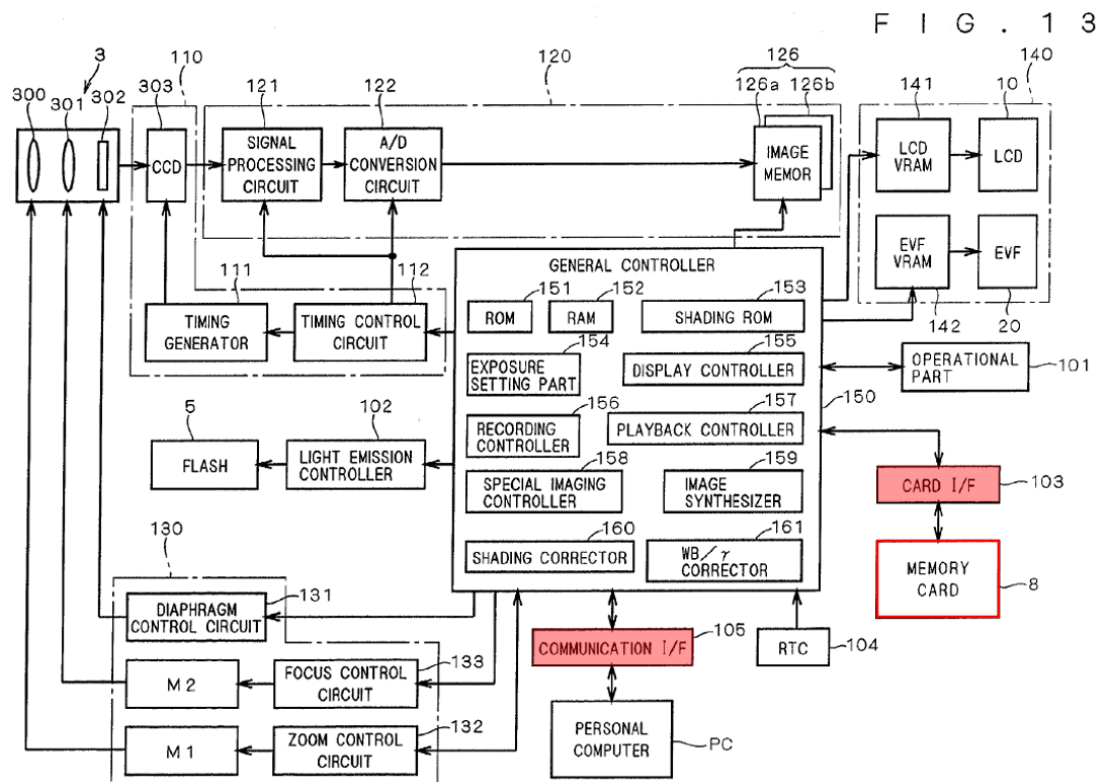


When camera 1 is placed proximate cradle 4, image time/date and software version data is automatically transmitted to PC 2 via the wireless charging connection to determine whether memory card 5 stores new images for download and whether updated program data is available. Watanabe-JP, [0042], [0057],

[0062], [0065]. New images are wirelessly transmitted to PC 2 ([0058]-[0060], FIG. 2) and updated program data is wirelessly received via wireless LAN unit 33 ([0061]-[0067], FIG. 3-4). Thus, image data and software version management processes can be performed automatically during regular camera charging activity without the user having to be particularly aware of it. Watanabe-JP, [0073]-[0076].

C. Reasons to Modify Niikawa with Teachings of Watanabe-JP

As shaded in **red** in FIG. 13 below, Niikawa's digital camera includes: (1) a "communication interface 105" to connect to a personal computer PC; and (2) a "card interface 103" to connect to a detachable memory card 8 for storing captured images (Niikawa, [0095]-[0096]) that can be transferred to an external device's card reader. Niikawa, [0167], [0173]; Laub, ¶174.



1. Benefits of Watanabe-JPs Wireless Image Transfer

POSAs would have been motivated to modify Niikawa with Watanabe-JP's wireless LAN communication unit 33 to provide more convenient image transfer to a wider range of external devices and circumstances—e.g., devices without a card reader, devices to which a physical connection cannot be made, etc. Watanabe-JP, [0009], [0073]; Laub, ¶175.

POSAs would have further recognized the benefit of Watanabe-JPs wireless LAN unit 33 in implementing Watanabe-JP's techniques for automatically identifying newly captured images to simplify image management and reduce download times. Watanabe-JP, [0056]-[0059], [0074]-[0076]. Laub, ¶176. Thus, POSAs had multiple beneficial reasons to implement Watanabe-JPs wireless LAN communication in Niikawa's camera. Laub, ¶177.

Additionally, wireless image transfer was a conventional feature of digital cameras with well-known benefits. Laub, ¶¶135-137 (*citing* EX1017, 40-52, 62-67; EX1021, [0172]-[0180], [0431]; EX1028, [0003]-[0004], [0014]; EX1016, [0157]-[0165], [0175]; EX1015, [0292], [0306]). Implementing Watanabe's JP wireless unit would merely have been the use of a known and familiar component for its intended purpose to yield the predicted and intended result of providing wireless communication between Niikawa's digital camera and external devices. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-421 (2007); Laub, ¶178.

2. Benefits of Watanabe-JPs Wireless Software Update

Niikawa discloses that general controller 150 (“GC-150”) is “so configured that program data recorded on a memory card 8 [] can be read out via the card interface 103 to be stored in the ROM 151” and therefore Niikawa’s “processing and control programs can be installed into the digital camera 1 from the memory card 8” or “installed from the personal computer PC via the communication interface 105” (Niikawa, [0096])—i.e., new or updated program data is installed on digital camera 1 to perform Niikawa’s processing and control techniques. Niikawa, [0022], [0095]-[0104], [0129]-[0131]. Laub, ¶179.

POSAs would have recognized the benefits of also configuring Niikawa’s GC-150 to receive updated program data wirelessly as taught by Watanabe-JP and would have been motivated to do so to provide an additional and/or more convenient way to upgrade Niikawa’s digital camera without the drawbacks of using physical connections. Watanabe-JP, [0004], [0009], [0073]; Laub, ¶180; *supra* §V.B.1. This ability to perform software upgrades wirelessly as taught by Watanabe-JP also provides further motivation to use Watanabe-JP’s wireless LAN unit. Laub, ¶181.

POSAs would have been further motivated to implement Watanabe-JP’s wireless software updates to take advantage of Watanabe-JP’s version management techniques that automatically compare version information and prompt the user when newer versions are available—e.g., when “updated program data is provided

by the manufacturer [] via the Web” (Watanabe-JP, [0048]). Watanabe-JP, [0062]-[0065], [0068]-[0072]; Laub, ¶182.

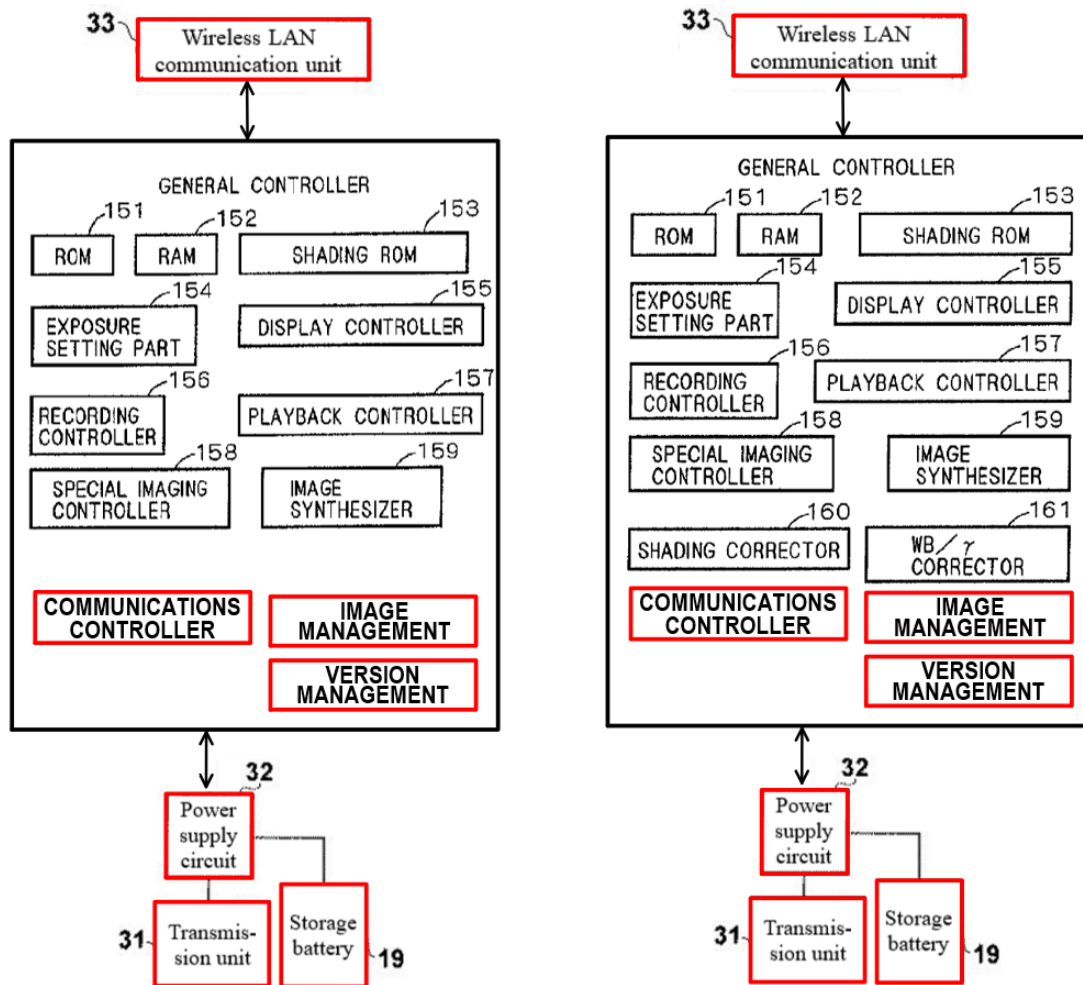
3. Benefits of a Charging Station

Niikawa’s camera uses four AA battery for power. Niikawa, [0066]. POSAs would have recognized the benefit and convenience of Watanabe-JP’s approach to powering and charging a digital camera independent of batteries that must be regularly replaced, and would have been motivated to modify Niikawa to include Watanabe-JP’s rechargeable battery and wireless charging system to take advantage of the benefits disclosed in Watanabe-JP (e.g., proximity charging without needing to physically connect the camera to the charging source). Laub, ¶¶183-184.

Watanabe-JP’s wireless charging system also enables wireless data exchange between the camera and the charging station that Watanabe-JP beneficially employs to (1) transmit time/date and version information to PC 2 ([0041]-[0042]); (2) monitor power levels before/during image transfer and software update tasks ([0069]); and (3) automatically perform image and version management processes during routine camera charging ([0073]-[0076]). Thus, POSAs would have had multiple further reasons to implement Watanabe-JPs wireless charging to facilitate more convenient image transfer and program update management. Laub, ¶¶185-186.

D. Niikawa-Watanabe Combination

For the reasons discussed *supra* §V.C, POSAs would have been motivated to modify Niikawa by (1) implementing Watanabe-JP's wireless LAN communication unit 33, transmission unit 31, rechargeable storage battery 19 and power supply circuit 32 in Niikawa's digital camera 1 (e.g., Watanabe-JP, [0037], [0041], [0049], [0079]); (2) configuring Niikawa's GC-150 with control programs and processing programs that perform Watanabe-JPs image data and version management processes (e.g., Watanabe-JP, [0055]-[0073]); and (3) utilizing Watanabe-JP's wireless charging cradle (e.g., Watanabe-JP, [0050]-[0052]). Laub, ¶187. Exemplary implementations of Niikawa-Watanabe are illustrated below showing the teachings of Watanabe-JP applied to Niikawa's digital camera 1 outlined in **red** for Niikawa's Fig. 5 and Fig. 13 configurations. Laub, ¶188.

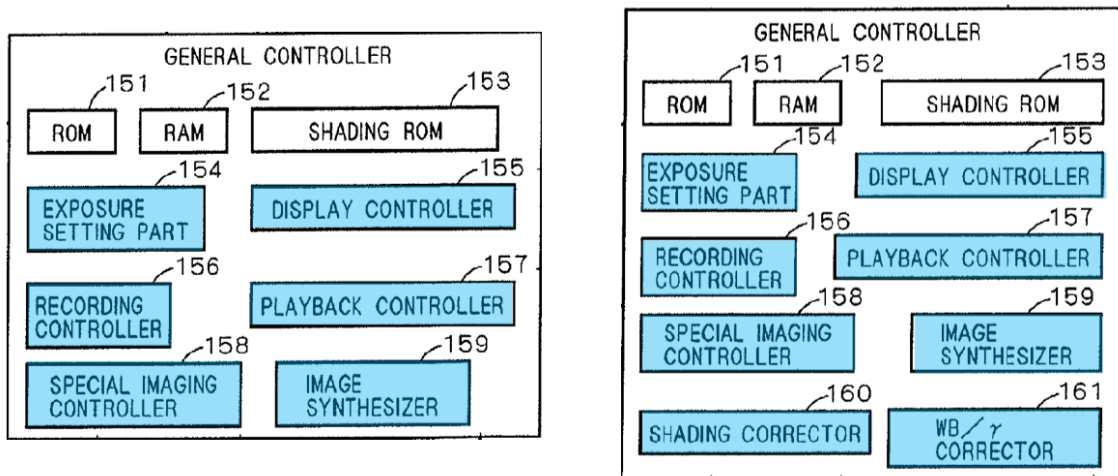


POSAs would have had a reasonable expectation of success in making the above Niikawa-Watanabe combination because modifying Niikawa's camera to include Watanabe-JP's wireless communication units and programming Niikawa's GC-150 to perform Watanabe-JPs image data and version management processes was straight forward and routine in the art, requiring only conventional skills. Laub, ¶¶189-191.

E. Claim 1

1. 1[PRE]: “A method of processing one or more images with a digital camera, comprising:”

Niikawa-Watanabe (§V.D) meets 1[PRE] because Niikawa’s “digital camera 1” (Niikawa, [0075], [0128]) includes “general controller 150” (GC-150) that executes “processing and control programs” ([0096]) to control digital camera 1 to capture and process images in multiple ways—e.g., program functions represented as “functional blocks” ([0097]) shaded blue in Niikawa’s GC-150 excerpted from FIG. 5 (below left) and FIG. 13 (below right). Niikawa, [0084]-[0086], [0095]-[0120], [0129]-[0142], [0148], [0157]-[0159]; Laub, ¶193.



2. [1A]: “digitally processing at least one captured image, the processing using in-camera hardware and software that is configured to:”

Niikawa’s GC-150 is “implemented by a microcomputer” (Niikawa, [0095]) that executes “processing and control programs” stored in ROM 151 (Niikawa, [0096]) to process image data captured by CCD 303 and converted to digital images

by A/D converter 122 (Niikawa, [0077]-[0081])—i.e., Niikawa’s camera “*digitally process[es] at least one captured image [] using in-camera hardware and software.*”

Niikawa, [0095]-[0104], [0129]-[0132]; Laub, ¶195.

GC-150’s digital processing of captured images includes: (1) performing shading, white balance (WB), γ correction and image synthesis processes (e.g., software programs shaded **blue** in FIGS. 5 and 13 *supra* §V.E.1); and (2) digitally processing live view images captured by the digital camera to perform Niikawa’s auto-focus “AF” and auto-exposure “AE” processes (Niikawa, [0098], [0106], [0134]) and display live video to the user (Niikawa, [0092]). Thus, Niikawa-Watanabe (§V.D) digitally processes captured images using camera 1’s in-camera hardware and software for multiple reasons. Niikawa, [0084]-[0086], [0095]-[0120], [0129]-[0142], [0148], [0157]-[0159]; Laub, ¶196.

As discussed *supra* §V.D, Niikawa’s GC-150 is configured to perform Watanabe-JP’s program update and wireless image transfer techniques and thus Niikawa-Watanabe’s “*in-camera hardware and software*” is “*configured to*” perform each of limitations [1A1]-[1A4] (*infra* §§V.E.2.a-V.E.2.d), and therefore meets [1A]. Laub, ¶197.

a. [1A1]: “perform a plurality of image correction algorithms”

Niikawa-Watanabe (§V.D) meets [1A1] because Niikawa’s GC-150 is configured to perform multiple “*image correction algorithms*” on captured images,

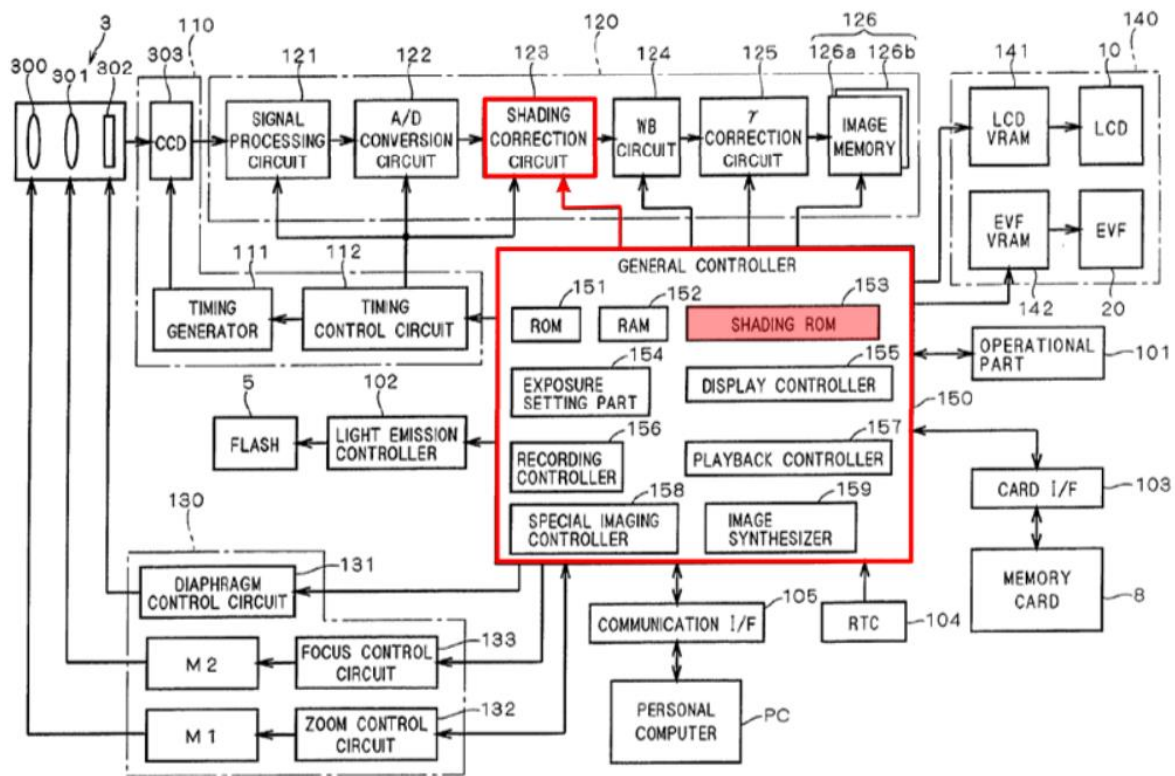
including shading, WB, γ , positioning and dynamic range correction processes. Laub, ¶198.

i. Shading Correction

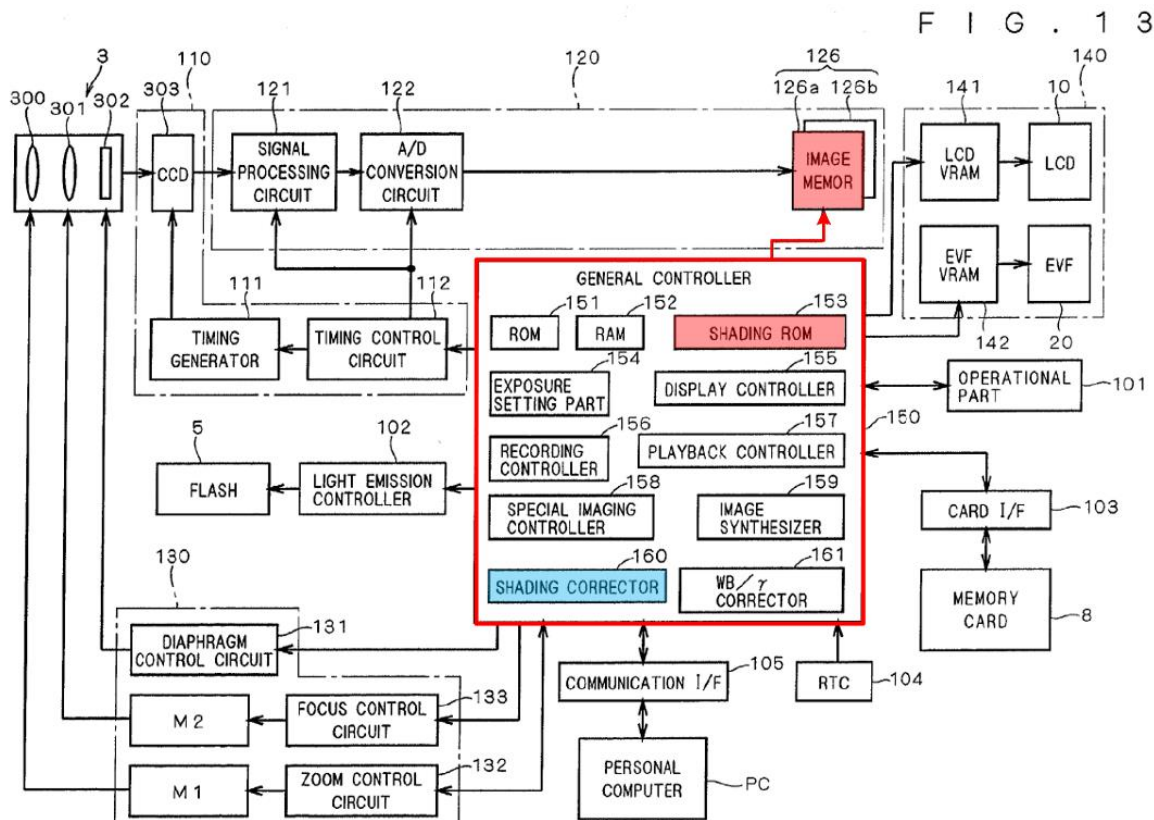
Niikawa's "shading correction process" corrects for variable lens shading effects on captured images by multiplying captured image data with "correction coefficients" stored in a "correction table" selected from "plurality of correction tables" stored in ROM 153 to remove the influence of shading (Niikawa, [0083]-[0084]). Niikawa, [0108]-[0110], [0129]-[0130], [0138], [0158]; Laub, ¶199.

Niikawa discloses configuring GC-150 to perform the above-described shading correction algorithm in two ways. In FIG. 5's configuration (annotated below), "general controller 150 performs selection of correction table from the shading ROM 153 in accordance with the optical condition such as focal length and f-number at the time of imaging" (Niikawa, [0084]). GC-150 inputs the selected correction table to "shading correction circuit 123" (*id.*) to multiply the "correction coefficients" stored in the table with corresponding pixel values in the captured image. Niikawa, [0083]-[0084], [0108], FIG. 6. Laub, ¶200.

FIG. 5



In FIG. 13's configuration (annotated below), GC-150 executes the “shading corrector 160” process program (shaded blue) to select a correction table from ROM 153 and multiply the correction coefficients with captured image data read from memory 126 in “software” (Niikawa, [0129]-[0130])—i.e., shading correction multiplications are performed using GC-150's computation unit instead of a dedicated circuit. Niikawa, [0030], [0138], [0158]; Laub, ¶201.



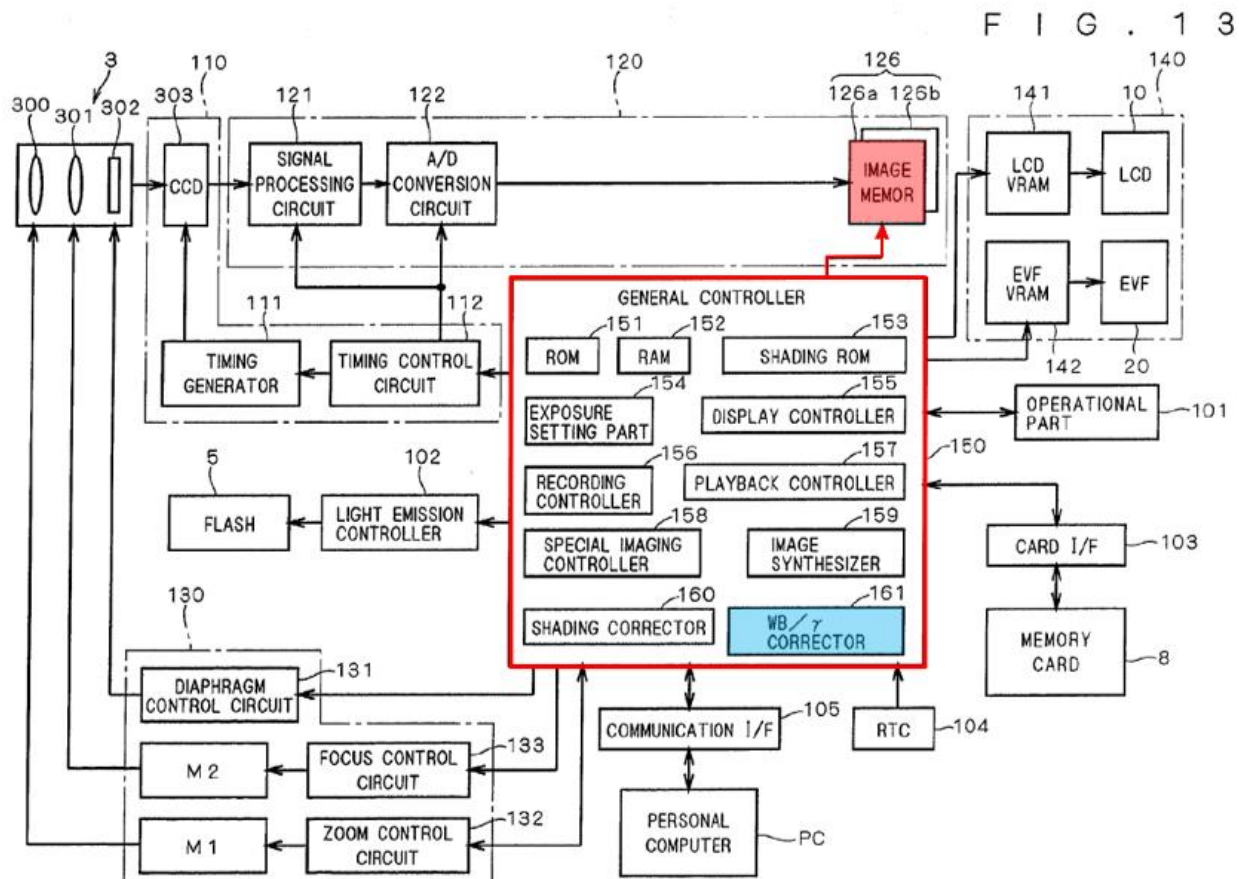
In both configurations, GC-150 “performs” selection of the correction table by executing its control/processing programs. Niikawa, [0084], [0095]-[0096], [0129]-[0130]; Laub, ¶202.

ii. WB and γ Correction

Niikawa’s WB correction process corrects for different light conditions by adjusting “the level of image data of each color component R, G, B” using “a level conversion table” (Niikawa, [0086]) and an “AWB value” determined from a live view image (Niikawa, [0106], [0134]) to adjust the color temperature of captured images. Niikawa, [0109]-[0110], [0131], [0140]; Laub, ¶¶91, 203. Niikawa’s γ correction process “corrects a γ characteristic of image data” using a “ γ correction

table” (Niikawa, [0086]). Niikawa, [0109]-[0110], [0131], [0140]; Laub, ¶¶84-85, 203.

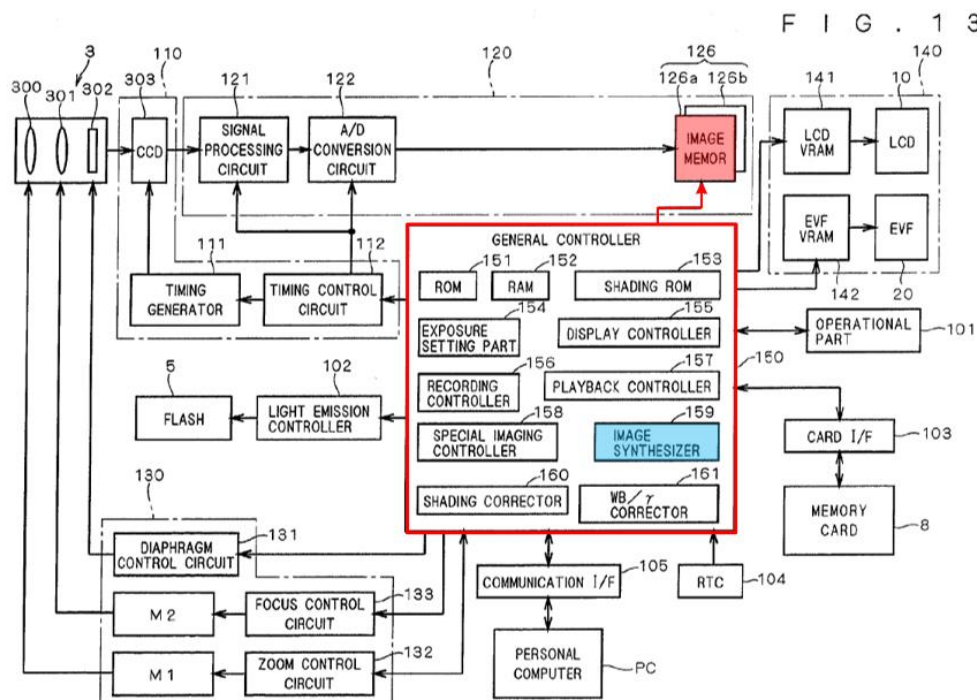
Niikawa likewise discloses configuring GC-150 to perform WB and γ image correction algorithms in two ways: using WB and γ correction circuits in the FIG. 5 configuration ([0086]) and executing “WB/ γ corrector 161” in the FIG. 13 configuration annotated below. Niikawa, [0131], [0140]; Laub, ¶204.



iii. Dynamic Range Correction

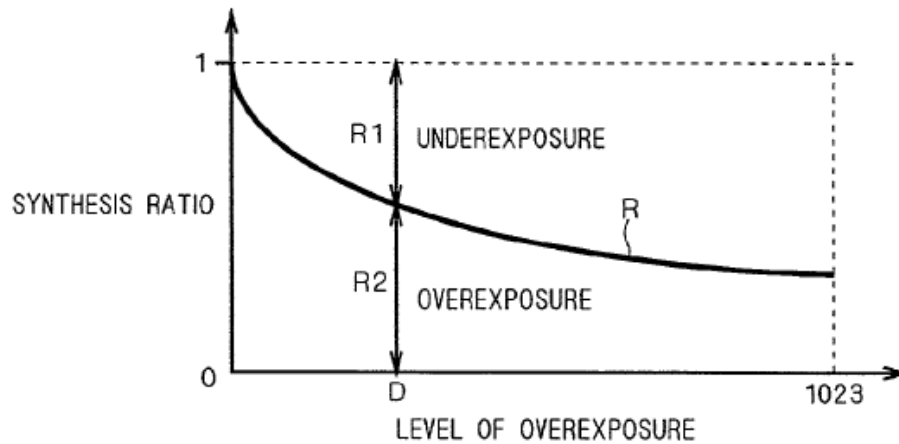
To correct for effects of the “narrow dynamic range” of the sensor (Niikawa, [0061]) on captured images, GC-150 captures two images at different exposure

settings (Niikawa, [0074], [0107]-[0110], [0135]-[0137], [0147]) and performs (1) a “positioning process” to align the images and (2) an “image synthesis process” to combine the image data to “obtain[] a synthesized image with substantially widened dynamic range” by executing “image synthesizer 159” software in both configurations (see e.g., FIG. 13 annotated below). Niikawa, [0074], [0111]-[0120]; Laub, ¶205.



Niikawa’s image synthesis algorithm uses the brightness level of each pixel in the overexposed image to index a set of adding ratios R1, R2 recorded for each possible brightness level of image data and adds the corresponding pixel values from the two images according to obtained adding ratios. Niikawa, [0120]; Laub, ¶206.

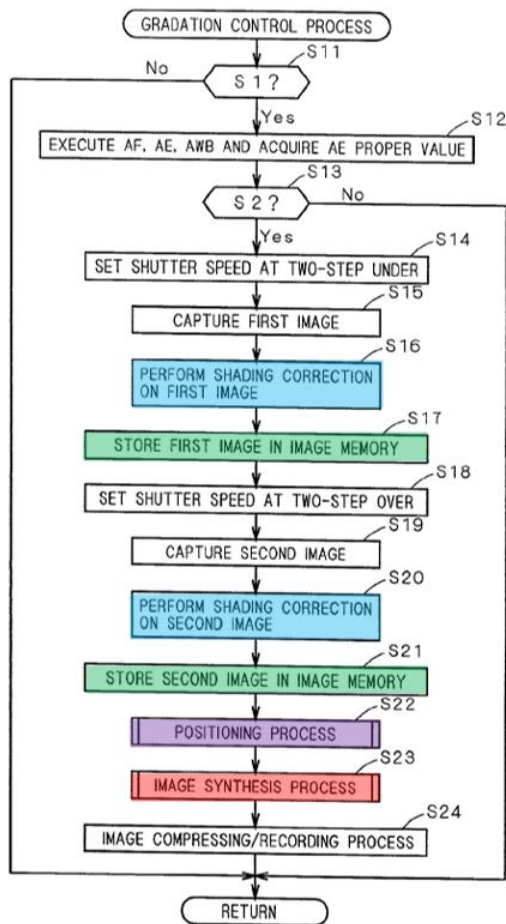
F I G . 1 2 B



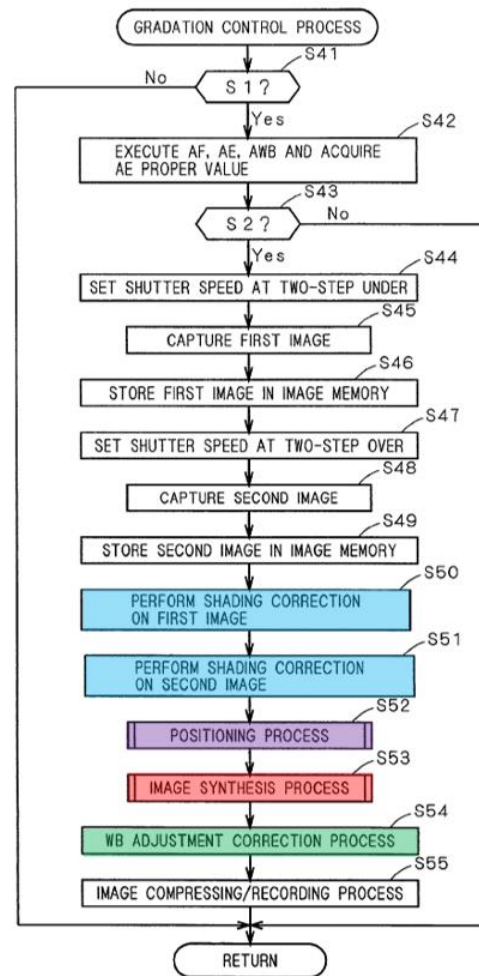
In the “normal exposure mode” (Niikawa, [0074]), Niikawa’s “processing and control programs” (Niikawa, [0096]) configure GC-150 to capture a single image and perform shading, WB and γ image correction algorithms on the captured image. Niikawa, [0108]-[0110], [0123]; Laub, ¶207.

In the “gradation control processing mode” (Niikawa, [0074]), Niikawa’s processing and control programs configure GC-150 to perform shading correction (shaded blue), WB and γ correction (shaded green), positioning (shaded purple), and image synthesis (shaded red) processes on the two images captured by the camera as shown in the gradation control processes illustrated in FIG. 9 ([0107]-[0120]) for the FIG. 5 configuration and FIG. 14 ([0129]-[0140]) for the FIG. 13 configuration. Laub, ¶208.

F I G . 9



F I G . 1 4



Thus, Niikawa-Watanabe (§V.D) meets [1A1] because GC-150 executing its “processing and control programs” stored in ROM 151 (Niikawa, [0096]) is configured to perform each of the “*plurality of image correction algorithms*” discussed *supra* §§V.E.2.a.i-V.E.2.a.iii. Niikawa, [0095]-[0104], [0129]-[0131]; Laub, ¶209.

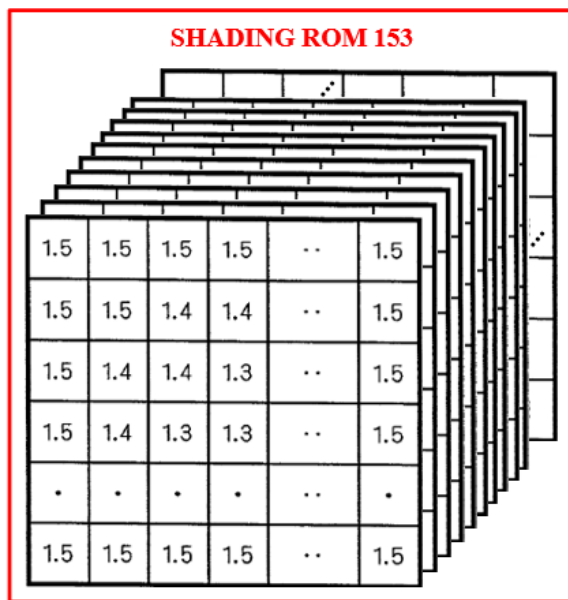
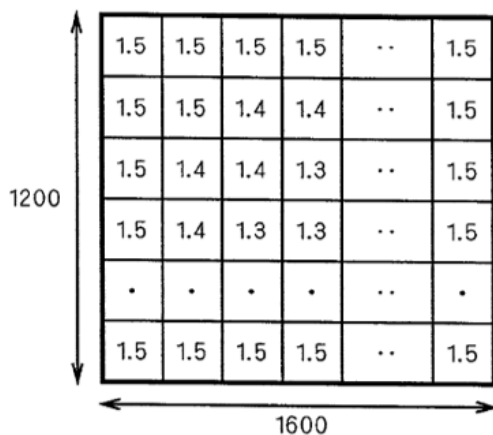
b. [1A2]: “process image correction data stored in a database system”

Niikawa-Watanabe meets [1A2] for multiple independent reasons. Laub, ¶¶210-229.

i. Niikawa’s Shading Correction Process Performs [1A2]

Niikawa’s FIG. 7 (below left) shows an example of a shading “correction table” storing “correction coefficients” at each location in an image for a given focal length and f-number. Niikawa, [0083]-[0084]; Laub, ¶210. Niikawa discloses that “a plurality of correction tables for different parameters which are the optical conditions such as focal length and f-number at the time of imaging are prepared and stored in a shading ROM 153” (Niikawa, [0084]), as illustrated by the drawing (below right). Laub, ¶211.

F I G . 7



To perform shading correction (*supra* §V.E.2.a.i), “general controller 150 performs selection of correction table from the shading ROM 153 in accordance with the optical condition such as focal length and f-number at the time of imaging” (Niikawa, [0084]) and performs a “coefficient process” (Niikawa, [0083]) that multiplies the correction coefficients from the selected correction table with corresponding pixels in a captured image—i.e., GC-150 is configured to “*process image correction data*” to perform shading correction. Niikawa, [0108], [0129]-[0130], [0138], [0158]. Laub, ¶¶212-213.

Niikawa’s “plurality of correction tables” for different focal length and f-number parameters (Niikawa, [0084]) is a database. EX1024, 2:8-12 (“a database may be viewed as one or more tables of information”); EX1055, 238 (a “database” is a “collection of data structured and organized...so that access is possible quickly to information of interest”); Laub, ¶¶215, 216 (*citing* EX1027, 9:26-43, 11:56-12:3, 15:1-33; EX1021, [0219]-[0220], [0234]-[0290], FIGS. 7-12; EX1029, [0088]-[0089], discussing conventional in-camera databases).

Niikawa’s GC-150 processing programs that access a database of correction tables using focal length and f-number parameters to select the corresponding correction table meets [1A2]’s “*database system*.” Niikawa, [0083]-[0084], [0095]-[0096], [0108]-[0110], [0129]-[0130]. Laub, ¶217.

A “database system” refers to programs that access stored data and is often used to refer to both the programs and the data that the programs access. EX10172, 1:12-16 (“A database system is a set of computer programs” used “to store and retrieve data...Most database systems store data in tables.”); EX1073, 1:15-18 (“a database system is a collection of interrelated data files [] and a set of programs”); EX1075, 88 (a “database system” is “a series of programs” that allow “use of a database”); Laub, ¶217. Thus, POSAs understood that GC-150’s processing programs and database of shading correction tables accessed by the programs comprise a “*database system*.” Laub, ¶218.

Limitation [1A2]’s “*database system*” requires only that image correction data is stored on it. The specification similarly imposes no specific requirements on a database system. Indeed, the term appears once in the specification: “software files are periodically downloaded to the camera in order to update the camera settings and the database system.” EX1001, (29:10-13); Laub, ¶218.

Embodiments in the ’266 patent describe a camera comprising a database that is “accessed” by the “camera’s microprocessor” (33:43-44) to obtain corresponding data stored thereon (e.g., “FIG. 13’s “similar scenes (1310),” 33:41-46, FIG. 25’s “corrections (2520),” 35:36-50, etc.). *See also*, EX1001, 10:63-65, 13:26-27, 15:11-16, 26:56-61, 36-:19-23, describing camera processes accessing a database; Laub, ¶219.

Niikawa's shading correction data stored in a database and selectively accessed by software executed by GC-150 to obtain the desired correction table is “*stored on a database system*” for the same reasons. Laub, ¶220.

Thus, Niikawa-Watanabe (§V.D) meets [1A2] because Niikawa's in-camera hardware and software is configured to “*process image correction data stored in a database system,*” and does so when GC-150 performs the shading correction process. Laub, ¶221.

ii. Niikawa's WB/ γ and Dynamic Range Correction Processes Each Perform [1A2]

Additionally, GC-150 is also configured to “*process*” multiple other types of “*image correction data*” stored in general controller's ROM—i.e., “a level conversion table” for WB correction, a “ γ correction table” for γ correction and a collection of adding ratios R1, R2 for image synthesis. Niikawa, [0086], [0131], [0140], [0118]-[0120]; Laub, ¶¶203-206, 222; *supra* §V.E.2.a.ii-V.E.2.a.iii.

Thus, general controller 150's processing programs that access WB/ γ correction tables and image synthesis data stored in ROM to obtain the corresponding correction data also meets [1A2]'s “*database system*” on which this correction data is stored—i.e., Niikawa's WB/ γ correction tables and image synthesis data are part of Niikawa's set of correction data stored in ROM and accessed by general controller 150's programs when performing normal mode and

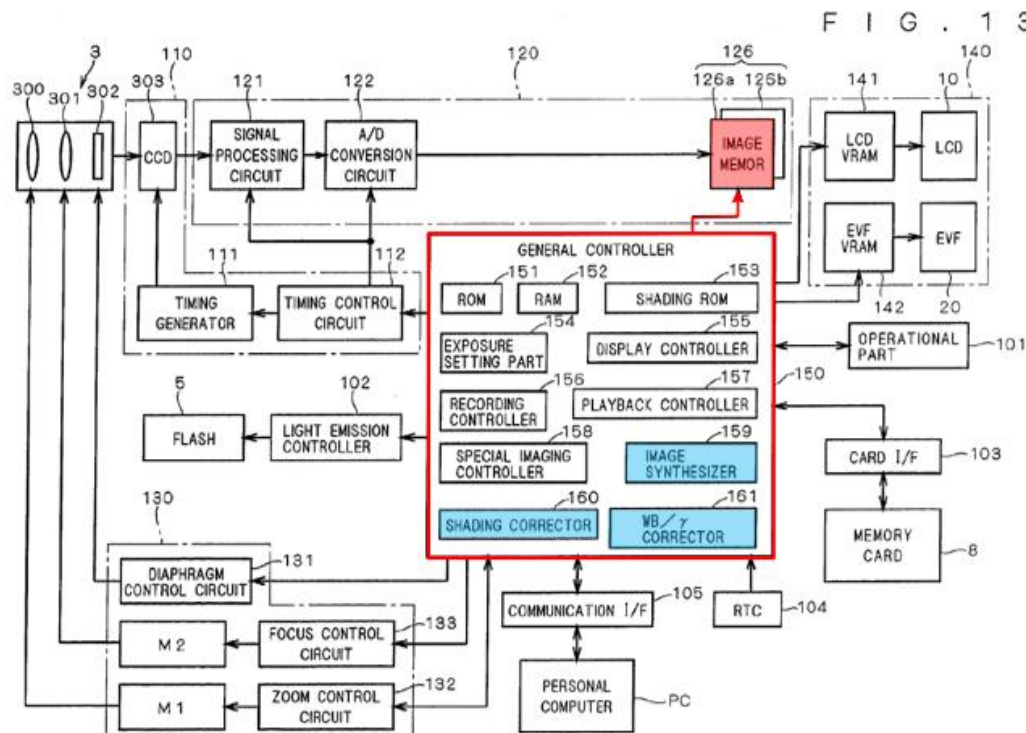
gradation control processing sequences (see *supra* §V.E.2.a). EX1074, 5:57-58 (“a database is a repository for stored data”); Laub, ¶¶223-225; *supra* §V.E.2.b.i.

Thus, Niikawa-Watanabe meets [1A2] for the additional reasons that GC-150 is configured to “*process image correction data stored in a database system*” and does so when GC-150 executes processing programs that perform Niikawa’s WB, γ and/or image synthesis processes. Laub, ¶226.

While limitation [1A2] does not require correction data to be stored in a particular way, Niikawa stores correction data in tables as was common and conventional for database systems. Laub, ¶225. POSAs understood that Niikawa’s structured correction, individually and collectively, comprise a database—i.e., structured data organized so that Niikawa’s set of processing programs can quickly and efficiently access the correction values stored therein and apply them to captured image data. EX1021, [0219]-[0220], [0232]-[0234], FIG. 6A, 7-12 (disclosing individual tables stored in camera’s memory are each a “database.”); EX1027, 11:56-12:3, 15:1-33 (disclosing individual structured sets of data stored in the camera are each a data base); EX1074, 5:57-58 (“a database is a repository for stored data”); Laub, ¶¶215-218, 225; *supra* §V.E.2.b.i (POSA’s understanding of a “database system”).

To the extent it is alleged that any of Niikawa’s correction data is not “*stored in a database system*,” POSA would have recognized there were many ways to

organize the data structures explicitly disclosed for storing Niikawa's different correction data that are accessed by GC-150 executing processing programs that perform the image correction functions shaded **blue** in FIG. 13 below, and a POSA would have known to do so in an organized way to allow Niikawa's processing programs to efficiently access and apply correction data to capture images. EX1029, [0088]-[0089] ("a data base for storing various reference tables and templates") Laub, ¶¶226-229.



c. **[1A3]: “receive updated software and image correction data”**

Niikawa-Watanabe (§V.D) meets [1A3] both because Niikawa's GC-150 is configured to receive updated software and image correction data via physical and wireless connections. Laub, ¶230.

i. Niikawa's Program Update

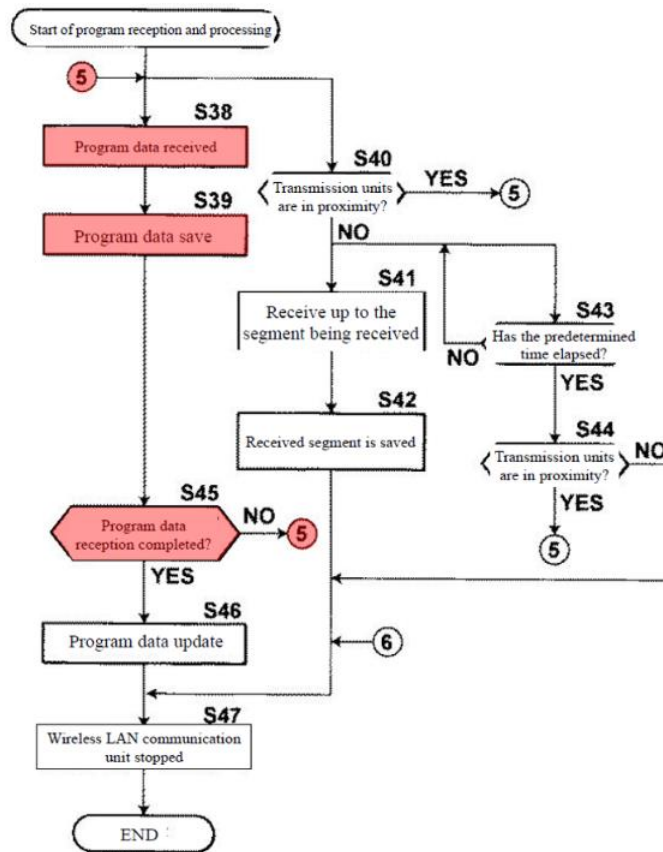
As discussed in *supra* §V.C.1, Niikawa's "processing and control programs can be installed on digital camera 1 from the memory card 8" or "from the personal computer PC via the communication interface 105" by storing "program data" received therefrom in digital camera 1's ROM. Niikawa, [0096]; Laub, ¶231.

POSAs understood from this disclosure that: (1) installing the "program data" updates the camera's program data because there would be no need to install it otherwise; (2) Niikawa's ROM is writable by GC-150 (e.g., an EEPROM) and which POSAs would have known to make "rewritable" as taught by Watanabe-JP ([0004], [0040]); (3) the updated program data included the image correction data (see *supra* §V.E.2.b) on which Niikawa's programs operate so that the programs can perform their disclosed functions; and (4) Niikawa's GC-150 is "*configured to*" [1A] install subsequent updates to the program data via the same installation process, each of which also would have been the obvious way to implement and use what Niikawa discloses. Niikawa, [0022], [0060], [0095]-[0104], [0115]-[0120], [0129]-[0131]; Laub, ¶232; *infra* §V.E.2.c.ii.

Thus, Niikawa-Watanabe (§V.D) meets [1A3] for this first reason. Laub, ¶233.

ii. Niikawa-Watanabe's Wireless Update

In Niikawa-Watanabe (§V.D), Niikawa's camera 1 includes Watanabe-JP's "wireless LAN communication unit 33" and Niikawa's GC-150 is configured to perform wireless software updates taught by Watanabe-JP's "program reception process" (highlighted in **red** in FIG. 4 below)—i.e., when updated program data is sent wirelessly to digital camera 1, "wireless LAN communication unit 33 of the digital camera 1 *receives the program data* (step S38)" (Watanabe-JP, [0068]) and stores it in the camera's program memory. Watanabe-JP, [0004], [0022]-[0025], [0040], [0062]-[0071]. Laub, ¶234.



POSAs understood that the updated program data would have included the correction data on which the programs operate. For example, POSA's understood that Watanabe-JP's "updated program data [] provided by the manufacturer" to upgrade the digital camera (Watanabe-JP, [0048]) included the data needed to perform the improved functionality or to implement new features of an updated version (Watanabe-JP, [0004], [0025], [0037]-[0040], [0061]-[0072]), which for image processing programs like Niikawa's (and Watanabe-JP's, [0039]) routinely included improvements to the correction data on which the programs operate. Laub, ¶¶235-239.

Moreover, the obvious and beneficial way to update Niikawa's programs would have been to update the correction data as improvements are made or new features added, as was conventional and routine. EX1009, 4:37-67 (updating a camera's image processing algorithms with enhanced "look-up tables, matrices, compression tables, dynamic range optimization tables, and other files capable of effecting the captured image."), 2:29-38, 8:50-9:1; EX1010, [0003]-[0009], [0021]-[0022], [0029]-[0036], FIGS. 4-6 (upgrading a digital camera with updated "correction data used during the execution of the image processing program for performing gamma correction, white balance correction, and the like"); EX1071, 14:7-24 (updating LUTs in a digital camera's stored "knowledgebase"); Laub, ¶¶236-239.

Thus, in addition to the updated correction data received when Niikawa's control and processing programs are installed on Niikawa's camera (*supra* §V.E.2.c.i), it would have been obvious and beneficial to update Niikawa's shading correction, WB/ γ correction and image synthesis processes, etc., with updates to the correction data on which the respective processing programs operate (Niikawa, [0084]-[0086], [0108]-[0109], [0119]-[0120], [0129]-[0131], [0138]-[0139]) as improvements are made, to add further image correction processes or new features, etc., as was conventional and routine. Watanabe-JP, [0004]; see also above-citations to EX1009, EX1010, EX1071; Laub, ¶240.

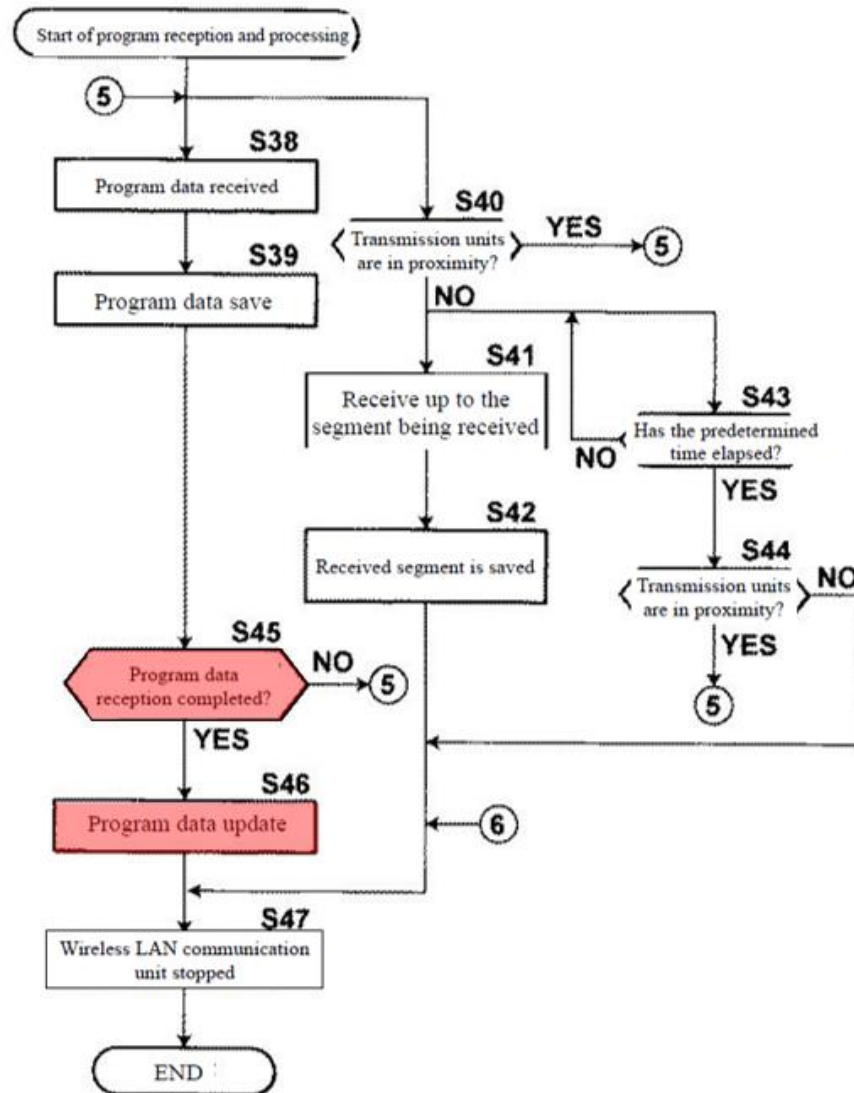
Niikawa-Watanabe's (§V.D) wireless update and/or its obvious implementation meets [1A3] for this additional reason. Laub, ¶241.

d. [1A4]: “upgrade the digital camera with the updated software and image correction data;”

Niikawa-Watanabe (§V.D) meets [1A4] because received updated program data discussed *supra* §V.E.2.c is applied to upgrade Niikawa's digital camera. Laub, ¶242.

As discussed *supra* §V.D, Niikawa-Watanabe implements Watanabe-JP's technique of storing received program segments without overwriting existing programs—i.e., program data received from PC 2 “is only stored in program memory 17, and no update of the program data is performed.” Watanabe-JP, [0068]. After all the updated program data is successfully received, the “received program

data is set up and the program data currently stored in program memory 17 is updated” (Watanabe-JP, [0072]), as illustrated by steps highlighted **red** in Watanabe-JP’s FIG. 4 below. Watanabe-JP, [0069]-[0072]; Laub, ¶¶243-244.



Niikawa-Watanabe (§V.D) applies this same technique by configuring GC-150 to store all received program data (which includes any received correction data) in its memory without overwriting any information until all program data has been received, as taught by Watanabe-JP and then “*upgrade the digital camera with the*

updated software and image correction data” once all segments have been successfully received. Laub, ¶245.

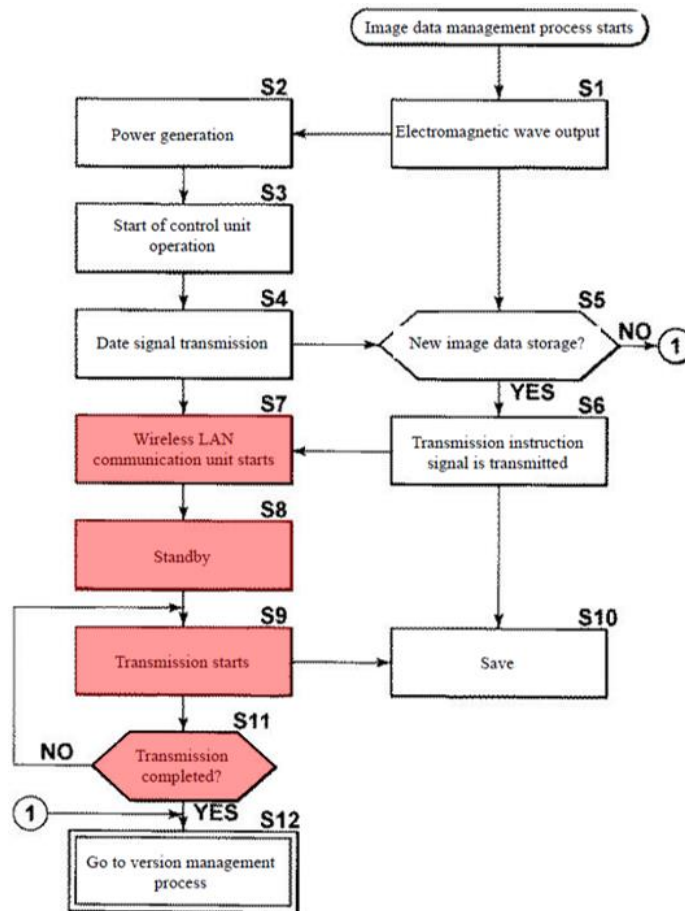
3. [1B]: “storing in memory one or more corrected images resulting from digitally processing the at least one captured image; and”

Niikawa-Wantanabe (§V.D) meets [1B] both because Niikawa’s “image memory 126” temporarily stores “image data for which image processing has been completed” (Niikawa, [0087], [0108]-[0110]) and because the “*corrected images*” subjected to shading, white balance and γ correction, and additionally to dynamic range correction in the gradation control processing mode, are stored on Niikawa’s memory card 8. Niikawa, [0100]-[0101], [0121], [0123], [0140], [0159]; Laub, ¶246.

4. [1C]: “wirelessly transmitting at least one of the one or more corrected images”

Niikawa-Watanabe (§V.D) meets [1C] because Watanabe-JP’s image management processes wirelessly transmit images from the digital camera to an external computer. Laub, ¶247.

As shown in Watanabe-JP’s FIG. 2, Watanabe-JP’s image management process determines whether new images have been acquired since the last download (step S5 in Watanabe-JP’s FIG. 2 below, [0057]) and new images are wirelessly transmitted via wireless LAN communication unit 33 (e.g., steps shaded **red** in FIG. 2 below). Watanabe-JP, [0058]-[0060]; Laub, ¶248.



Thus, Niikawa-Watanabe (§V.D) implementing Watanabe-JP's wireless image transfer performs [1C] when corrected images stored on Niikawa's memory card 8 are wirelessly transmitted in the same way, e.g., using the image tag's time/data information (Niikawa, [0100]-[0101], FIG. 8) or when a user selects images to be transmitted as was conventional. Watanabe-JP, [0057]-[0060]; Laub, ¶¶135-136, 249.

5. [1D]: “wherein the in-camera software and database system are upgradable to provide improved algorithms and correction data for correction of images”

Niikawa-Watanabe (§V.D) meets [1D] for the same reasons Niikawa-Watanabe meets [1A3] and [1A4] discussed *supra* §§V.E.2.a-V.E.2.d. Laub, ¶250.

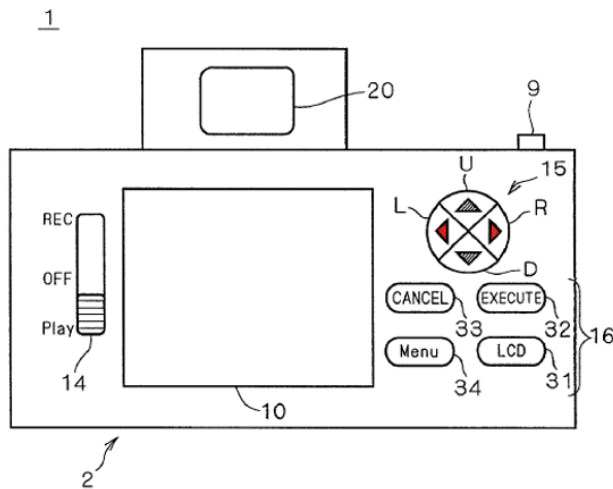
F. Claim 2: “The method of claim 1, wherein the digitally processing at least one captured image further comprises: [2A] electronically reading stored user-adjustable variables; and [2B] processing image corrections using the user-adjustable variables

Niikawa-Watanabe (§V.D) meets claim 2 because Niikawa’s GC-150 performs image correction processes (e.g., shading, white balance, γ and dynamic range corrections) using multiple user-adjustable variables discussed *infra* §V.F.1-V.F.3. Laub, ¶251.

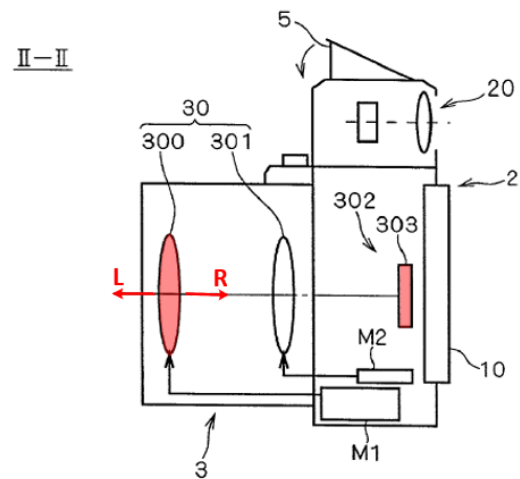
1. User-Adjustable Focal Length

The user adjusts the “zoom ratio” (Niikawa, [0067], [0072]) of Niikawa’s camera using the L, R buttons (shaded **red** in Niikawa’s FIG. 4 below left) to move zoom lens 300 either to the “tele side” (L) or the “wide side” (R). As the user moves zoom lens 300 towards or away from sensor 303 (see annotations in **red** in Niikawa’s FIG. 3 below right), the user adjusts the focal length of imaging lens 3 in correspondence—i.e., zoom ratio and focal length are “*user-adjustable variables*.” Niikawa, [0060], [0072], [0083]-[0084], [0108]-[0110], [0138], [0158]; EX1001, 26:18-66; Laub, ¶¶252-254.

F I G . 4



F I G . 3



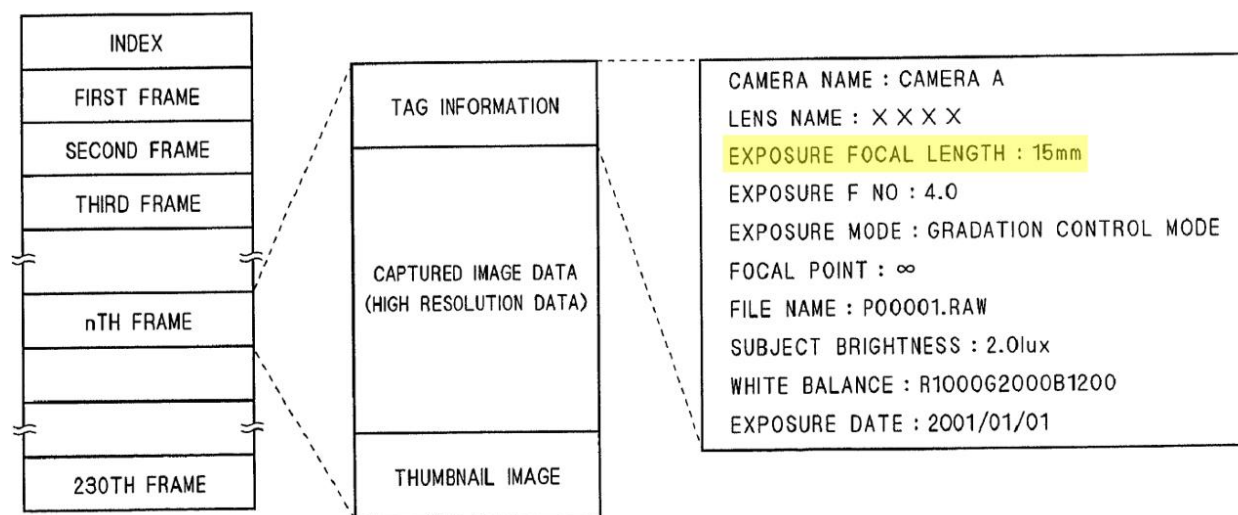
To perform shading correction, “general controller 150 performs selection of correction table from the shading ROM 153 in accordance with the optical condition such as **focal length** and f-number at the time of imaging” (Niikawa, [0084]) to apply to the captured image data. Niikawa, [0108]-[0110], [0129]-[0130], [0138], [0158]; Laub, ¶¶255-257. Thus, GC-150 “*process[es] image corrections using the user-adjustable variable[]*” of focal length when it performs shading correction, as recited in [2B]. Laub, ¶258.

POSAs understood that focal length is “*stored*” in memory and “*electronically read[]*” by GC-150 at least from Niikawa’s express disclosure that GC-150 uses the focal length to select “a correction table that corresponds to the optical conditions of focal length and f-number at the time of exposure” ([0108]). Laub, ¶248. GC-150 is a “microcomputer” which operates by electronically reading and manipulating data stored in memory (see *e.g.*, Niikawa, [0095]-[0096]) and POSAs therefore

understood that GC-150 “electronically read[s]” the “stored” focal length set at the time of exposure that it uses to select the corresponding correction table. Niikawa, [0084], [0108], [0129]-[0130], [0138], [0158]; Laub, ¶¶259-260.

Additionally, the focal length at the time of exposure is also “stored” when recording controller 156 executed by GC-150 ([0096]-[0097]) generates tag information that includes “exposure focal length” (highlighted in Niikawa’s FIG. 8 below) and stores the tag information with the corrected image data on memory card 8. Niikawa, [0096]-[0100]; Laub, ¶261.

F I G . 8



Niikawa’s tag information (1) reinforces that focal length is stored in the camera’s memory so that GC-150 can access and write it to the image tag when it executes the recording controller 156 program, and (2) explicitly shows another instance in which focal length is stored. See also Niikawa, [0155]-[0159] (disclosing

a mode in which the focal length is read from the stored image tag to perform shading correction on images stored on memory card 8); Laub, ¶¶262-263.

2. User-Adjustable Exposure Mode Setting

Niikawa's exposure mode setting selected by the user via a menu displayed on LCD 10 (Niikawa, [0070]-[0074]) is another of camera 1's "*user-adjustable variables*." Laub, ¶¶264.

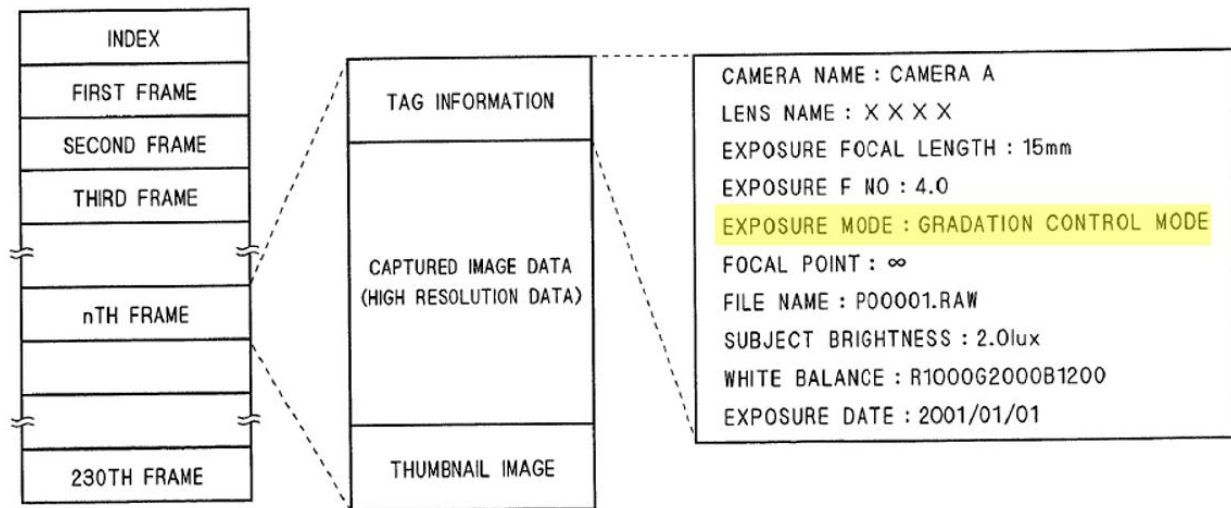
POSAs understood that the exposure mode set by the user is "*stored*" and "*electronically read[]*" ([2A]) and used to "*process[] image corrections*" ([2B]) because GC-150 uses the exposure mode set by the user to determine how to control the camera and which image correction processes to perform (Niikawa, [0074], [0100], [0103]). Laub, ¶¶264-269 (also *citing* Niikawa, [0101], [0148]-[0159] and FIG. 8 (highlighted below) demonstrating storing and reading of the exposure mode setting).

The '266 patent discloses using user-adjustable variables in processing image corrections in the same way. EX1001, 12:41-49 (disclosing that it is "useful to have manually adjusted variables" by which "one may omit a specific correction in an image."), EX1001, 13:19-23 (disclosing the "combination of processes are performed in-camera by user adjusted-settings."), 35:36-40 (disclosing that the "type and degree of special effects" are "selected by user-adjustable in-camera software"); Laub, ¶¶267.

Specifically, when the user sets the camera in “normal exposure mode,” GC-150 sets the f-number and shutter speed to the “proper value” (Niikawa, [0109]-[0110], [0123]) determined by Niikawa’s AE process to capture a single image on which shading, white balance and γ correction processes are performed. Niikawa, [0074], [0100], [0106], [0109]-[0110], [0123], [0134]; Laub, ¶266.

When the user sets the camera to the “gradation control processing mode,” GC-150 captures two images at different shutter speeds and, in addition to the above image corrections (Niikawa, [0107]-[0110], [0129]-[0131], [0138], [0140], [0158]), corrects for effects resulting from the “limited dynamic range” of the sensor (Niikawa, [0061], [0074]) by performing positioning and image synthesis processes on the two images (Niikawa, [0111]-[0121], [0139], [0159]). Laub, ¶¶265-266.

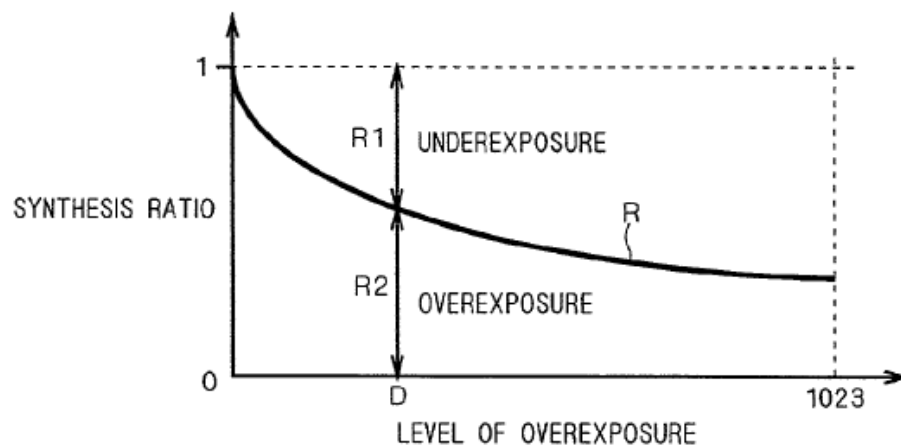
Thus, GC-150 using the user-adjustable exposure mode setting to determine whether to capture one or two images, which settings to use and whether to perform normal or gradation control processing sequences meets [2B] for the same reasons the ’226 patent’s embodiments do. Laub, ¶¶267-268.



3. User Adjustable Synthesis Ratio

Niikawa's image synthesis process combines pixel values of overexposed and underexposed images according to different adding ratios R_1 and R_2 set for each image level (e.g. as shown in FIG. 12B below). Niikawa, [0118]-[0120], [0182]; Laub, ¶270; *supra* §V.E.2.a.iii.

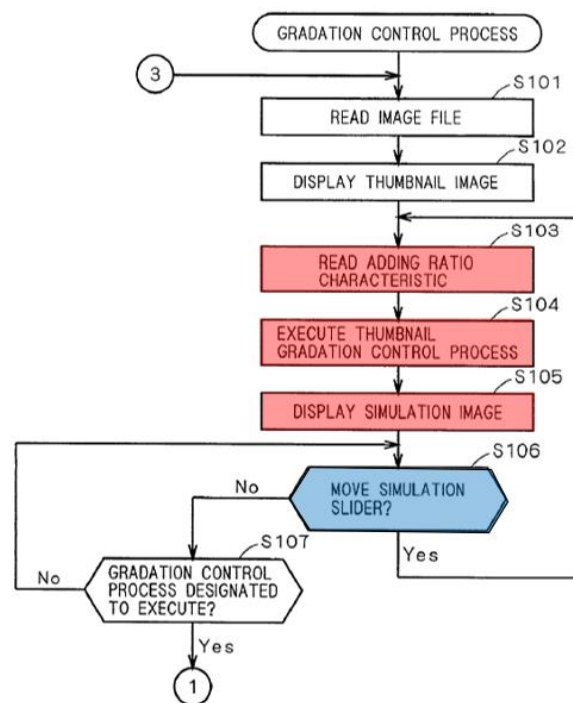
F I G . 1 2 B



Niikawa discloses a “fourth preferred embodiment” (Niikawa, [0163]-[0164]) in which the synthesis ratio can be adjusted by the user to obtain desired dynamic range correction. Niikawa, [0182]-[0185], [0203], [0206]. Laub, ¶271.

In FIG. 22 (annotated below), a user moves a slider control (step S106 shaded blue) to adjust the adding ratios used in an iterative image synthesis process performed on thumbnails displayed to the user (S103-S104 shaded red). Niikawa, [0185]-[0187]; Laub, ¶272.

F I G . 2 2



When a desired dynamic range correction is achieved (Niikawa, [0187]-[0190]), Niikawa’s image synthesis process “is performed in accordance with the adding ratio characteristic set by the slider” on the full images (step S124 shaded red in the gradation control process of FIG. 23 below). Niikawa, [0203]; Laub, ¶273.

```

graph TD
    1((1)) --> S111[READ FIRST IMAGE AND SECOND IMAGE S111]
    S111 --> S112[READ POSITIONING REGION S112]
    S112 --> S113{SHADING CORRECTION OF POSITIONING REGION REQUIRED? S113}
    S113 -- No --> 2((2))
    S113 -- Yes --> S114{CAMERA SETTING "AUTO"? S114}
    S114 -- No --> 2
    S114 -- Yes --> S115[READ CAMERA NAME FROM TAG INFORMATION S115]
    S115 --> S116[READ FOCAL LENGTH FROM TAG INFORMATION S116]
    S116 --> S117[READ F-NUMBER FROM TAG INFORMATION S117]
    S117 --> S118{TAG INFORMATION NORMALLY READ? S118}
    S118 -- Yes --> 2
    S118 -- No --> S119[SET POSITIONING REGION TO 20% OF SCREEN S119]
    S119 --> 2
    2 --> S120[SET CORRECTION TABLE S120]
    S120 --> S121[PERFORM SHADING CORRECTION ON FIRST IMAGE S121]
    S121 --> S122[PERFORM SHADING CORRECTION ON SECOND IMAGE S122]
    S122 --> 3((2))
    3 --> S123[POSITIONING PROCESS S123]
    S123 --> S124[IMAGE SYNTHESIS PROCESS AT SET ADDING RATIO S124]
    S124 --> S125[OPEN WINDOW AND DISPLAY SYNTHESIZED IMAGE S125]
    S125 --> S126{SAVE SYNTHESIZED IMAGE? S126}
    S126 -- No --> 3
    S126 -- Yes --> S127[SAVE IMAGE S127]
    S127 --> 3
    3 --> 4((3))
  
```

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Thus, GC-150’s “*digitally processing at least one captured image*” comprises “*electronically reading stored user-adjustable variables*” ([2A]), including lens focal length, exposure mode setting, and synthesis ratio, and “*processing image corrections using the user-adjustable variables*” ([2B]) for the reasons discussed *supra* §§V.F.1-V.F.3, and therefore Niikawa-Watanabe meets claim 2. Laub, ¶277.

G. Claim 4: “...wherein the user-adjustable variables include lens data.”

Niikawa-Watanabe meets claim 4 for the same reason discussed *supra* §V.F.1 because Niikawa’s user-adjustable focal length is “*lens data*” as claimed. Laub, ¶278.

The ’266 patent uses the term “lens data” generically and without limitation. EX1001, 19:17-21 (“data about a specific lens are provided to the camera in order to correct specific lens aberrations”); 19:29-33 (“lens and exposure data” used to determine nano-grid corrections); 24:4-7 (analyzing “specific variables, such as aperture data, shutter speed data, lens data...”); 35:34-38, FIG. 24 (camera “analyzes the lens data, the aperture data, and the shutter speed data...”). Laub, ¶279.

The ’266 patent also uses “lens focal length” (EX1001, 27:27-36, 36:23-28) in the manner in which it describes “lens data” is used—e.g., to identify corrections to apply to captured image data, both in matching fixed-focal length lenses to those stored in a database (e.g., EX1001, 11:19-57, 31:7-32, FIGS. 4, 6) and for variable-

focus zoom lenses for which different corrections are stored for different focal lengths (e.g., EX1001, 26:18-27:4, 36:18-31, FIG. 29), like Niikawa. Laub, ¶280.

Thus, POSA understood the term “lens data” includes lens focal length, which is consistent with its plain meaning and customary use. Laub, ¶¶281-282 (*citing* EX1033, [0086]; EX1032, 4:15-18; EX1034, [0053]-[0054]; EX1036, 5:51-58, 10:15-21; EX1035, Abstract).

H. Claim 5: “...wherein the user-adjustable variables include shutter speed settings.”

Niikawa-Watanabe (§V.D) meets claim 5 because shutter speed settings are adjusted based on the user setting the exposure mode. Laub, ¶283.

As discussed *supra* §V.F.2 (claim 2), GC-150 sets the shutter speed to the “proper value” determined by Niikawa’s AE process (Niikawa, [0109]-[0110]) when the user selects the “normal exposure mode,” and adjusts the shutter speed two steps under and over the proper value to capture respective underexposed and overexposed images when the user selects the “gradation control processing mode.” Niikawa, [0074], [0098], [0106]-[0110], [0134], [0136]-[0137], [0147]-[0159]; Laub, ¶284.

285. The shutter speed setting Niikawa’s camera uses depends on the user’s selection of exposure mode and is thus “*user-adjustable*” at least to the same extent it is disclosed in the ’266 patent, which uniformly describes that the camera’s automatic processes adjust shutter speed, not the user (EX1001, 13:59-14:11, 14:58-67, 23:58-24:9, 27:27-49, 32:65-33:2, 35:33-44), and at best discloses the user

adjusting shutter speed settings by virtue of selecting specific correction processes (EX1001, 14:38-60), like in Niikawa. Laub, ¶285.

POSA's understood that the shutter speed calculated by Niikawa's AE process is “stored” and “electronically read[]” ([2A]) because GC-150 uses that shutter speed to set different shutter speeds depending on the exposure mode, and GC-150 “process[es] image corrections using” the shutter speed settings ([2B]) because (1) GC-150 performs subsequent image corrections on images captured at the set shutter speeds in both modes (which is all the '266 patent describes), and (2) Niikawa's image synthesis process uses the four-stop difference in shutter speed to increase dynamic range. Niikawa, [0107]-[0110], [0118]-[0120]; Laub, ¶286.

Thus, Niikawa-Watanabe (§V.D) meets claim 5 and meets claim 2 for this additional reason. Laub, ¶287.

I. Claim 8: “...wherein the user-adjustable variables include tonal range corrections.”

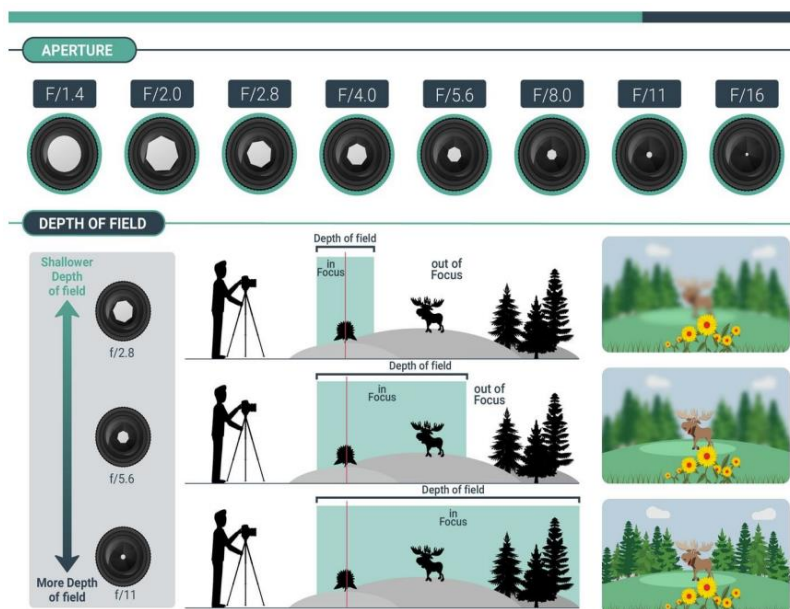
POSAs understood that Niikawa “dynamic range” and the '266 patent's “tonal range” refer to the same image characteristic—i.e., the range of levels between the darkest and lightest pixels in an image. *Compare* Niikawa, [0061], [0074], [0118]-[0120] with EX1001, 14:17-15:1-4; Laub, ¶288.

As discussed *supra* §V.F.3 (claim 2), the user adjusts dynamic range corrections (i.e., “tonal range corrections”) performed by Niikawa's gradation control process by adjusting the synthesis ratio used by Niikawa's image synthesis

process. Niikawa, [0061], [0061], [0074], [0118]-[0120], [0182]-[0190], [0203], [0206]. Thus, Niikawa-Watanabe (§V.D) meets claim 8 for the same reasons discussed *supra* §V.F.3. Laub, ¶¶289-290.

J. Claim 11: “... wherein the digitally processing the at least one captured image for image correction further comprises adjusting a depth of field of an image”

Niikawa “*digitally process[es] at least one captured image*” when Niikawa’s AE process evaluates the scene’s brightness by processing captured live view images to determine the “correct” f-number and shutter speed settings. Niikawa, [0092], [0098], [0106], [0134]; Laub, ¶¶291-292; *supra* §V.E.2. Depth of field (DOF), as the ’266 patent explains, is “dependent on the aperture setting of the lens” (EX1001, 13:38-39). Specifically, the larger the aperture (i.e., smaller f-number), the narrower the depth of field and vice versa, as illustrated in the drawing below (EX1030, 27). EX1030, 9, 27; Laub, ¶¶293-294.



Thus, Niikawa-Watanabe (§V.D) meets claim 11 because Niikawa’s GC-150’s digital processing of live view images “*further compris[es] adjusting a depth of field of an image*” by executing the AE process and setting the aperture to the adjusted f-number, like the ’266 patent discloses. EX1001, 13:34-36 (“the present system allows in-camera depth-of-field (DOF) optimization by affecting the aperture of the lens that is used”), 38-62 (multiple disclosures of same). Laub, ¶¶295-296.

K. Claim 13: “The method of claim 1, wherein the in-camera software processes image corrections based on one or more prior image corrections.”

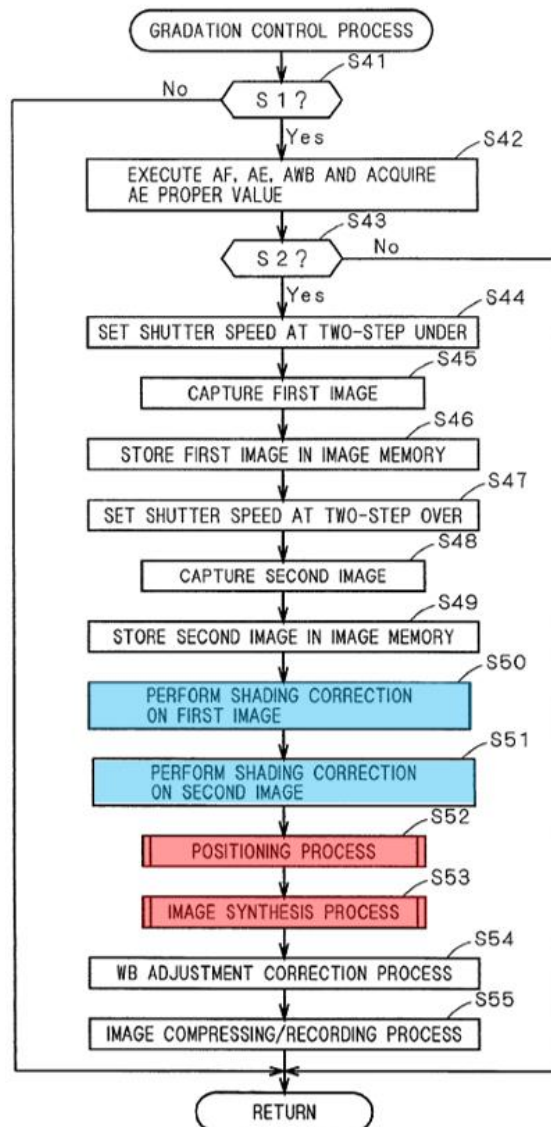
Niikawa-Watanabe (§V.D) meets claim 13 because Niikawa’s gradation control process (i.e., “*in-camera software*”) performs positioning and image synthesis on images that have undergone shading correction—i.e., based on prior shading corrections. Laub, ¶297.

Specifically, prior to performing image synthesis, Niikawa first performs “a positioning process” to align the underexposed and overexposed images. Niikawa, [0061]-[0062], [0108]-[0117], [0138]-[0141], [0158]-[0161]; Laub, ¶297. Niikawa performs shading correction on the images ***prior*** to performing positioning because it is “impossible to effect accurate[ly]” without taking the “influence of shading [] into consideration” (Niikawa, [0062]). Niikawa, [0117], [0141], [0161]. Laub, ¶298.

As FIG. 14 (below) shows, shading correction (steps S50-S51 shaded **blue**) is performed on both images prior to performing positioning and image synthesis

processes (step S52-S53 shaded red) such that the “influence of shading is taken into consideration when effecting the positioning” so that image synthesis combines accurately aligned image data (Niikawa, [0062]). Niikawa, [0061], [0129]-[0130], [0138]-[0141]; Laub, ¶299

F I G . 1 4



Thus, Niikawa-Watanabe (§V.D) meets claim 13 because position image corrections (positioning process) and dynamic range image corrections (image

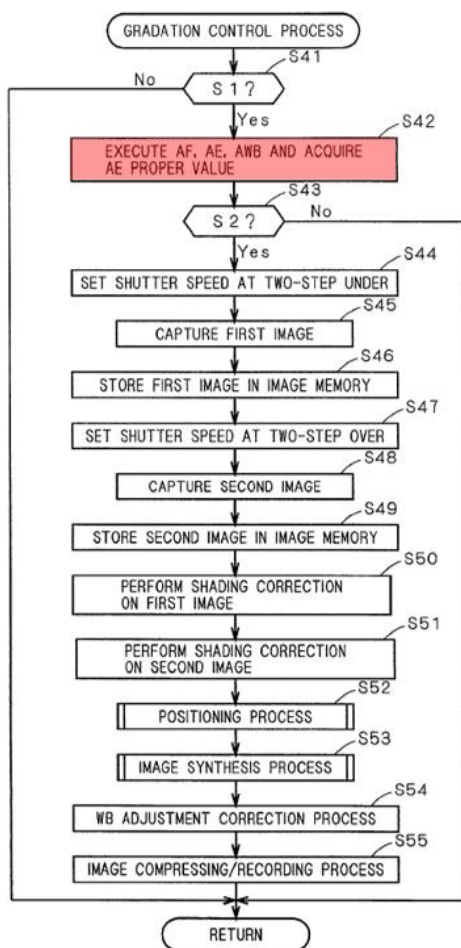
synthesis process) are processed based on prior shading corrections—i.e., “*based on one or more prior image corrections.*” Laub, ¶300.

L. Claim 14: “The method of claim 1, further comprising changing a variable based on an auto-focus process performed by the camera and electronically storing that changed variable”

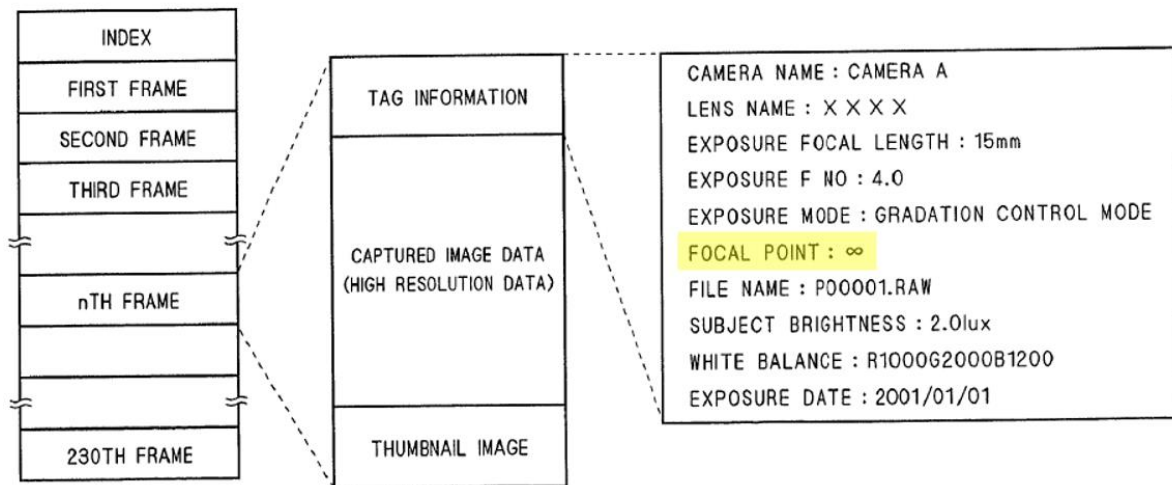
Niikawa-Watanabe meets claim 14 because Niikawa’s auto-focus process changes the focal point of the lens. Niikawa, [0090], [0106], [0134]; Laub, ¶301.

When Niikawa’s shutter button 9 is pressed half-way, GC-150 executes an auto-focus “AF” process (step S42 shaded **red** in FIG. 14 below) in which “a focal point of the lens group 30 of the imaging lens 3 is adjusted for a main subject” (Niikawa, [0106], [0134]) by sending “an AF control signal” to “focus control circuit 133” to set “focus lens 301 at the in-focus position” (Niikawa, [0090]). Laub, ¶302.

FIG. 14



The focal point variable changed by Niikawa's AF process is "*electronically stor[ed]*" in the tag information (highlighted in FIG. 8 below) stored with the captured image on memory card 8, and thus Niikawa-Watanabe (§V.D) meets claim 14 for this first reason. Niikawa, [0100]-[0101]; Laub, ¶¶303-304.



Niikawa-Watanabe (§V.D) also meets claim 14 because Niikawa’s exposure control process adjusts the camera’s f-number based on the focal point adjustment performed by Niikawa’s AF process. Laub, ¶305.

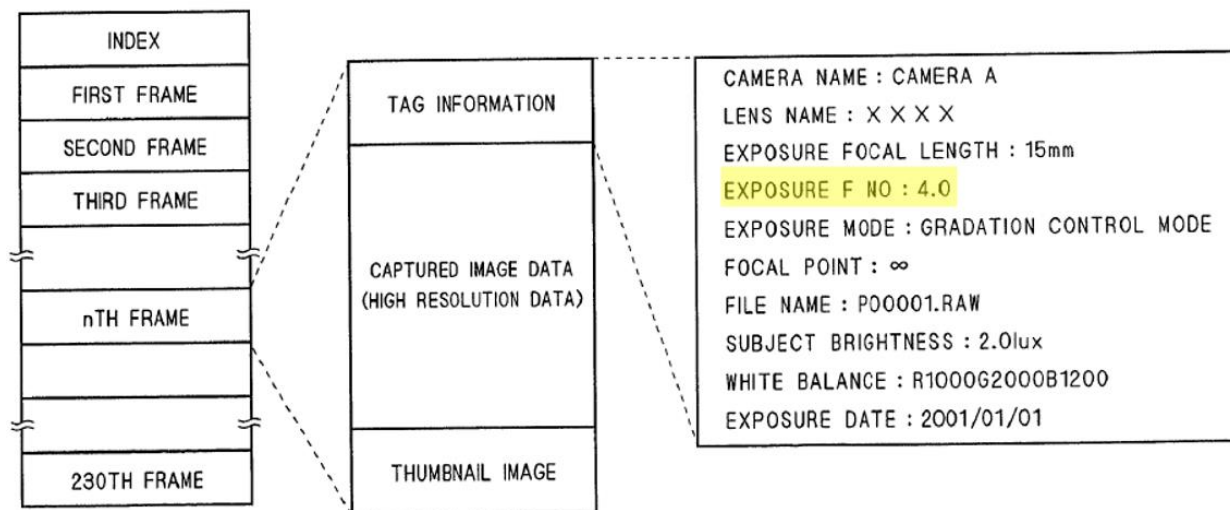
Specifically, after executing Niikawa’s AF process to focus on the “main subject,” GC-150 executes Niikawa’s AE process (e.g., step S42 in FIG. 14 above) that evaluates “a brightness of the subject” from a live view image (Niikawa, [0098]) to determine the “correct” f-number for an exposure (Niikawa, [0106], [0134]). Laub, ¶306. POSAs understood that moving focus lens 301 to focus on the main subject impacts the brightness of the subject on which the f-number is determined. Niikawa, [0092], [0098], [0106], [0134]; Laub, ¶307.

Thus, Niikawa’s AE process adjusts the f-number (i.e., “*changes a variable*”) used to capture an image “*based on*” Niikawa’s AF process. The adjusted f-number is also “*electronically stor[ed]*” in the tag information (highlighted in FIG. 8 below)

and Niikawa-Watanabe (§V.D) therefore meets claim 14 for this additional reason.

Laub, ¶¶308-309.

F I G . 8



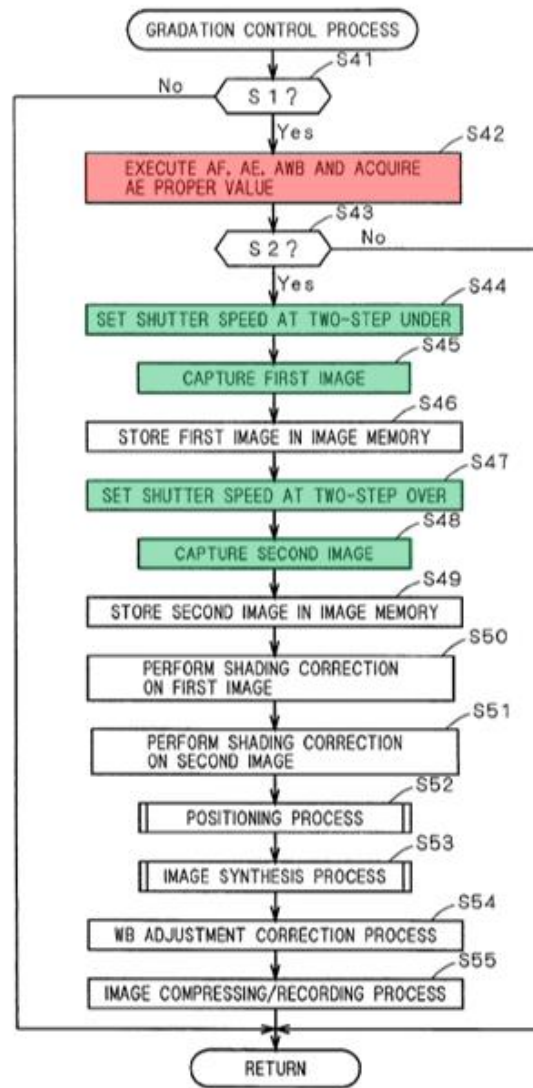
M. Claim 15: “The method of claim 1, further comprising changing a variable based on an auto-exposure process performed by the camera and electronically storing that changed variable”

Niikawa-Watanabe (§V.D) meets claim 15 because both aperture and shutter speed settings are adjusted based on Niikawa’s auto-exposure process. Laub, ¶310.

As discussed *supra* §V.L (claim 14), when shutter button 9 is half-way pressed, GC-150 performs an AF process followed by an “AE” process (e.g., step S42 (shaded in **red** in FIG. 14 below) that determines “a brightness of the subject using image data of G color component of the live view image” (Niikawa, [0098]) to obtain “a shutter speed and an f-number which are correct” (Niikawa, [0106], [0134]). Laub, ¶311.

When the shutter button 9 is fully pressed in the gradation process control mode, the aperture is set to the correct f-number determined by the AE process and the shutter speed is adjusted two steps down and then two steps to capture an “underexposed first image” ([0118]) and an “overexposed second image” ([0119]), respectively (e.g., steps S44-S45 and S47-48 shaded **green** in FIG. 14 below). Niikawa, [0074], [0135]-[0137], [0109]-[0110], FIGS. 9, 14. Laub, ¶312.

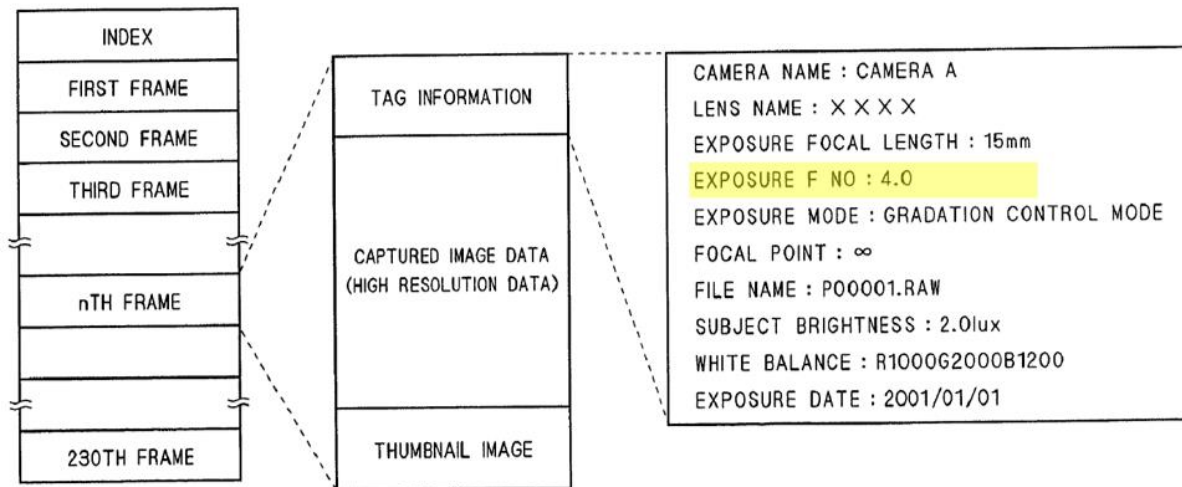
F I G . 1 4



In the normal exposure mode, both the f-number and shutter speed setting are set to the “proper value” determined by the Niikawa’s AE process (Niikawa, [0109]-[0110]) to capture a single image. Niikawa, [0074], [0109]-[0110], [0136]-[0137]; Laub, ¶313.

Thus, Niikawa-Watanabe (§V.D) “*chang[es] a variable based on an auto-focus process performed by the camera*” for two independent reasons—i.e., Niikawa’s AE process changes both the aperture and shutter speeding settings. Laub, ¶314. As discussed *supra* §V.H, the correct shutter speed “obtained” by Niikawa’s AE process is “*electronically stored*” so that GC-150 can either set that value or adjust it depending on the exposure mode setting. Niikawa, [0106], [0134]; Laub, ¶315.

POSA’s understood the f-number obtained by Niikawa’s is “*electronically stored*” for the similar reason that GC-150 accesses the value to set the aperture accordingly, and for the additional reasons the f-number is (1) accessed by GC-150 to select “a correction table that corresponds to the optical conditions of focal length and ***f-number*** at the time of exposure” (Niikawa, [0108], *see also* §V.F.1) and (2) stored in the tag information attached to each image, as illustrated in FIG. 8 below. Laub, ¶316.



Thus, Niikawa-Watanabe (§V.D) meets claim 15 for at least two independent reasons. Laub, ¶317.

N. Claim 16: “The method of claim 1, further comprising changing a variable based on a depth of field adjustment process performed by the camera and electronically storing that changed camera variable.”

As discussed *supra* §V.J (claim 11), DOF is adjusted when the f-number is changed, and therefore Niikawa-Watanabe (§V.D) meets claim 16 by changing the aperture setting to the f-number determined by Niikawa’s AE process, which adjusted f-number (i.e., the “*changed camera variable*”) is “*electronically stor[ed]*” for the reasons demonstrated *supra* §V.M. Niikawa, [0092], [0098]-[0101], [0106]-[0110], [0134]; Laub, ¶¶318-319.

O. Claims 17-19: “...further comprising digitally processing the at least one captured image using the in-camera software to correct at least one optical image aberration

associated with an optical system and the changed camera variable.”

Claims 17-19 recite the same limitation but depend from claims 14-16, respectively. Niikawa-Watanabe (§V.D) meets claims 17-19 because Niikawa’s adjusted f-number meets the “*changed camera variable*” of each of claims 14-16 (see *supra* §§V.L-V.N) and Niikawa corrects for the shading effect (also referred to as “vignetting,” EX1014, 1:26-42; Laub, ¶¶321-324) associated with imaging lens 3 and the adjusted f-number set at the time of exposure. Niikawa, [0084], [0108], [0138]; Laub, ¶¶320-322.

Specifically, Niikawa discloses that the shading effect caused by imaging lens 3 varies as a function of the focal length and f-number at the time of exposure. Niikawa, [0012], [0060]. As discussed *supra* §§V.E.2.a.i, V.E.2.b.i, Niikawa corrects for this variable shading effect by selecting “a correction table which corresponds to the optical conditions of focal length and f-number at the time of exposure” (Niikawa, [0108]) and applying the correction coefficients stored therein to the captured image data. Niikawa, [0084], [0129]-[0130], [0138], [0158]; Laub, ¶¶322-325.

Thus, Niikawa-Watanabe (§V.D) meets claims 17-19 because Niikawa’s shading correction process (“*in-camera software*”) corrects for the shading effect produced by imaging lens 3 at the adjusted f-number set at the time of exposure by applying a corresponding correction table—i.e., Niikawa-Watanabe corrects the

specific “*optical image aberration associated with an optical system and the changed camera variable.*” Niikawa, [0012], [0060], [0084], [0106], [0108], [0129]-[0130], [0134], [0138], [0158]; Laub, ¶326; *supra* §§V.L-V.N.

P. Claim 20: “The method of claim 1, wherein the wirelessly transmitting images includes automatically transmitting the at least one of the one or more corrected images”

Niikawa-Watanabe (§V.D) meets claim 20 because Watanabe-JPs image management technique automatically transfers newly captured images wirelessly. Laub, ¶327.

Watanabe-JP explains that one benefit of the disclosed “image data management process” is that new images captured since the last image transfer can be downloaded wirelessly without the user “having to be particularly aware of it.” Watanabe-JP, [0076]. When the camera is placed in proximity to the charging cradle, the process of identifying new images stored on the camera and wirelessly transmitting those images to an external PC are performed automatically by programmatic data exchange between the camera and the PC. Watanabe-JP, [0055]-[0060], [0073], [0076], FIG. 2; Laub, ¶328; *supra* §§V.B, V.C.

Thus, Niikawa-Watanabe (§V.D) implementing Watanabe-JPs image data management process meets claim 20. Laub, ¶329.

Q. Claim 30: “...further comprising: [30A] “digitally processing a plurality of images to correct video taken by

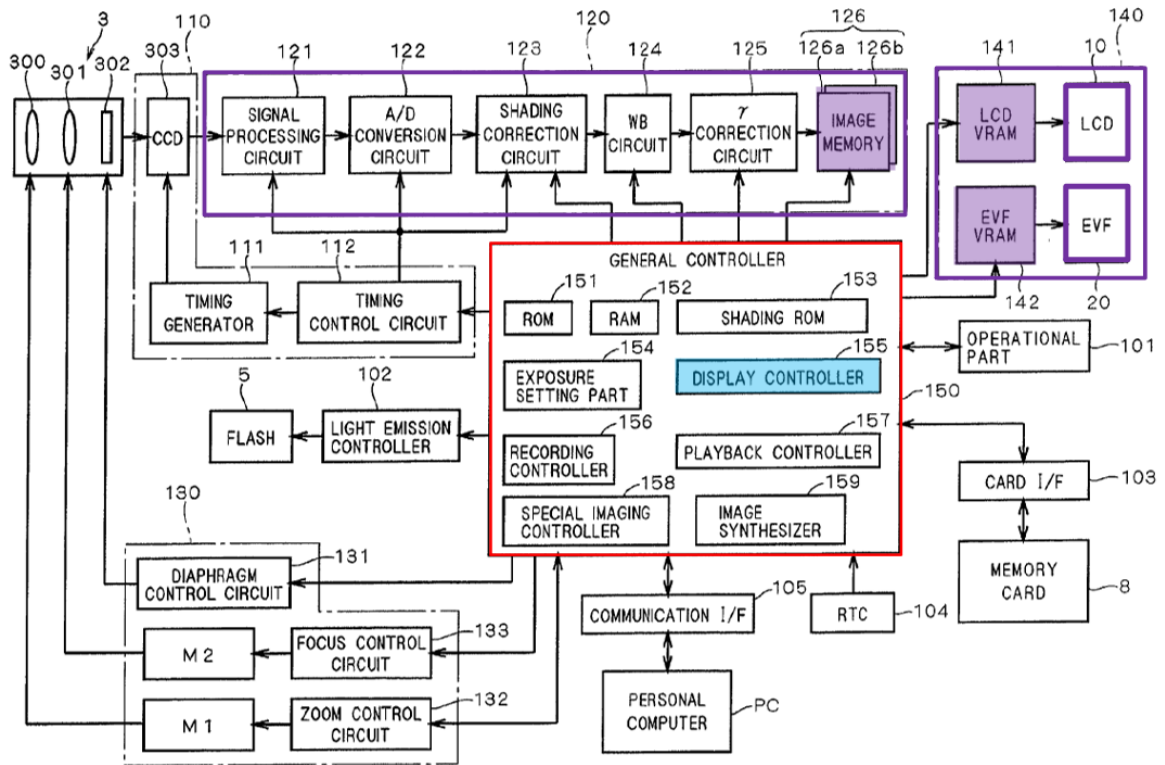
the digital camera; and [30B] “storing a plurality of corrected images”

Niikawa’s “live view display” process displays “images taken every 1/30 (sec.)” on LCD 10 and EVF (Niikawa, [0092])—i.e., live video of the scene in the camera’s frame. *Id.*; EX1001, 27:35-36; Laub, ¶330. Live view images undergo “predetermined signal processing by the signal processor 120” and are temporarily stored in image memory 126 from where GC-150 reads out the video, performs “size adjustment” and transfers the video to VRAMs 141, 142 (video memories) of LCD 10 and EVF 20 for live view display. Niikawa, [0092]; Laub, ¶¶331-332.

First, Niikawa meets [30A] because GC-150 digitally processes the live video images to correct the image size “to adapt to the image size of the display destination” (Niikawa, [0099]), i.e., “*to correct the video taken by the digital camera*” for proper display on LCD 10 and EVF 20, and meets [30B] because the size-corrected images are stored on VRAM 141, 142. Niikawa, [0092], [0099]; Laub, ¶¶330-333, 338.

Niikawa additionally meets [30A] because in the Niikawa’s FIG. 5 configuration (annotated below), POSAs understood the “predetermined signal processing” performed on live view images would include the correction circuits positioned in the data path between CCD 103 and image memory 125, which meets ([30B]) because the corrected live view images are first stored in image memory 126 and then in VRAMs 141, 142. Niikawa, [0079], [0092], [0132]; Laub, ¶334.

FIG. 5



Even were circuit bypasses available, POSAs would have recognized the benefit of using the correction circuits to correct live view images so that the user accurately sees what a potential photograph will look like as the user views thus scene, frames the photo, etc. Laub, ¶¶335-337.

R. Claim 22

The table below shows limitations in claim 22 that are met for the same reasons discussed for limitations in claim 1 in the corresponding section cited. Laub, ¶339.

Claim 22	Claim 1
[22A]	[1A], <i>supra</i> §V.E.2
[22A1]	[1A1], <i>supra</i> §V.E.2.a
[22A2]	[1A2], <i>supra</i> §V.E.2.b
[22A4]	[1A4], <i>supra</i> §V.E.2.d
[22C]	[1D], <i>supra</i> §V.E.5

The differences between claims 1 and 22 are discussed below.

1. [22PRE]

To the extent claim 22’s preamble reciting a “*method of displaying one or more images captured by a digital camera on an external monitor*” is limiting, Niikawa-Watanabe meets the preamble for the same reason it meets the additional language recited in [22B] discussed *infra* §V.R.3. Laub, ¶341.

2. [22A3]

Niikawa-Watanabe “store[s] updated software or image correction data or both” as recited in [22A3] for at least the reasons discussed *supra* §V.E.2.c-V.E.2.d—i.e., Niikawa-Watanabe stores received updated program before (and after) updating any existing software. Laub, ¶342.

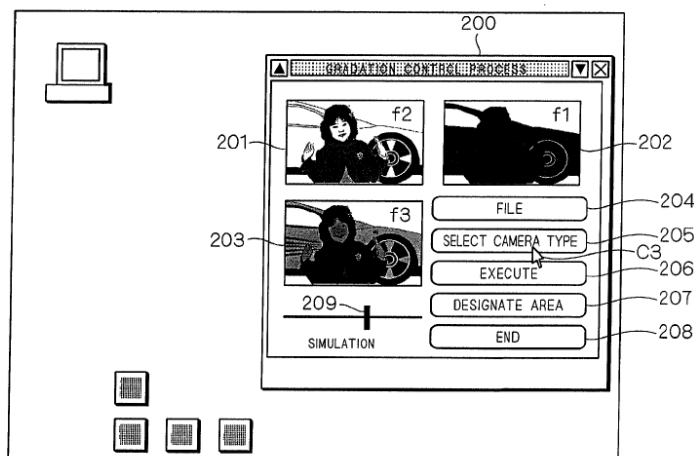
3. [22B]

Limitation [22B] recites [1C]’s “*wirelessly transmitting at least one or more of the corrected images*” (which Niikawa-Watanabe meets for the same reasons discussed *supra* §V.E.4) and adds “*in a format that the external monitor can receive.*” Laub, ¶343.

Niikawa’s images stored on the memory card are either JPEG compressed (stored as .JPG files) or stored in uncompressed “RAW” form (.RAW files)—both standard and widely used formats that virtually any monitor would have been able to receive and display. Niikawa, [0100], [0132], [0136]-[0137], [0148]-[0149]; EX1059, [1005]-[1006]; EX1061, [0001]; Laub, ¶¶344-345.

Niikawa expressly discloses displaying the “RAW” images on an external monitor—e.g., in a window on “display 62” of “personal computer 60” (Niikawa, [0167]) as shown in FIG. 19 below. Niikawa, [0166]-[0171], see also FIGS. 20-21, 25, [100] (thumbnails are in same format, but include every 8th pixel); Laub, ¶346.

FIG. 19



Thus, Niikawa-Watanabe wirelessly transmits corrected images stored on the memory card (§§V.E.3-V.E.4) “*in a format that the external monitor can receive*” and therefore meets [22C]. Laub, ¶¶347-348.

S. Claim 23

Claim 23 recites the same limitations as claim 2 and therefore Niikawa-Watanabe meets claim 2 for the reasons demonstrated *supra* §V.F. Laub, ¶¶349-350.

T. Claim 25

Claim 25 recites the same limitations as claim 11 and therefore Niikawa-Watanabe meets claim 25 for the reasons demonstrated *supra* §V.J. Laub, ¶¶351-352

U. Claim 27

Claim 27 recites the same limitation as claim 13 and therefore Niikawa-Watanabe meets claim 27 for the reasons demonstrated *supra* §V.K. Laub, ¶¶353-354.

VI. GROUND 2: CLAIMS 1-3, 5-11, 16, 19, 22-25 WOULD HAVE BEEN OBVIOUS OVER NIIKAWA AND WATANABE IN VIEW OF BOLLE

Niikawa’s digital camera automatically adjusts focus and exposure parameters (e.g., aperture, shutter speed, etc.) when the user presses the shutter button 9 half-way. Niikawa, [0106], [0134]; Laub, ¶355.

A. Bolle (EX1007)

Bolle discloses that despite the sophistication of digital cameras with auto-setting capabilities (like Niikawa's), poor quality images often still resulted due to the user's lack of control in adjusting camera settings needed for, e.g., "compensating for backlighting, setting the depth-of-field appropriately, and the like" because camera controls were either hidden or not provided. Bolle, 1:16-38; Laub, ¶356.

Bolle thus describes a digital camera system that "can run in a fully automatic mode" or a "guided mode" (2:37-40) where the user can choose or select from suggested camera settings or "take full manual control" of the camera's settings (3:7-10). Bolle, 2:4-10, 37-40, 2:62-3:10; Laub, ¶¶356-357. The basis for both Bolle's "automatic" and "guided" modes is a scene analysis unit 103 and photographic expert unit 104 executed by the camera's digital computer, both of which are shaded **blue** in Bolle's camera system illustrated in FIG. 1 below. Bolle, 2:62-3:43; Laub, ¶358.

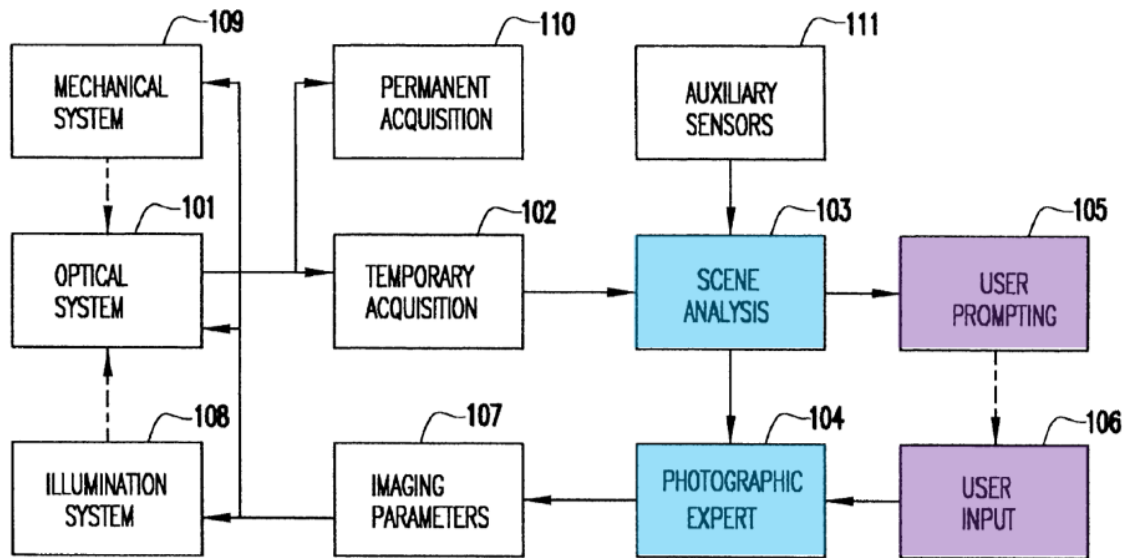


FIG.1

Scene analysis 103 receives image data acquired a digital camera's "CCD or CMOS imaging array" (Bolle, 3:20-34), processes and analyzes the image to extract and evaluate image attributes and features, and forms hypotheses as to the type of scene in the image, as illustrated in FIG. 2 below. Bolle, 3:65-5:28; Laub, ¶359.

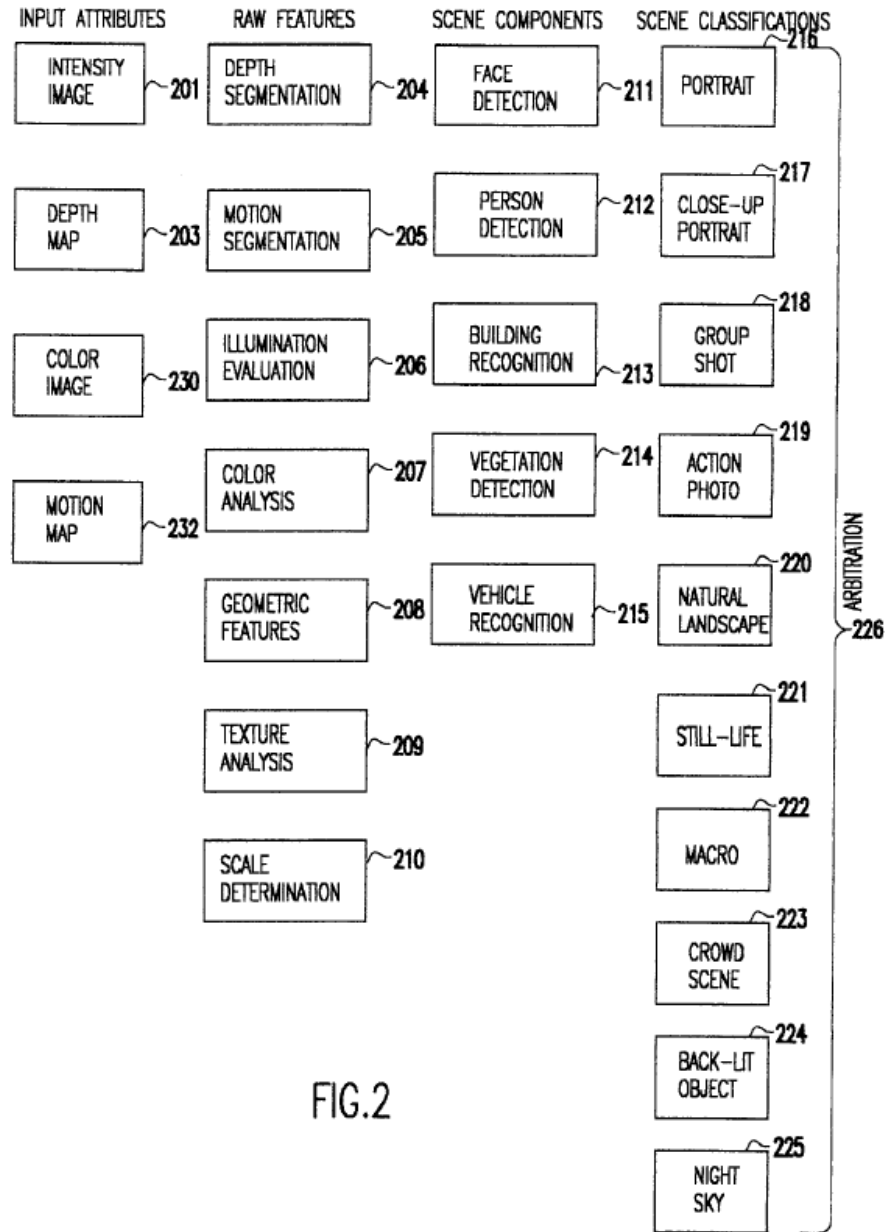


FIG.2

Photographic expert 104 (shaded blue in FIG. 1 above) determines an optimal set of camera parameters 107 from the information provided by scene analysis 103 for the type of photograph that expert 104 hypothesizes, as illustrated in FIG. 3 below. Bolle, 3:2-7, 5:28-6:8; Laub, ¶360.

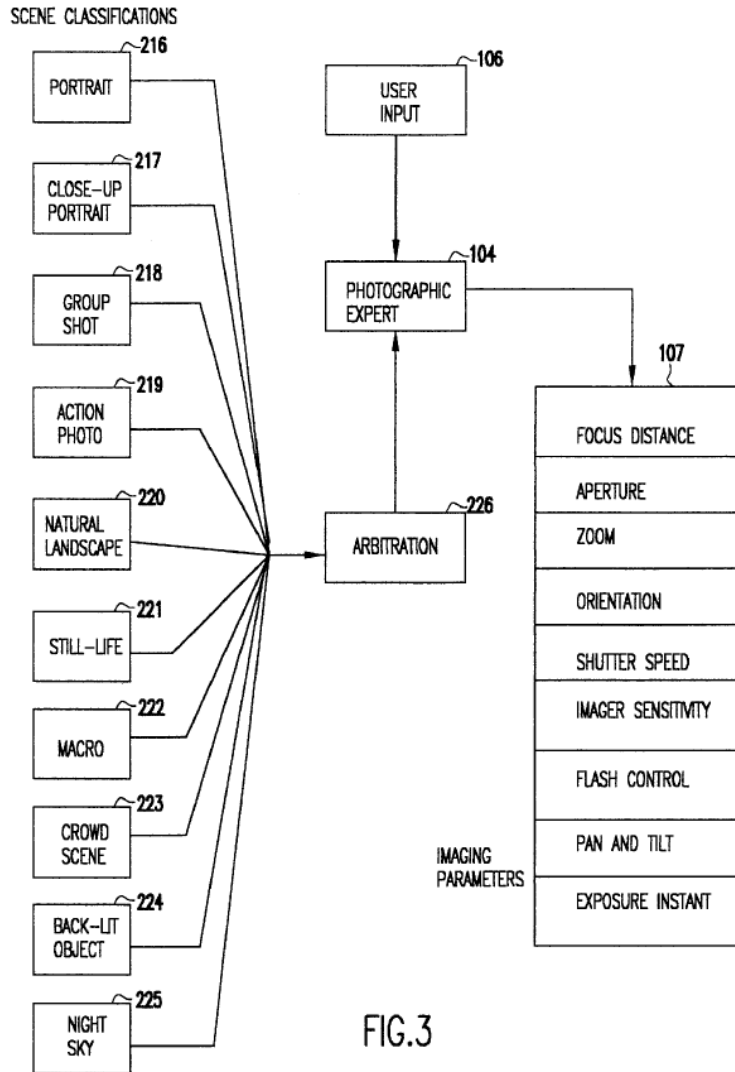


FIG.3

In a “fully automatic mode” (2:37-38), expert 104 sets the camera to the optimal set of camera parameter values 107 determined from scene analysis. Bolle, 2:6-7, 37-38, 5:28-34, 58-65. In a “guided mode” (2:38-39), expert 104 presents its understanding of the scene to the user (e.g., user prompting 105 shaded **purple** in FIG. 1 above) so the user can “give feedback, override the expert, or take full manual control” via user input 106 (also shaded **purple** in FIG. 1 above). Bolle, 3:7-13; Laub, ¶¶361-362.

B. Niikawa-Watanabe-Bolle Combination

1. Benefits to Niikawa's Automatic Processes

POSA would have recognized the benefit applying Bolle's scene analysis 103 and expert 104 in a "fully automatic mode" to improve Niikawa's auto-focus and auto-exposure processes like Bolle's teaches to improve "point-and-shoot" features of a camera (Bolle, 5:58-65). Laub, ¶363.

For example, POSAs understood that Niikawa's AF process (Niikawa, [0090], [0106], [0134]) that focuses on a "main subject" would have benefitted from Bolle's scene analysis 103 and expert 104 that detects the types of objects in the scene to determine optimal focus distance and depth of field for the detected objects of interest and scene type. Bolle, 5:36-39, 61-63, 7:20-42. Laub, ¶364.

Similarly, POSAs would have recognized that Niikawa's AE process (Niikawa, [0098], [0106], [0134]), which assesses scene brightness from the G color component of a live view image, would benefit of Bolle's techniques that, in addition to "image intensity 201" (Bolle, 3:65-66, FIG. 2) analyzes further "input attributes, raw features, scene components and scene classifications" (Bolle, 3:56-64, FIG. 2) to determine optimal exposure settings under a variety of conditions and scene types. Bolle, 7:31-51; Laub, ¶365.

a. Niikawa-Watanabe-Bolle's Automatic Mode

Thus, a POSA would have been motivated to configure Niikawa's GC-150 with Bolle's scene analysis 103 and expert 104 programs (e.g., Bolle, 3:56-6:8) in

an automatic mode in which the camera settings determined by expert camera 104 are automatically used (e.g., Bolle, 2:4-7, 5:52-65), thus beneficially preserving Niikawa's point and shoot functionality and improving Niikawa's automatic processes (e.g., Niikawa, [0090], [0098], [0106], [0134]). Laub, ¶¶366, 370-371.

2. Benefits of Implementing Bolle's Guided Mode

POSAs would have additionally recognized benefits of implementing Bolle's "guided mode" that allows the user to control the camera settings by "feedback" (e.g., selecting among proposed camera settings), by providing an "override to the expert" or by taking "full manual control" through an input device (Bolle, 3:7-13), thus providing an additional and desirable capability to Niikawa's camera as taught by Bolle to improve the quality of captured images. Bolle, Abstract, 2:4-10, 2:37-40, 5:65-6:8; Laub, ¶367.

a. Niikawa-Watanabe-Bolle's Guide Mode

Thus, a POSA would have also been motivated to configured GC-150 to additionally operate in Bolle's "guided mode" (e.g., Bolle, 2:8-10, 2:35-40, 3:7-19, 3:43-55, 5:66-6:8) to allow the user to adjust the "set of values 107" for the camera's imaging parameters such as the "basic controls" shaded **red** in Bolle's FIG. 8 below (e.g., Bolle, 3:7-19, 5:29-33), accept or select expert 104's assessment of the subject matter in the scene (e.g., scene classifications shaded **blue**) on which expert 104 determines the imaging parameters (e.g., Bolle, 5:66-6:8), etc., which user-

adjustments further allows expert 104 to learn user preferences to improve the future recommendations for analogous imaging situations (e.g., Bolle, 3:43-55). Laub, ¶¶368, 370-371.

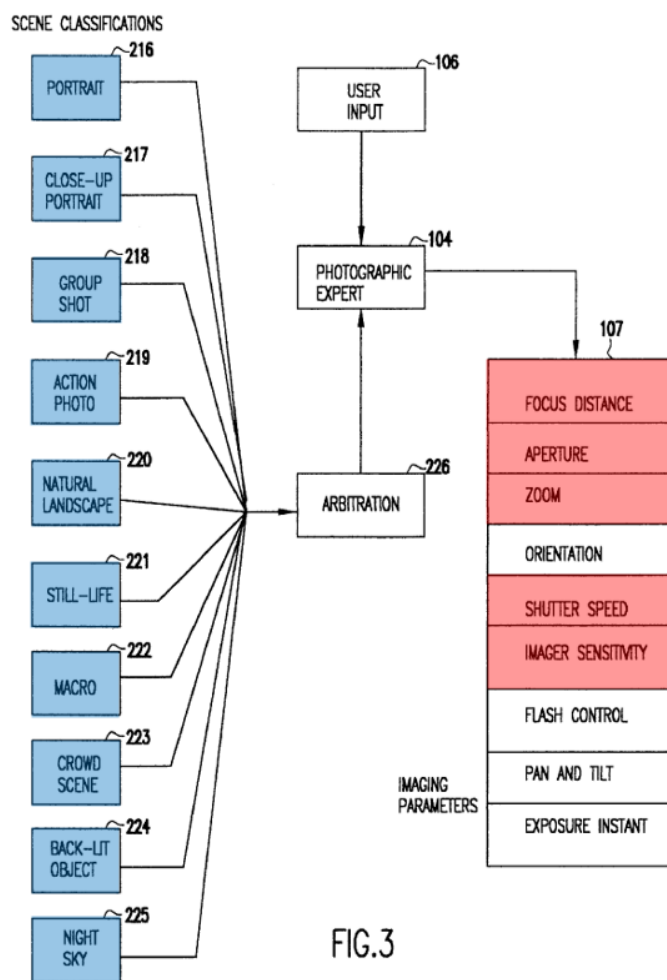


FIG.3

3. Reasonable Expectation of Success

Implementing Bolle's techniques in Niikawa would have required nothing more than conventional and routine programming skills—e.g., configuring GC-150 with Bolle's scene analysis 103 and expert 104 programs, configuring GC-150's to use Niikawa's LCD 10 and interface controls (Niikawa, [0070]-[0073], FIG. 4) to

provide the “user interface” by which the user provides feedback (Bolle, 3:10-13, 6:1-2), etc. Laub, ¶¶369.

C. Claims 1-2 and 22-23

Niikawa-Watanabe-Bolle (§VI.B) meets claims 1-2 and 22-23 for the same reasons discussed in Ground 1 for Niikawa-Watanabe. Laub, ¶¶372, 418; §§V.E-V.F, V.R-V.S.

D. Claim 2

Niikawa-Watanabe-Bolle (§VI.B) meets claim 2 for the additional reasons discussed *infra* §§VI.E-VI.K. Laub, ¶¶373-374.

E. Claim 3: “...wherein the user-adjustable variables include an aperture setting.”

Niikawa-Watanabe-Bolle (§VI.B) meets claim 3 because, as highlighted in Bolle’s FIG. 3 below, the aperture setting (i.e., f-number) is among the “set of values 107” (Bolle, 5:29-33) determined by expert 104 and adjustable by the user in guided mode by accepting the expert 104’s proposed aperture setting, selecting from “a number of alternative settings” (Bolle, 2:37-40) or by taking “full manual control” over the camera’s settings (Bolle, 3:7-13). Bolle, 2:4-10, 2:37-40, 3:7-19, 3:43-48, 8:34-39; Laub, ¶¶375-377. Thus, Niikawa-Watanabe-Bolle’s “*user-adjustable variables include an aperture setting*” as claimed. *Id.*

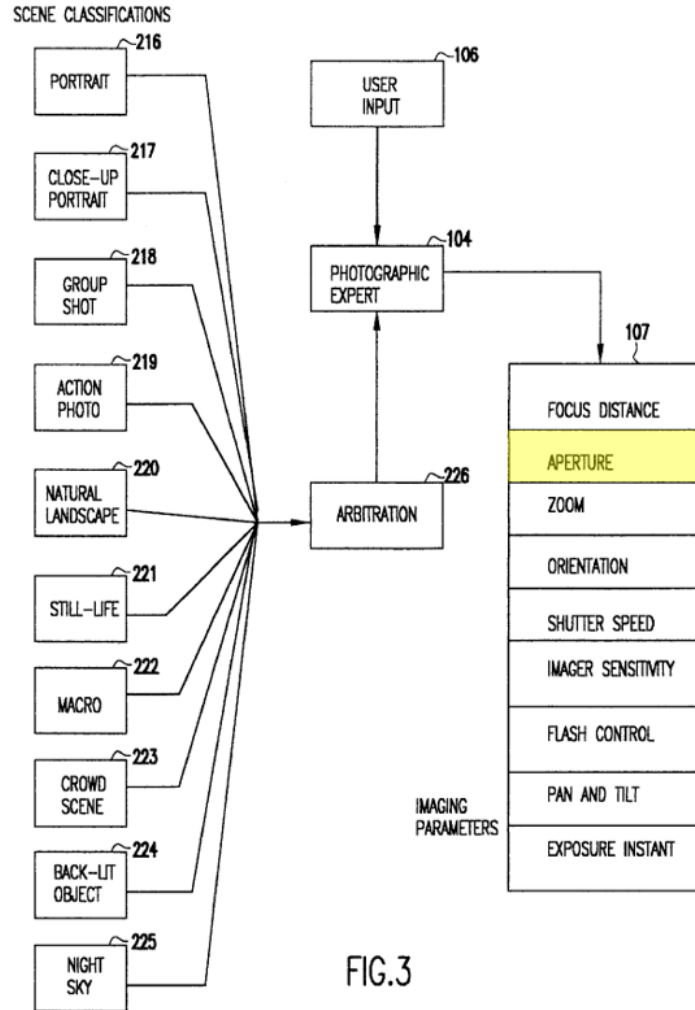


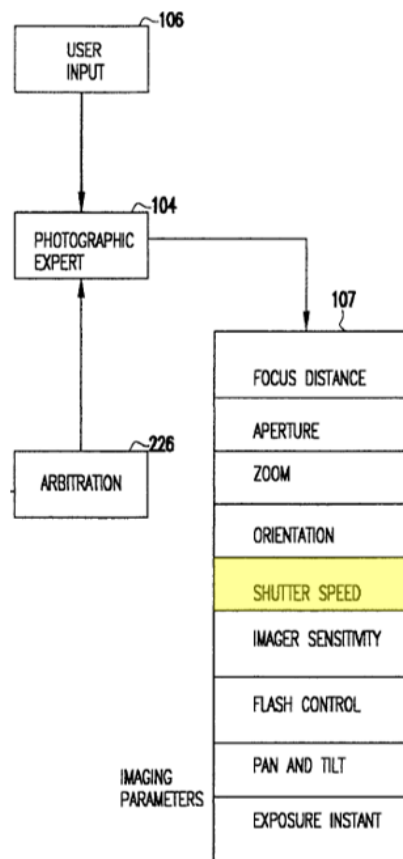
FIG.3

Niikawa’s GC-150 uses the “focal length and ***f-number*** at the time of imaging” (Niikawa, [0084]) to select the corresponding correction table using to perform Niikawa’s shading correction process (Niikawa, [0084], [0108]-[0110], [0129]-[0130], [0138], [0158])—i.e., GC-150 “*electronically read[s]*” the “*stored*” f-number, which can be set automatically or adjusted by the user in Niikawa-Watanabe-Bolle (§VI.B), and uses the f-number to “*process image corrections*” ([2B]). *Id.*; Laub, ¶¶378-379. *supra* §V.L (showing f-number is stored).

F. Claim 5: “...shutter speed settings.”

Niikawa-Watanabe-Bolle (§VI.B) meets claim 5 because shutter speed is another camera parameter set by GC-150 executing Bolle’s expert 104 in Niikawa-Watanabe-Bolle that is adjustable by the user, and thus Niikawa-Watanabe-Bolle’s “*user-adjustable variables include shutter speed settings*” for this additional reason.

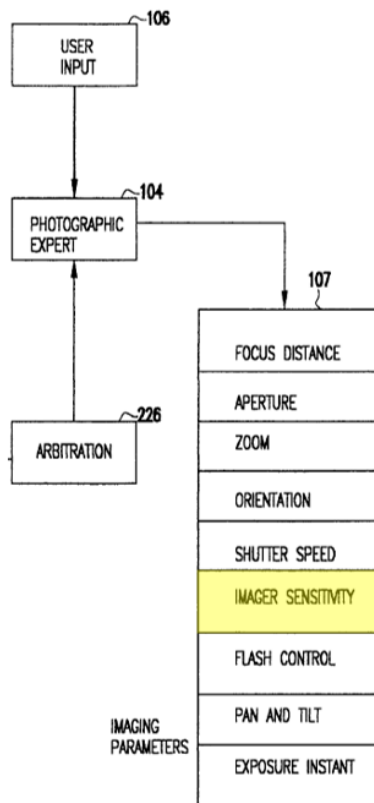
Bolle, 2:4-10, 2:37-40, 3:7-19, 3:43-48, 8:34-39; Laub, ¶¶380-382; *supra* §V.H.



GC-150 electronically reads stored shutter speed settings that are used in “*processing image corrections*” ([2B]) for the same reasons discussed *supra* §V.H, and therefore Niikawa-Watanabe-Bolle meets claim 5. Laub, ¶¶382-384.

G. Claim 6: “...wherein the user-adjustable variables include ISO settings.”

Niikawa-Watanabe-Bolle (§VI.B) meets claim 6 because ISO is another of the “set of values 107” (i.e., “imager sensitivity” highlighted in Bolle’s FIG. 3 below) set by GC-150 executing Bolle’s expert 104 that is adjustable by the user. POSAs understood that Niikawa’s gain control circuit (Niikawa, [0080]) adjusts the ISO setting of the sensor. Laub, ¶¶385-388 (*citing* EX1060, Abstract, [0032]-[0040]). ISO is a basic exposure setting that user’s benefit in having control over as taught by Bolle. Laub, ¶¶386-391. Thus, Niikawa-Watanabe-Bolle’s (§VI.B) “*user-adjustable variables include ISO settings*” as claimed. Bolle, 2:29-34; 9:42-46; 4-10, 2:37-40; Laub, ¶392.



Niikawa-Watanabe-Bolle uses ISO settings in “*processing image corrections*” for at least the same reasons the ’266 patent does, which neither discloses that ISO is a user-adjustable setting, nor describes using the ISO setting in “*processing image corrections*” except in this way. EX1001, 19:40-51, 20:16-23, 21:29-35, 28:37-43 (disclosing that ISO adjustment is performed *by the camera* for tracking); Laub, ¶¶393-395.

H. Claim 7: “...wherein the user-adjustable variables include subject type.”

Niikawa-Watanabe-Bolle (§VI.B) meets claim 7 because the user can select the “category” or “classification” (Bolle, 5:21-28) of the scene (e.g., portrait, landscape, group photo, night sky, etc. highlighted in Bolle’s FIG. 3 below)—i.e., the user can choose the “*subject type*” of the scene by selecting the expert 104’s “best guess” or choosing another. Bolle, 5:64-6:8; Laub, ¶¶396-397.

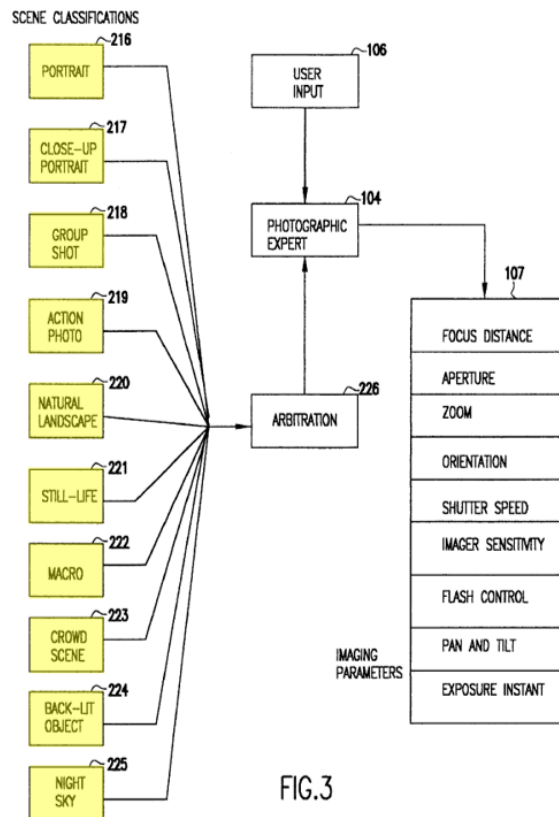


FIG.3

Thus, Niikawa-Watanabe-Bolle’s “*user-adjustable variables include subject type*” are “*stored*” and “*electronically read*” at least because scene classifications are displayed to the user via the LCD in the guided mode (Bolle, 5:64-6:8) and the user’s selection is then used to set the values 107 for camera parameters, and then used to “*process image corrections*” for at least the reasons discussed *supra* §VI.G, and therefore Niikawa-Watanabe-Bolle meets claim 7. Laub, ¶¶398-399.

Additionally, the selected subject type is used to “*process image corrections*” because the user-selected image category controls the “*filter application*” and “*filter parameters*” used to correct the captured images, as discussed *infra* §VI.J for claim 9. Laub, ¶400.

I. Claim 8

See *infra* §VI.J.

J. Claim 9: “...wherein the user-adjustable variables include filter settings”

Niikawa-Watanabe-Bolle (§VI.B) meets claim 9 because Bolle’s expert 104 determines optimal “filter application” and “filter parameters” (Bolle, 2:29-33, 9:42-46) to which the user can provide feedback in the guided mode and therefore Niikawa-Watanabe-Bolle’s “*user-adjustable variables include filter settings.*” Bolle, 2:38-40, 3:7-13, 5:66-6:8; Laub, ¶401.

In addition to full manual control, the user can adjust filter settings by selecting the scene type, e.g., selecting the landscape category for which “a dynamic controllable filter [is] activated” so that different portions of the image appear correctly illuminated (e.g., “dimming of upper portion of the image corresponding to the sky”) or “color balance may be adjusted” when objects of known color characteristics are identified “to achieve maximum resolution in the relevant part of the spectrum”—i.e., to achieve optimal tonal range for relevant colors. Bolle, 7:54-61; Laub, ¶402.

Thus, Niikawa-Watanabe-Bolle also meets claim 8 because the user-adjustable filter settings include “*tonal range settings*” (e.g., “color balance” settings). Niikawa-Watanabe-Bolle’s filter settings are “*stored*” and “*electronically read*” because these settings are accessed and manipulated by GC-150 executing

expert 140 and used to “*process image corrections*”—e.g., by correcting the image illumination and/or color characteristics in the image. Bolle, 7:54-61; Laub, ¶403.

K. Claim 10: “...wherein the user-adjustable variables include special effects”

The ’266 patent includes “color enhancing” among the “main categories” of special effects. EX1001, 15:20-22. As discussed *supra* §VI.J, user-adjustable filter settings include adjustments to the “color balance” of detected objects with known color characteristics “to achieve maximum resolution in the relevant part of the spectrum” (Bolle, 7:54-61)—i.e., colors are enhanced in the range of colors for those detected objects. Thus, Niikawa-Watanabe-Bolle’s “*user-adjustable variables include special effects*” as recited in claim 10 for reasons discussed *supra* §VI.J for claim 9. Laub, ¶¶404-409.

L. Claims 11 and 25

Niikawa-Watanabe-Bolle (§VI.B) implements Bolle’s scene analysis 103 and expert 104 to analyze Niikawa’s live view images to determine optimal camera settings for image capture, including analyzing objects in the scene to determine an optimal depth of field. Bolle, 5:36-39, 61-63, 7:20-42. Laub, ¶410. For example, when expert 104 determines that the scene includes multiple objects of interest, the “aperture and focus settings are adjusted to give appropriate depth of field” (Bolle, 7:20-29), or when a closely framed face is detected, expert 104 “focuses on the face” and “chooses a narrow depth of focus” (Bolle, 7:36-42).

Therefore, Niikawa-Watanabe-Bolle’s “*digitally processing*” of live view images “*further comprises adjusting a depth of field of an image,*” and therefore meets claims 11 and 25. Laub, ¶¶410-414; *supra* §V.J, V.T.

M. Claim 16

Niikawa-Watanabe-Bolle (§VI.B) meets claim 16 for reasons discussed *supra* §VI.L for claim 11—e.g., the “aperture and focus settings are adjusted to give appropriate depth of field” (Bolle, 7:27-29) for the objects identified in the scene. The aperture (f-number) adjusted by Niikawa-Watanabe-Bolle’s expert 104 are “*electronically stor[ed]*” for at least the reasons discussed *supra* §§VI.E. Laub, ¶¶415-416.

N. Claim 19

Niikawa-Watanabe-Bolle (§VI.B) meets claim 19 for the same reasons discussed *supra* §V.O because Niikawa-Watanabe-Bolle’s changed aperture value (f-number) set at the time of exposure (i.e., claim 16’s “*changed variable,*”—*supra* §VI.M) is used in shading correction in the same way Niikawa-Watanabe uses f-number—i.e., to select the corresponding correction table for correcting the specific shading effect. Laub, ¶417.

O. Claim 24

Claim 24 recites the user-adjustable variables recited in claims 3-6 and therefore Niikawa-Watanabe-Bolle (§VI.B) meets claim 24 for the same reasons discussed *supra* §§V.F-V.H, VI.E-VI.G. Laub, ¶419.

VII. GROUND 3: CLAIMS 1, 11, 12, 21, 22, 25, 26 ARE OBVIOUS OVER NIIKAWA-WATANABE IN VIEW OF NG

It was known that conventional auto-focus processes that focused the camera on a single object, like Niikawa's AF process that adjusts the "focal point of the lens" to bring a "main subject" into focus (Niikawa, [0106], [0134]), often left other parts of the scene and/or off-center objects of interest out of focus. EX1008 ("Ng"), 1:21-25; Bolle, 1:46-55; Laub, ¶¶420-422.

A. Ng (EX1008)

Ng teaches techniques for refocusing images captured by a digital camera using a virtual camera model and an image captured by the camera's sensor to compute multiple images at different depths of field by varying a "virtual aperture" that can be combined "to produce an extended depth of field image" (20:26-28) that brings objects at different depths into focus—i.e., a captured image in which objects of interest are not in focus can be brought into focus by computationally extending the depth of field of the image. Ng, 6:22-24, 15:30-33, 17:8-19:20, 20:1-26:16; Laub, ¶¶423-424.

B. Niikawa-Watanabe-Ng Combination

POSAs would have recognized the benefit of implementing Ng's refocusing techniques in Niikawa-Watanabe (§V.D) to bring additional objects of interest at depths different from the "main subject" focused on by Niikawa's AF process

(Niikawa, [0106], [0134]) into focus by “extending the depth of field” of the image after image capture (Ng., 19:24-27). Ng, 20:8-28, 24:30-26:3; Laub, ¶425.

To take advantage of Ng’s refocusing techniques, a POSA would have (1) configured GC-150 to execute Ng’s camera model to perform Ng’s virtual aperture functions; (2) stored Ng’s pre-computed “database of weights” (Ng, 24:30-25:21) in GC-150’s ROM; and (3) included Ng’s microlens array and circuitry for detecting light direction, which POSAs would have had a reasonable expectation in successfully implementing because known microlens array and sensor configurations can be employed (Ng, 7:11-19, 8:13-9:21; EX1056, 8:31-40, Fig. 1a,1b) and programming GC-150 to perform Ng’s processor-implemented algorithms required only conventional and routine software programming techniques. Laub, ¶¶426-431.

C. Claims 1 and 22

Niikawa-Watanabe-Ng (§VII.B) meets claims 1 and 22 for the reasons discussed in Ground 1 (*supra* §§V.E, V.R) and for two additional reasons: (1) GC-150 performs an additional “*image correction algorithm[]*” ([1A1], [22A1]) when it performs Ng’s refocusing techniques to “generate focused and/or corrected image data” (Ng, 31:13-15); and (2) GC-150 also “*process[es] image correction data stored in a database system*” ([1A2], [22A2]) when it accesses the “database of

weights” (Ng, 24:30-25:21) stored in GC-150’s ROM to perform Ng’s “correction processes” (Ng, 24:21-25:21); Laub, ¶432.

D. Claims 11 and 25:

Niikawa-Watanabe-Ng (§VII.B) additionally meets claims 11 and 25 because Ng’s refocusing techniques digitally process a captured image to generate multiple images that are combined “to produce an extended depth of field image” (Ng, 20:26-28) to correct an image that is “blurry due to misfocus” (Ng, 19:24-27). Ng, 20:8-28, 24:30-26:3; Laub, ¶¶433.

E. Claims 12 and 26: “...further comprising adjusting a depth of field of an image after capture of the image using the in-camera software”

Niikawa-Watanabe-Ng (§VII.B) meets claims 12 and 26 because GC-150 computationally refocuses an image after the image is captured using Ng’s software processing techniques and camera model “to produce an extended depth of field image” (20:26-28). Ng, 19:24-27, 20:8-28, 24:30-26:3; Laub, ¶434.

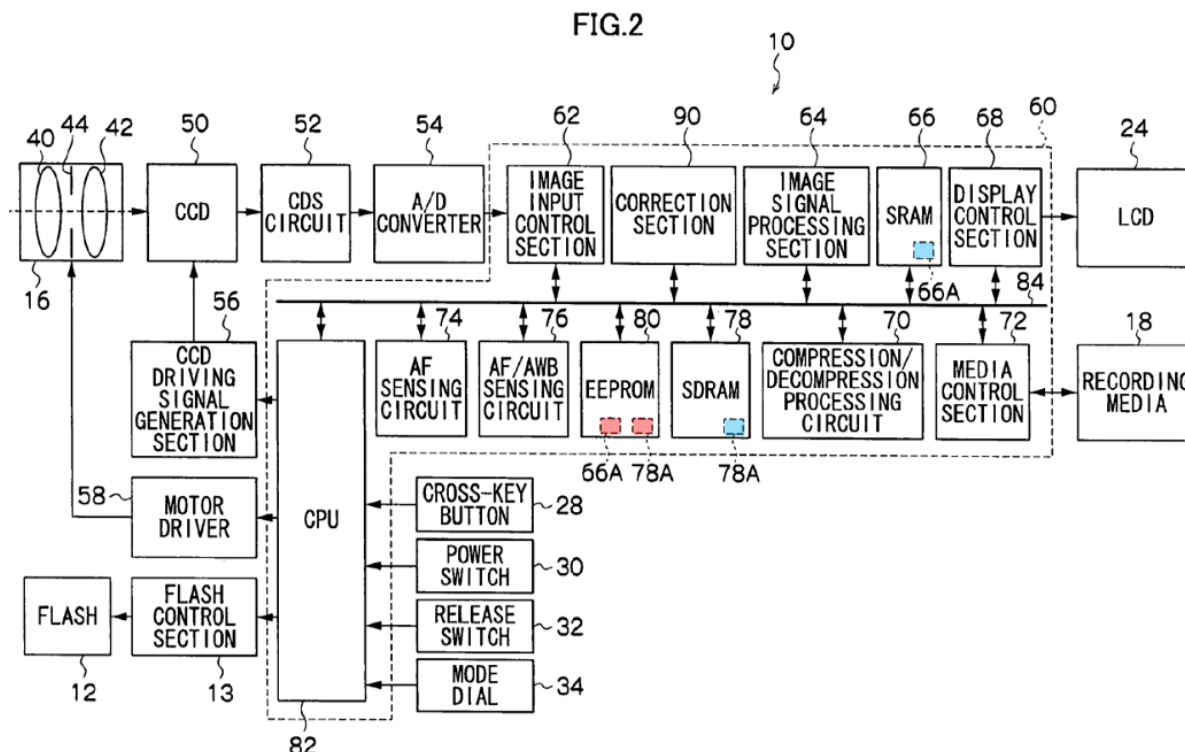
F. Claim 21: “wherein the image processing algorithms include a fast Fourier transform”

Niikawa-Watanabe-Ng meets (§VII.B) claim 21 because it implements Ng’s refocusing process that uses a “Fast Fourier Transform (FFT) algorithm” (Ng, 26:1-4) in processing captured images to extend the depth of field to bring into focus objects at different depths in the image that appear “blurry due to misfocus” (Ng, 19:24-27). Ng, 20:1-22:20; 25:22-26:16; Laub, ¶435.

VIII. GROUND 4: CLAIMS 1, 29, 30 ARE OBVIOUS OVER NIIKAWA-WATANABE IN VIEW OF IRIE

A. Irie (EX1011)

Irie discloses a method of correcting erroneous pixel values resulting from static defects of a CCD sensor, e.g., dust adhesion, sensor damage, etc. ([0042]) capable of multiple photography modes ([0035]). In particular, Irie discloses storing in EEPROM 80 LUTs 66A, 78A that record the locations of sensor defects, i.e., "defective pixel locations" that are contiguous and isolated, respectively, as shaded **red** in FIG. 2 below ([0040]-[0042]). To perform defective pixel correction, pixel values in captured images corresponding to the defective pixel locations read from the LUTs are replaced with neighboring (non-defective) pixel values ([0047]-[0059]). Laub, ¶437.



Prior to performing defective pixel correction, LUT 66A is read from ROM 80 into (high-speed) SRAM 66 to support continuous and video photography modes, and LUT 78A is read into SDRAM 78, as shaded in **blue** in FIG. 2 above ([0047]). Irie's digital camera 10 uses a dual-state shutter button 32 wherein when the half-pressed state is detected, AF, AE and AWB processes are performed ([0035]) and when the full-pressed state is detected, defective pixel correction is performed on captured image data using LUT 66A in continuous and video photography modes ([0040]-[0041], [0047]-[0057], and performed using both LUTs 66A and 78A in the still photography mode ([0058]-[0060]), and further image processing is performed on the defective pixel corrected images ([0047]-[0060]). Laub, ¶438.

B. Niikawa-Watanabe-Irie Combination

Both defective pixel correction and continuous/video captures modes were well-known features of conventional digital cameras that would have been obvious and beneficial to implement in Niikawa's digital camera. *KSR*, 550 U.S. at 416-417; Laub, ¶436 (citing EX1011, [0005]-[0010]; EX1071, 1:45-54; EX1012, [0002]-[0004]; EX1039, 1:12-48; EX1040, [0008]-[0009]; EX1041, [0002]), ¶¶439-441.

POSAs would have recognized the benefit of Irie's dual-state shutter button image capture operation (Irie, [0035], [0040], [0047]-[0050], [0058]-[0060]) as a straightforward way to allow users to capture and store continuous photography and video image data and to implement defective pixel correction in Niikawa's similar

dual-state shutter button operations (Niikawa, [0068], [0106], [0134]). Laub, ¶¶441-443.

Niikawa's GC-150 is configured to perform AF, AE and AWB processes upon a half-press of shutter button 9 (like Irie, [0035]) and to control the camera to capture either a single image or two images upon a full-press of shutter button 9 depending on the exposure mode set by the user (Niikawa, [0070]-[0074], [0106], [0134]) and perform corresponding image corrections and the captured image data. Laub, ¶444.

Thus, Irie's continuous and video photography modes would have been advantageously implemented in software with control programs for continuous and video photography image capture that are executed by GC-150 upon a full-press of shutter button 9 when the user has selected continuous or video photography mode operation (e.g., via addition to Niikawa's selection menus, [0070]-[0074]), as taught by Irie ([0035], [0055]-[0056]), without changing Niikawa's still photography exposure mode operations and requiring only routine and ordinary programming skills. Laub, ¶¶445.

Implementing Irie's defective pixel correction would have likewise have required only the routine and ordinary skills of (1) storing LUTs recording contiguous and isolated defective pixel locations determined for Niikawa's CCD 103 in GC-150's ROM, (2) including a high-speed SRAM in GC-150's RAM 152

(Niikawa, [0096]) into which the contiguous location LUT is read to support high-speed photography modes, and (3) configuring GC-150 to perform defective pixel correction on image data captured upon full-press of shutter button 9 in accordance with the selected photography mode, as taught by Irie ([0040]-[0042], [0047]-[0060]. Laub, ¶446.

C. Claim 1

Niikawa-Watanabe-Irie (§VIII.B) meets claim 1 for the reasons discussed *supra* §V.E in Ground 1 and meets [1A1] and [1A2] for additional reasons. Laub, ¶447.

D. Claim 29: “...correcting for a dead pixel on a digital image sensor of the digital camera”

Niikawa-Watanabe-Irie (§VIII.B) meets claim 29 because Irie’s defective pixel correction corrects for “black flaws” of the CCD sensor that reduce the amount of incident light (Irie, [0042]), like the ’266 patent’s “dead pixels” that are “too dark” (EX1001, 17:4-6). Irie, [0042]-[0054]; Laub, ¶448.

E. Claim 30

Niikawa-Watanabe-Irie (§VIII.B) meets claim 30 at least because Niikawa’s GC-150 “*digitally process[es] a plurality of images*” when it replaces defective pixel values with its neighboring pixel values to “*correct video taken by the digital camera*” ([30A]) in the continuous photography and video modes and “*stor[es] a plurality of corrected images*” ([30B]) when defective pixel corrected images (or

any other of Niikawa's corrected images) are recorded on memory card 8. Laub, ¶449.

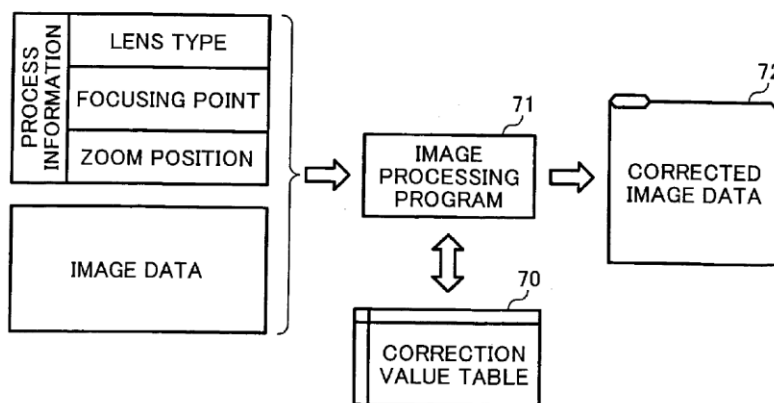
IX. GROUND 5: CLAIMS 1, 17, 22 ARE OBVIOUS OVER NIIKAWA-WATANABE IN VIEW OF WATANABE-US

A. Watanabe-US (EX1013)

Watanabe-US discloses performing “a distortion aberration correction process” and “a peripheral light intensity correction process” (Watanabe-US, [0048]) on image data captured by a digital camera 100 using tables 70 stored in the camera's ROM 58. Watanabe-US, [0039]-[0049], FIGS. 1A-1B; Laub, ¶450.

Watanabe-US discloses obtaining “distortion aberration correction values and peripheral light intensity correction values” from tables 70 based on “lens type,” “focusing point” and “zoom position” corresponding to captured image data and applying the “correction values” obtained from tables 70 to provide “corrected image data 72” (Watanabe-US, [0047]), as illustrated in FIG. 3 below. Laub, ¶451.

FIG. 3



B. Reasons to Combine Niikawa-Watanabe and Watanabe-US

Niikawa teaches that eliminating the influence of shading is important to accurately aligning images for image synthesis. Niikawa, [0012], [0017], [0021], [0023]. Laub, ¶146. Niikawa stores shading correction tables with correction coefficients for different “optical conditions such as focal length and f-number” (Niikawa, [0084]), acknowledging that the stored correction tables could include corrections for additional optical conditions. Laub, ¶¶149, 453.

1. Improving Niikawa’s Shading Correction and Synthesis Processes

Thus, POSAs would have recognized the benefit of including correction data in Niikawa’s correction tables that correct for different focus points, as taught by Watanabe-US in performing “peripheral light intensity correction” ([0046]-[0047]), so that the different shading effects resulting from “focal point” adjustments made by Niikawa’s AF process (Niikawa, [0106], [0134]) can also be corrected, which would in turn improve Niikawa’s image synthesis process by eliminating the influence of this additional source of shading variation in Niikawa’s positioning process. Niikawa, [0012], [0017]; Laub, ¶¶454-455.

Further, POSAs would have been motivated to include “distortion aberration correction values” in Niikawa’s correction tables as taught by Watanabe-US ([0042]-[0049]) to correct for additional lens characteristics, which would likewise

improve Niikawa's image synthesis by further eliminating the influence of position-dependent distortion aberrations (Watanabe, [0054]-[0056]). Laub, ¶456-457.

2. Image Correction for Different Lenses

Niikawa discloses that "imaging lens 3 [] is detachably attached to the camera main body 2" (Niikawa, [0066]), which allows for the use of different lenses as was well known. Laub, ¶¶458-460 (*citing* EX1014, 1:19-25, 4:19-23; Niikawa, [0101], [0205]). Thus, POSAs would have recognized the benefit of storing correction tables for different lens types as taught by Watanabe-US ([0047]) to correct for lens effects of different lenses. Laub, ¶458.

Additionally, storing and applying correction tables prepared for multiple different lens aberrations and different lens types was well-known and including tables for additional lens aberrations and lens types in Niikawa would merely have been the use of known and familiar techniques to yield the predicted and intended result of correcting for additional lens effects in Niikawa's capture images. *KSR*, 550 U.S. at 416-417; Laub, ¶461.

C. Combination of Niikawa, Watanabe-JP and Watanabe-US (Niikawa-Watanabe-US)

Thus, POSAs would have been motivated to modify Niikawa-Watanabe (§V.D) based on Watanabe-US by (1) storing in GC-150's ROM correction tables prepared with (i) shading correction coefficients corresponding to different focal lengths, f-numbers and focal points, and distortion aberration correction values for

different focus points and zoom positions (*supra* §IX.B.1), and optionally (iii) the above-described correction tables for different lens types (§IX.B.2); and (2) configuring GC-150 to (i) access the stored correction tables using the parameters for which correction tables have been stored, and (ii) apply the obtained correction data to perform distortion aberration correction and shading correction processes. Watanabe, [0042]-[0049]; Laub, ¶462.

D. Claims 1 and 22

Niikawa-Watanabe-US (§IX.C) meets claims 1 and 22 for the same reasons discussed in Ground 1 for Niikawa-Watanabe (*supra* §§V.E, V.R) and for the following additional reasons. Laub, ¶463.

1. [1A1], [22A1]

In addition to performing the “*plurality of image correction algorithms*” discussed *supra* §V.E.2.a, GC-150 is further configured to additionally perform “distortion aberration correction” taught by Watanabe-US ([0046]-[0049]) so that multiple optical aberration corrections are performed—i.e., shading and distortion aberration correction processes. *Id.*; Laub, ¶464; *supra* §IX.C.

2. [1A2], [22A2]

In Niikawa-Watanabe-US (§IX.C), GC-150 is also configured to “*process image correction data stored in a database system*” ([1A2], [22A2]) because GC-150 is further configured to (1) access a database of correction tables stored in GC-150’s ROM using the focal length set by the user’s choice of zoom ratio, the f-

number set by Niikawa's AE process, and the focal point set by Niikawa's AF process (Niikawa, [0067], [0072], [0090], [0106], [0134]; *supra* §§V.F.1, V.L), and lens type if lens-specific tables are stored (Watanabe-US, [0047]), to obtain shading "correction coefficients" (Niikawa, [0084]-[0085]) and "distortion aberration correction values" (Watanabe-US, [0047]); and (2) apply this obtained correction data to perform both shading and distortion aberration correction processes. Niikawa, [0084], [0129]-[0131], [0138], [0158]; Watanabe-US ([0046]-[0049]); Laub, ¶465; *supra* §IX.C.

Niikawa-Watanabe-US thus meets [1A2] for this additional reason. Laub, ¶465; *supra* §V.E.2.b.

E. Claim 17

Niikawa-Watanabe-US (§IX.C) also meets claim 17 for the additional reason that the focal point variable changed by Niikawa's AF process that meets claim 14 (see *supra* §V.L) is used to correct for shading and distortion aberrations, both of which are optical aberrations associated with imaging lens 3 and the changed focal point. Niikawa, [0090], [0106], [0134]; Laub, ¶466.

X. NO BASIS EXISTS FOR DISCRETIONARY DENIAL

A. Section 314(a)-*Fintiv*

1. Stay Potential

While Petitioner will seek a pre-institution stay, without "specific evidence" on how the court will rule this factor is neutral. *Sand Revolution II v. Continental*

Intermodal Group–Trucking, IPR2019-01393, Paper 24, 7 (June 16, 2020) (informative).

2. Trial Timing

Petitioner filed this petition before the district court has held an initial scheduling conference, so Factor 2 weighs against denial. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 11 (Mar. 20, 2020) (precedential) (“expeditiously” filed petitions “weigh[] against [denial]”).

FWD can be expected in December 2025. Petitioner was served with the complaint on May 13 and has not answered or filed any motion (EX1048), and the court has not set a trial date. While the median-time-to-trial is 21.4 months (EX1049), Director’s Interim Procedure (“IP”) at 3, without accounting for such late service the median-time-to-trial analysis is inapplicable. This weighs against discretionary denial. IP, 9; *Sand Revolution II*, 9-10 (“relatively close proximity” of FWD and “scheduled trial date” weighs against discretionary denial).

3. Litigation Investment

Patent Owner (PO) filed a complaint, but Petitioner has not answered and the court has not held an initial scheduling conference. EX1048. This weighs against discretionary denial. *Samsung Elecs. v. Netlist*, IPR2022-00063, Paper 13, 8 (May 5, 2022) (instituting where no “claim construction and merits determinations” had occurred).

4. Issue Overlap

Sony challenges 29 claims, whereas PO asserts only claim 1 in the Litigation. EX1047, ¶¶89-108. Challenging claims the district court will not address weighs against denial. *Markforged v. Continuous Composites*, IPR2022-00679, Paper 7, 32-33 (Oct. 25, 2022).

5. Litigation Defendants

Petitioner is the defendant in district court, which “is far from an unusual circumstance.” *Sand Revolution II*, Paper 24, 12-13. This factor is neutral.

6. Other Considerations

The Petition’s “strong showing on the merits” (*supra* §§V-IX) weighs against denial. *Data Company v. Bright Data*, IPR2022-00138, Paper 12, 15-16 (May 11, 2022). “[T]he PTAB will not deny institution based on *Fintiv* if,” as here, “there is compelling evidence of unpatentability.” IP, 5 (discussing *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential)).

B. No Basis Exist for Denial Under Section 325(b)

Each of Grounds 1-5 present new art and each of Grounds 1-2 and 4-5 present *all* new art (Niikawa, Watanabe-JP, Bolle, Irie and Watanabe-US) not considered during prosecution.

XI. CONCLUSION

The Board should institute review and cancel claims 1-27, 29-30.

Dated: June 25, 2024

Respectfully submitted,
Sony Corporation

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CERTIFICATE OF SERVICE UNDER 37 C.F.R. § 42.6 (E)(4)

I certify that on June 25, 2024, I will cause a copy of the foregoing document, including any exhibits or appendices filed therewith, to be served via Overnight FedEx at the following correspondence address of record for the patent:

The Law Office of Michael J. Scheer
5531 Murietta Avenue
Sherman Oaks, CA 91401

Date: June 25, 2024

/MacAulay Rush/
MacAulay Rush
Paralegal
WOLF, GREENFIELD & SACKS, P.C.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned certifies that the foregoing Petition for *Inter Partes* Review contains 13,992 words excluding a table of contents, a table of authorities, Mandatory Notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing. Petitioner has relied on the word count feature of the word processing system used to create this paper in making this certification.

Date: June 25, 2024

/MacAulay Rush/
MacAulay Rush
Paralegal
WOLF, GREENFIELD & SACKS, P.C.

XII. CLAIM LISTING

The following claim listing assigns labels (e.g., [1PRE], [1A], [1B], etc.) to limitations of certain claims for clarity.

Claim 1
[1PRE] A method of processing one or more images with a digital camera, comprising:
[1A] digitally processing at least one captured image, the processing using in-camera hardware and software that is configured to:
[1A1] perform a plurality of image correction algorithms,
[1A2] process image correction data stored in a database system,
[1A3] receive updated software and image correction data, and
[1A4] upgrade the digital camera with the updated software and image correction data;
[1B] storing in memory one or more corrected images resulting from digitally processing the at least one captured image; and
[1C] wirelessly transmitting at least one of the one or more corrected images,
[1D] wherein the in-camera software and database system are upgradable to provide improved algorithms and correction data for correction of images.
Claim 2
[2PRE] The method of claim 1, wherein the digitally processing at least one captured image further comprises:
[2A] electronically reading stored user-adjustable variables; and
[2B] processing image corrections using the user-adjustable variables.
Claim 3
The method of claim 2, wherein the user-adjustable variables include an aperture setting.
Claim 4
The method of claim 2, wherein the user-adjustable variables include lens data.
Claim 5
The method of claim 2, wherein the user-adjustable variables include shutter speed settings.
Claim 6
The method of claim 2, wherein the user-adjustable variables include ISO settings.

Claim 7
The method of claim 2, wherein the user-adjustable variables include subject type.
Claim 8
The method of claim 2, wherein the user-adjustable variables include tonal range corrections.
Claim 9
The method of claim 2, wherein the user-adjustable variables include filter settings.
Claim 10
The method of claim 2, wherein the user-adjustable variables include special effects.
Claim 11
The method of claim 1, wherein the digitally processing the at least one captured image for image correction further comprises adjusting a depth of field of an image.
Claim 12
The method of claim 1, further comprising adjusting a depth of field of an image after capture of the image using the in-camera software
Claim 13
The method of claim 1, wherein the in-camera software processes image corrections based on one or more prior image corrections.
Claim 14
The method of claim 1, further comprising changing a variable based on an auto-focus process performed by the camera and electronically storing that changed variable.
Claim 15
The method of claim 1, further comprising changing a variable based on an auto-exposure process performed by the camera and electronically storing that changed variable.
Claim 16
The method of claim 1, further comprising changing a variable based on a depth of field adjustment process performed by the camera and electronically storing that changed camera variable.
Claim 17
The method of claim 14, further comprising digitally processing the at least one captured image using the in-camera software to correct at least one optical image aberration associated with an optical system and the changed camera variable.

Claim 18
The method of claim 15, further comprising digitally processing the at least one image using the in-camera software to correct at least one optical image aberration associated with an optical system and the changed camera variable.
Claim 19
The method of claim 16, further comprising digitally processing the at least one image using the in-camera software to correct at least one optical image aberration and the changed camera variable.
Claim 20
The method of claim 1, wherein the wirelessly transmitting images includes automatically transmitting the at least one of the one or more corrected images.
Claim 21
The method of claim 1, wherein the image processing algorithms include a fast Fourier transform.
Claim 22
[22PRE] A method of displaying one or more images captured by a digital camera on an external monitor, comprising:
[22A] digitally processing at least one captured image to produce one or more corrected image, the processing using in-camera hardware and software that is configured to:
[22A1] perform a plurality of image correction algorithms,
[22A2] process image correction data stored in a database system,
[22A3] store updated software or image correction data or both, and
[22A4] upgrade the digital camera with the updated software or image correction data or both; and
[22B] wirelessly transmitting at least one of the one or more corrected images in a format that the external monitor can receive,
[22C] wherein the in-camera software and database system are upgradable to provide improved algorithms and correction data for correction of images.
Claim 23
[23PRE] The method of claim 22, wherein the digitally processing at least one captured image further comprises:
[23A] electronically reading stored user-adjustable variables; and
[23B] processing image corrections using the user-adjustable variables
Claim 24
The method of claim 22, wherein the user-adjustable variables include aperture settings, lens data, shutter speed settings, and ISO settings.

Claim 25
The method of claim 22, wherein the digitally processing the at least one captured image for image correction further comprises adjusting a depth of field of an image.
Claim 26
The method of claim 22, further comprising adjusting a depth of field of an image after capture of the image using the in-camera software.
Claim 27
The method of claim 22, wherein the in-camera software processes image corrections based on one or more prior image corrections.
Claim 29
[29PRE] The method of claim 1, further comprising:
[29A] correcting for a dead pixel on a digital image sensor of the digital camera.
Claim 30
[30PRE] The method of claim 1; further comprising:
[30A] digitally processing a plurality of images to correct video taken by the digital camera; and
[30B] storing a plurality of corrected images.