

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NEARMAP US, INC.,
Petitioner

v.

PICTOMETRY INTERNATIONAL CORP.,
Patent Owner

Case IPR2024-00729
Patent 9,182,657

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT No. 9,182,657**

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LIST OF EXHIBITS

Exhibit	Description
EX1001	U.S. Patent No. 9,182,657
EX1002	U.S. Patent No. 9,182,657 File History
EX1003	Declaration of David A. Forsyth, Ph.D.
EX1004	U.S. Patent No. 7,184,072 (Loewen)
EX1005	EP0053640 (Fujimoto)
EX1006	U.S. Patent No. 5,878,356 (Garrot)
EX1007	Mostafa, M.M.R. & Schwarz, K.-P., “Digital image georeferencing from a multiple camera system by GPS/INS,” ISPRS Journal of Photogrammetry & Remote Sensing, Vol.56, 1-12 (2001) (Mostafa)
EX1008	WO 97/35166 (Kain 1997)
EX1009	U.S. Patent Pub. No. 2003/0048357 (Kain 2003)
EX1010	U.S. Patent No. 7,893,957 (Peters)
EX1011	Hall, R.J. & Hiscocks, P., “A Microcomputer-Based Camera Control System,” Photogrammetric Engineering and Remote Sensing, Vol.56 No.5, 443-446 (April 1990)
EX1012	Held, K.J. & Robinson, B., “TIER II Plus Airborne EO Sensor LOS Control and Image Geolocation,” 1997 IEEE Aerospace Conference, Vol.2, 377-405 (1997)
EX1013	<i>U.S. District Courts—National Judicial Caseload Profile</i> , available at https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile1231.2023.pdf (Dec. 31, 2023)
EX1014	Fourth Amended Patent Case Scheduling Order, Dkt. 372, <i>Eagle View Technologies Inc., and Pictometry International Corp v. Nearmap US, Inc., Nearmap Australia Pty Ltd, and Nearmap Ltd</i> , C.A. No. 2:21-cv-00283-TS-DAO (D. Utah Dec. 27, 2023)
EX1015	WO 99/18732 (Ciampa)
EX1016	U.S. Patent Pub. No. 2003/0164962 (Nims)
EX1017	“ISPRS Journal of Photogrammetry and Remote Sensing,” https://www.sciencedirect.com/journal/isprs-journal-of-photogrammetry-and-remote-sensing/vol/56/issue/1
EX1018	“Nadir,” “Merriam-Webster.com Dictionary,” available at https://www.merriam-webster.com/dictionary/nadir (Accessed March 26, 2024)

EX1019	Compilation of Annotated Images from Oblique Aerials Browser, “A collection of historical aerial photographs of the City of Tampa,” https://storymaps.arcgis.com/stories/f26b7c047dde45d6ae2224208d46071a (accessed March 27, 2024)
EX1020	Declaration of June Munford
EX1021	Oblique Aerials Browser, “A collection of historical aerial photographs of the City of Tampa,” https://storymaps.arcgis.com/stories/f26b7c047dde45d6ae2224208d46071a (accessed March 27, 2024)
EX1022	Declaration of Sayem Osman

Nearmap US, Inc. (“Petitioner”) petitions, under §§311-319 and §42.1,¹ for IPR of Claims 1-5, 14, 19-21, and 26-27 (“Claims”) of U.S. Patent 9,182,657 (“’657”). There is a reasonable likelihood at least one Claim is unpatentable for the reasons herein, and Petitioner requests review of, and judgment against, all Claims under §103.

The Claims generally concern concepts well-known long before ’657’s earliest-claimed November 8, 2002 priority date: a computerized system for capturing oblique aerial images using image-capturing devices, storing the images, associating them with navigational data, and separately controlling the image-capturing devices (which formed the basis for the Examiner’s allowance of the independent claims). EX1001, 3:66-35, 14:38-41, cl.1. The remaining limitations merely catalog trivial implementation choices well understood by POSITA²—and the resulting combinations were certainly obvious.

¹ Sections are from 35 U.S.C./37 C.F.R. as context indicates, and emphasis/color annotations added and internal quotations/citations omitted unless noted.

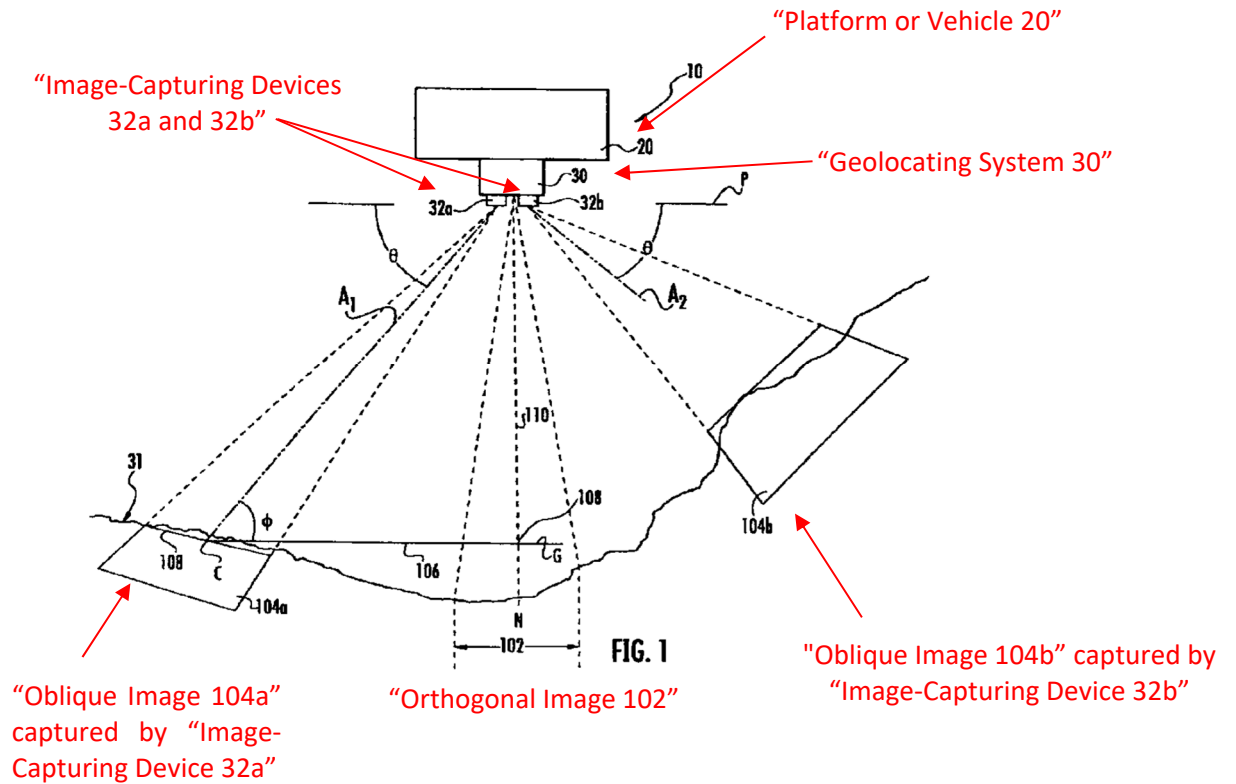
² Persons of ordinary skill in the art as of November 8, 2002. §VI.B.

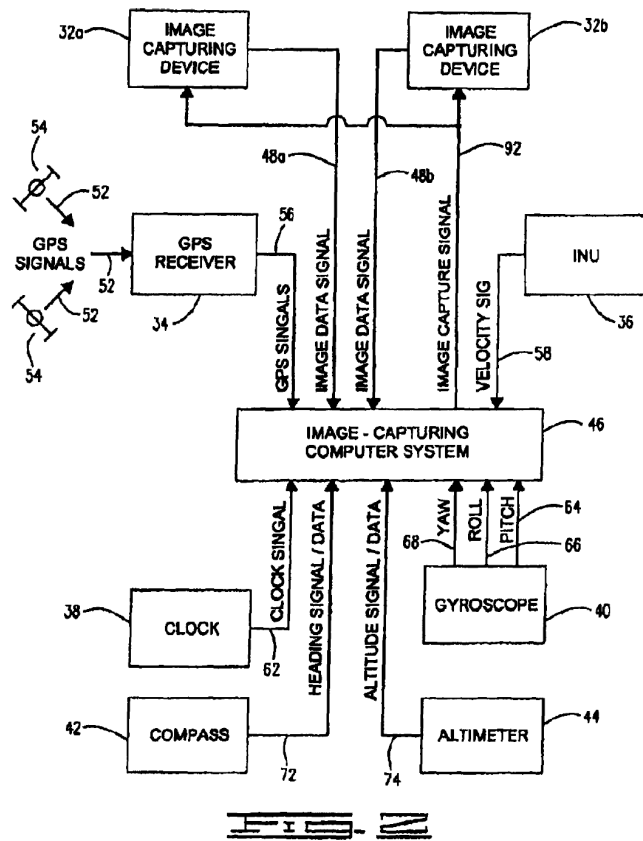
I. '657 PATENT

A. Overview

'657 concerns “an apparatus for capturing and geolocating oblique images.”

EX1001, 3:67-4:1, cl.1, Figs.1, 2; EX1003, ¶18:





'657's claims generally require a first image-capturing device for capturing oblique aerial images (*e.g.*, camera capturing generally trapezoidal area with foreground having substantially smaller ground sample distance than background), transmitting image-data signals corresponding to images (*e.g.*, aerial images) captured by the first image-capturing device, a second image-capturing device (*e.g.*, second camera) for capturing aerial images, transmitting image-data signals corresponding to images captured by the second image-capturing device (*e.g.*, aerial images), a geo-locating device (*e.g.*, GPS receiver, altimeter, inertial navigation unit, compass) issuing a corresponding geo-locating signal indicative at

least in part of a geo-location of the first image-capturing device (*e.g.*, latitude and longitude, height, acceleration/pitch, heading of the camera), a computer system for receiving and storing the image-data signals and geo-locating signal (*e.g.*, computer with data storage), associating by the computer system of the image-data signals with the geo-locating signal (*e.g.*, associating aerial images with latitude and longitude coordinates or geo-location data), and separate control by the computer system of the first and second image-capturing devices (*e.g.*, computer controls and triggers each camera individually). EX1001, cl.1; EX1003, ¶19.

B. Prosecution

The application leading to '657 (filed March 8, 2013) claims priority to a November 8, 2002 provisional. EX1002, 4-5; EX1003, ¶21. Among other rejections, then-pending claims 1-2, 4-8, 13, 16-21, 26-28, and 33-35 were rejected as anticipated by U.S. Patent 7,184,072 (primary reference “**Loewen**” (EX1004), filed September 6, 2002 with June 15, 2001 priority). EX1002, 114-119; EX1003, ¶21. In response, Pictometry (“PO”) amended pending claim 1 to include “a second image-capturing device” and require that the “*computer system* transmits image-capture signals to the first image-capturing device and the second image-capturing device... [and] *controls the first and second image-capturing devices separately.*” EX1002, 188-189; EX1003, ¶21. The claims were allowed, but PO requested continued examination, and the Examiner rejected claim 1 and others as

obvious over Loewen in view of Nims (U.S. Pub. 2003/0164962; EX1016).

EX1002, 212-218, 226, 257; EX1003, ¶22. The Examiner determined Loewen expressly disclosed each claim 1 limitation except “wherein *the computer system controls the first and second image-capturing devices separately*,” EX1002, 257, for which the Examiner relied on Nims. *Id.*; EX1003, ¶22.

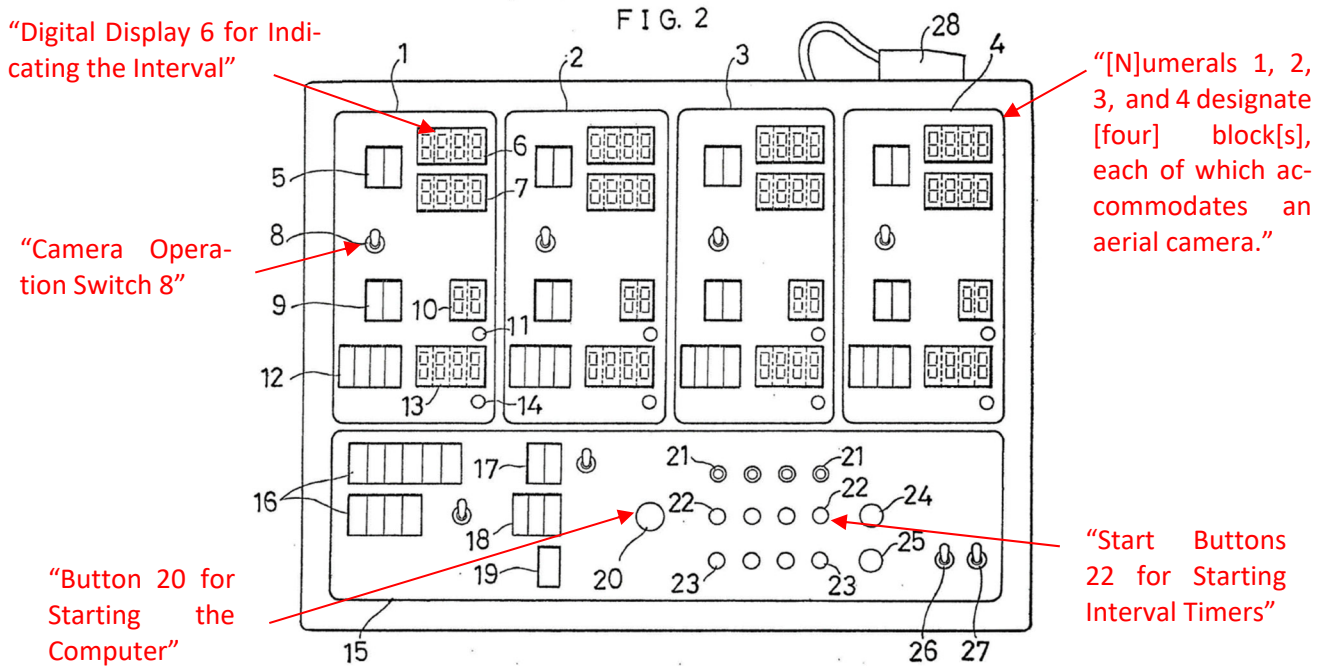
PO argued “Nims does not teach any manner of how the cameras are controlled.” EX1003, ¶23. “For example, it is possible that the cameras are slaved together such that the cameras are signaled together.... This type of ‘slaving’ of cameras was used in the past to simplify control signals and data processing....” EX1002, 290–291; EX1003, ¶23. PO urged that “Nims cameras 16, 18, and 20 were slaved together,” and “[t]hus neither Loewen nor Nims,” disclosed *separate camera control* as claim 1 required. EX1002, 291-292; EX1003, ¶23. Notably, the Examiner did not have before him “**Fujimoto**” (EP0053640 (EX1005), published June 16, 1982), which expressly discloses an aerial imaging system including “computerized control for *opening the shutters of a plurality of cameras independently of one another*,” or any reference cumulative of Fujimoto. EX1005, ¶0004; *see generally* EX1002; *see also* EX1011, 2, Fig.3 (disclosing independent camera control). The Examiner then allowed the claims. EX1002, 322-328; EX1003, ¶23.

II. BACKGROUND ART

The Examiner allowed '657 believing the art lacked “wherein the computer system controls the first and second image-capturing devices separately.” See §§I.A-I.B. But this concept (with its benefits) was well known long before '657. *E.g.*, EX1003, ¶¶29-70:

1. The computer system *controls the first and second image-capturing devices separately*:

- Fujimoto disclosed separate camera control: “computerized control for opening the shutters of a plurality of cameras *independently of one another* thereby to secure a series of photographs of the ground without waste of film” (EX1005, ¶0004), and “signals being produced with respect to all the cameras... thereby enabling each shutter to be driven at independently different interval time.” EX1005, ¶0006, Fig.2 (four “block[s]” 1-4, each “accommodat[ing] an aerial camera” so “the illustrated control system can control four cameras”); EX1003, ¶31:



- Hall (EX1011; *see also* EX1020, Appendix HALL02, published April 1990) disclosed determining “the required firing *intervals* for the two cameras” with “*independent overlap control* for cycling both cameras...” EX1011, 2 (“determine if *a camera* should be fired”), Abstract, 1, 3, Fig.3 (computer “Controlled Framing” of camera by “Manual Timing,” “Grid Timing”); EX1003, ¶¶32-33:

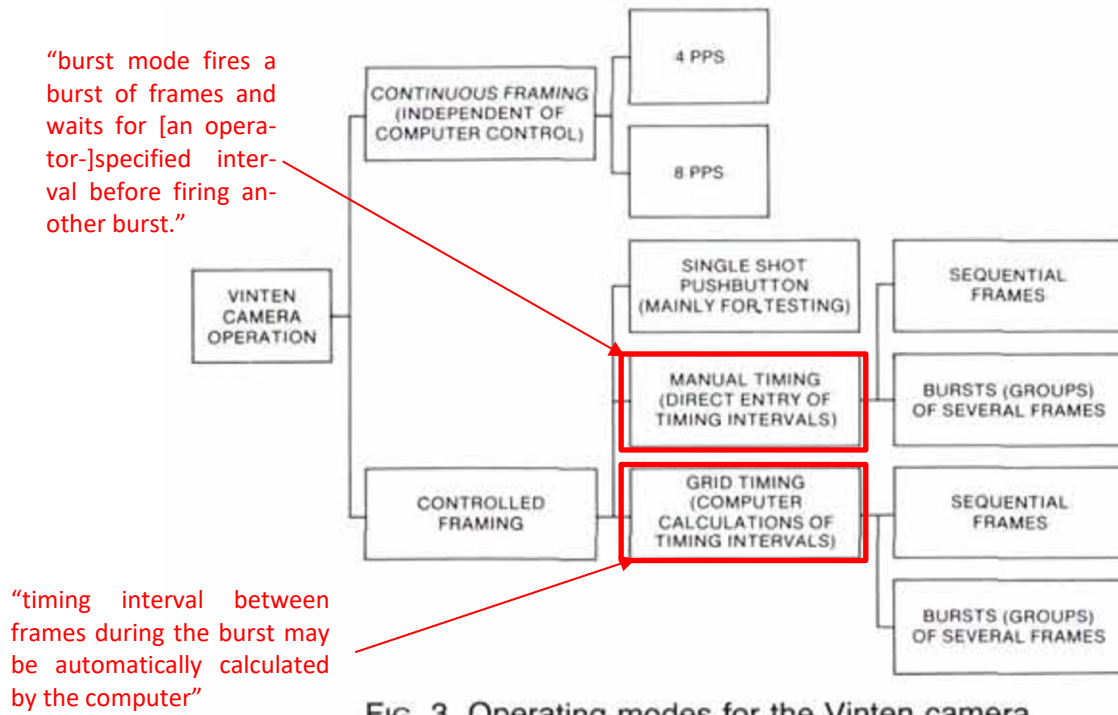


FIG. 3. Operating modes for the Vinten camera.

- Held (EX1012, published 1997; *see also* EX1020, Appendix HELD02) disclosed an aircraft with multiple separately-controlled image-capture devices (“IR sensor” and “EO sensor”): “The EO sensor is controlled by a Kodak camera control unit (CCU) and the IR sensor is controlled by a Hughes EO/IR processor card.” EX1012, 1, 5, Fig.1.3.1; EX1003, ¶¶34-35:

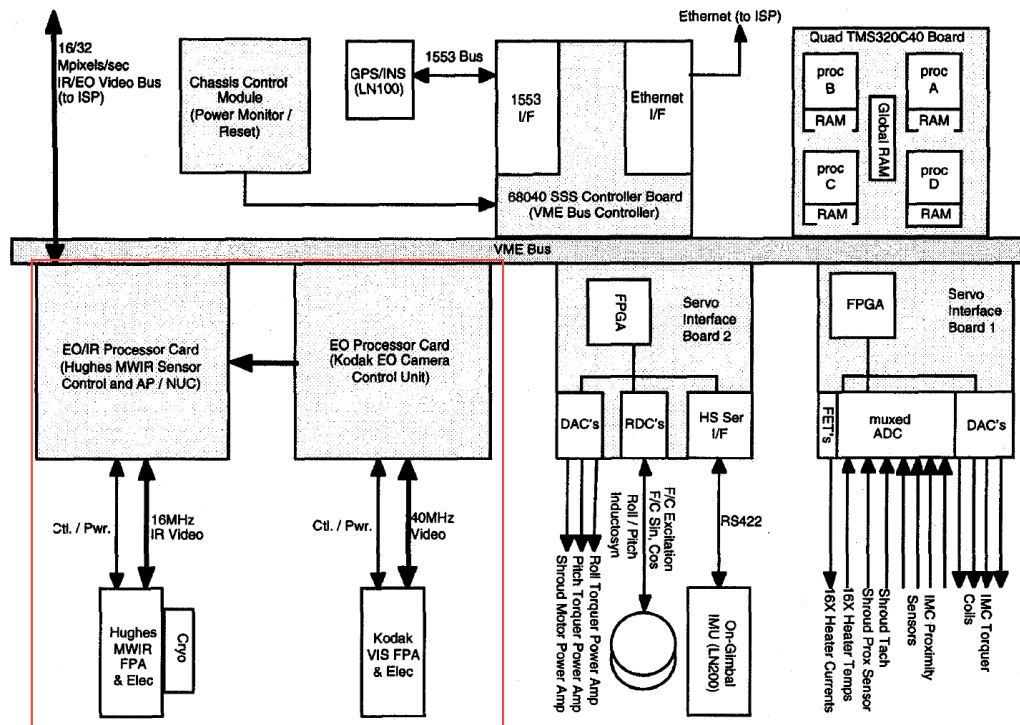


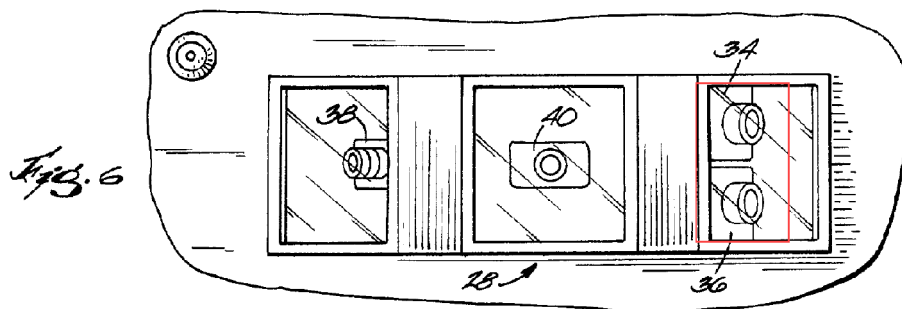
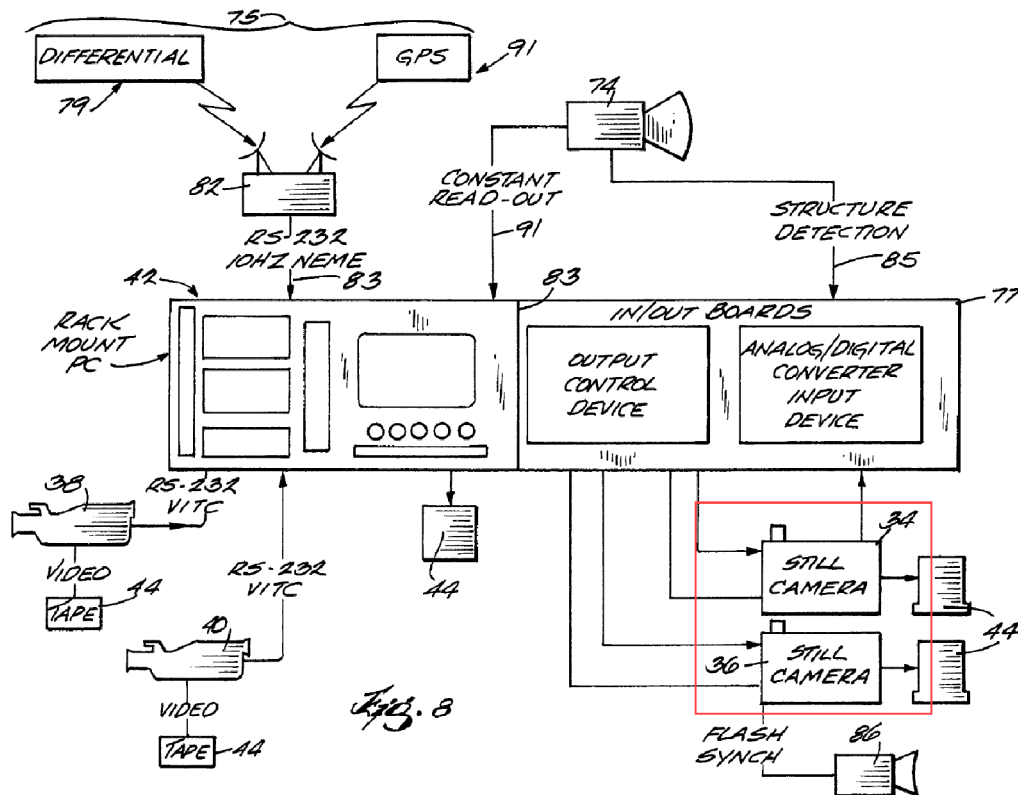
Figure 1.3.1. Sensor Electronics Unit Functional Block Diagram

Consistent with the Examiner's determination (§I.B), the Claims' other limitations were also well known. *E.g.*, EX1002, 111-119, 255-258 (for claim 1):

2. Multiple *image-capturing devices*, including image-capturing devices that capture *oblique aerial images* at image-capturing events, and *issue image-data signals corresponding to captured images* (*e.g.*, EX1002, 111, 114, 256):

- Loewen disclosed image-capturing devices capturing oblique aerial images (*see* §VI.A; EX1003, ¶¶123-130) and issuing image-data signals, describing a system for “acquiring images of electric transmission line tower structures,” including “a fixed wing aircraft” with, *e.g.*, two “still cameras... to take pictures along an exposure line... at an angle of

substantially 30–60 degrees to the horizontal” (EX1004, Abstract, 2:39-49, 3:51-57, Figs.6, 8), where the cameras “write their information directly to the onboard computer system” (EX1004, 6:49-51), EX1003, ¶39:



- Multiple other references disclosed capturing aerial images, including from an angle. *E.g.*, EX1005, Abstract (“photograph[ing] not only vertically but also obliquely”), Fig.1; EX1007 (“Mostafa,” published June 2001; *see also* EX1020, Appendix MOSTAFA02), Abstract, 4 (cameras “captur[ing]... **nadir**... images” (*see* EX1018)), 12, Fig.6; EX1011, 1 (“two... aerial cameras” on helicopter), Fig. 1; EX1010 (filed August 28, 2002), Abstract (“first imaging sensor” and “[a]t least one second imaging sensor” “intersect[ing] with the focal axis of the first”), 1:20-27, Figs.1A, 7; EX1003, ¶¶40-44:

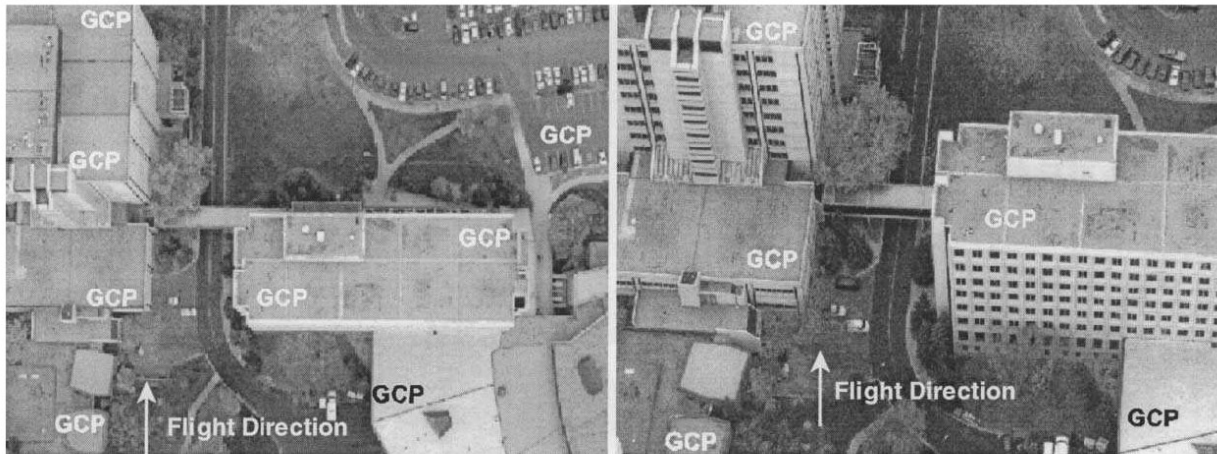
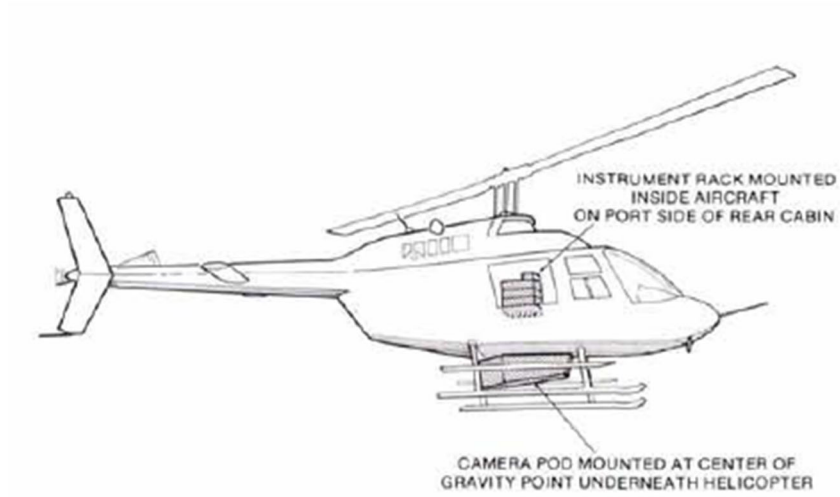


Fig. 6. A nadir digital image (left) and an oblique digital image (right), October 1998 flights.

EX1007, Fig.6



EX1011, Fig. 1

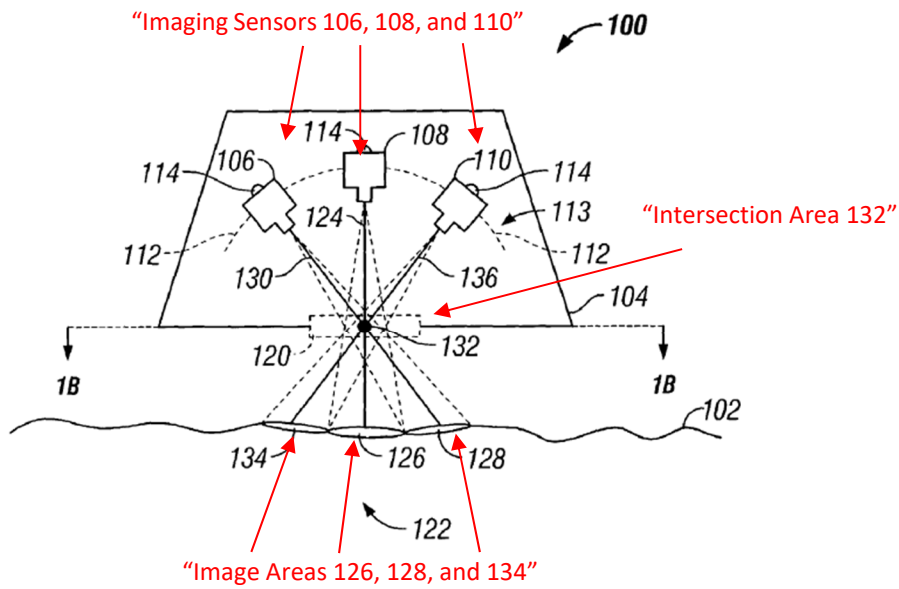


FIG. 1A

EX1010 Fig.1A

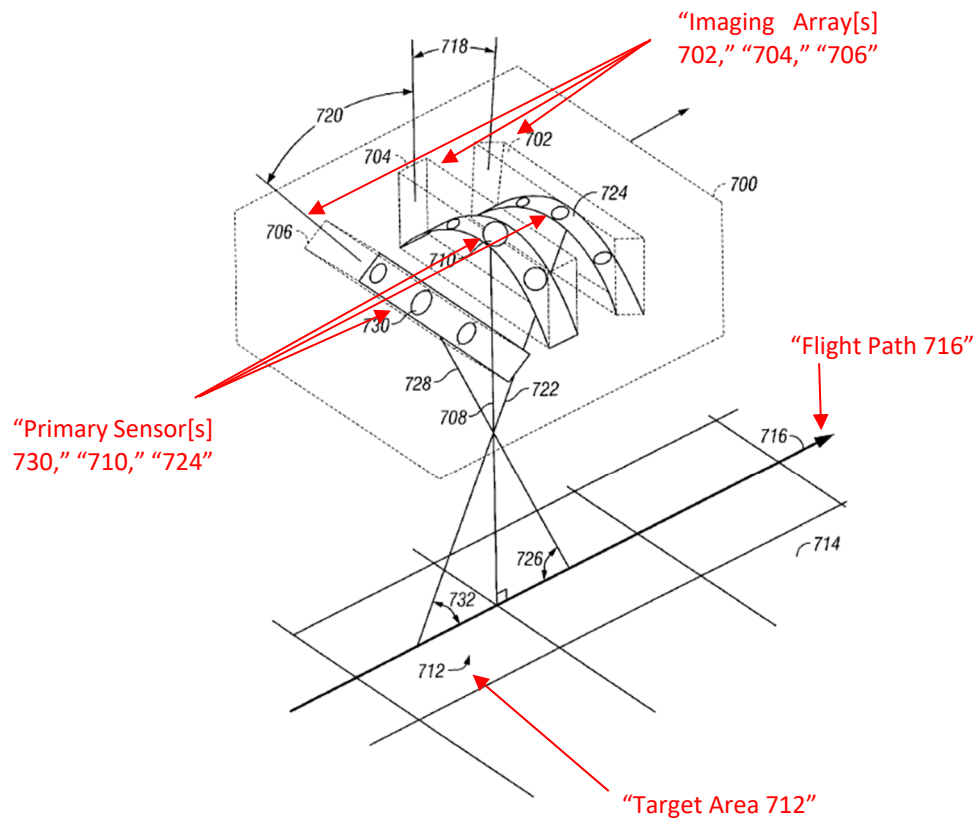


FIG 7

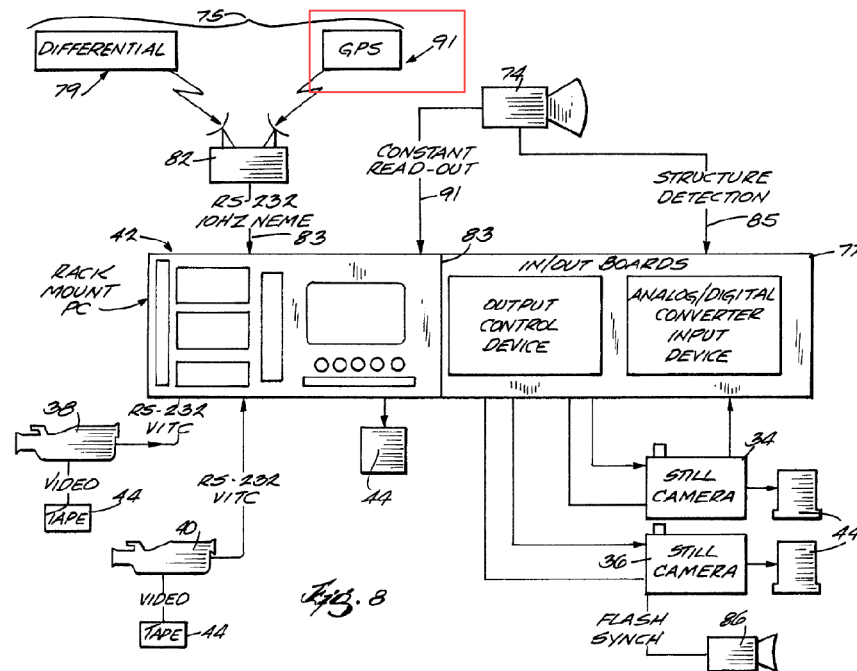
EX1010 Fig.7

3. **Geo-locating devices** issuing at least **one geo-locating signal indicative at least in part of a geo-location of said first image-capturing device** during image capturing events (e.g., EX1002, 111-115, 256, 258-259):

- Loewen disclosed “a GPS unit which **supplies continuous longitude/latitude coordinates**” of the camera-bearing aircraft, “**transmitt[ing this data] to the onboard computer,**” and “recording...

longitude/latitude coordinates in *association with the image*”

(EX1004, Abstract, 3:37-50, Fig.8; EX1003, ¶46):



- Mostafa disclosed GPS and inertial navigation system geo-locating signals, including “***GPS/INS*** interpolated position and attitude angles ***at each exposure station.***” EX1007, 9, Abstract, 2, 4, Fig.8; EX1003, ¶47:

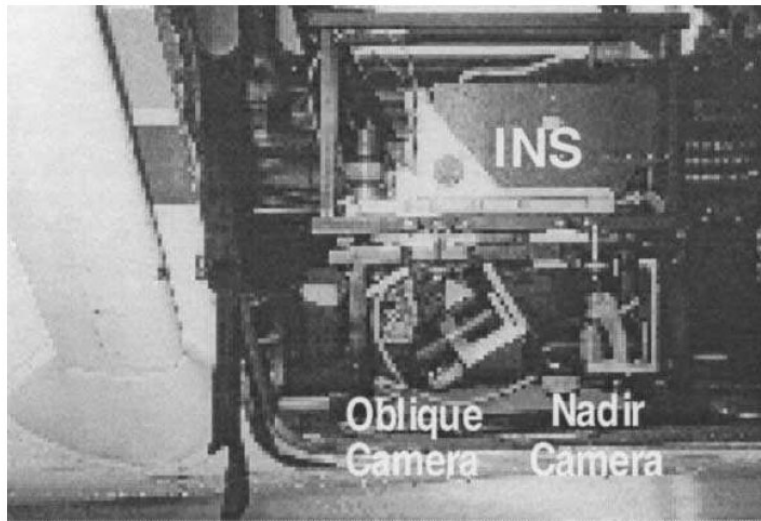
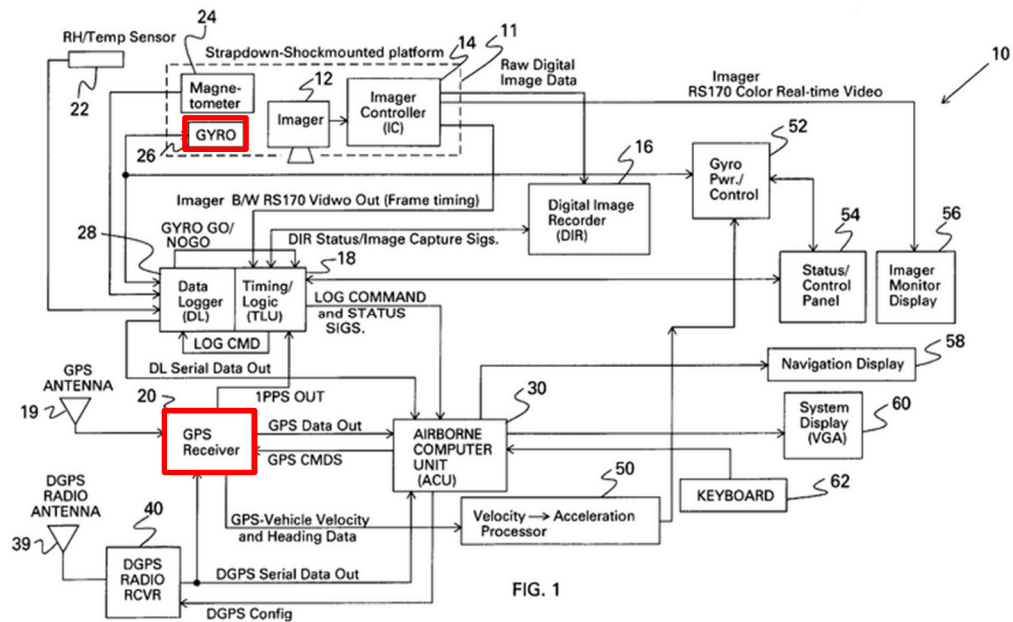


Fig. 8. The multi-sensor system used in the October 1998 test flights.

- Many other references also disclosed geo-locating signals indicative of an image-capturing device's geo-location when capturing images. EX1008 (published 1997), Abstract, 5:32-6:1 (“***GPS*** data accurately represents... *position of cameras*”); EX1009 (filed August 27, 2002), ¶9 (“*inertial measurement system... fixed... relative to the camera assembly*” “*detects acceleration and rotation rates of the camera assembly*”; and “(*GPS*)... *detecting the position of the imaging system*”); EX1006 (issued March 2, 1999), Abstract (“imaging system... for georeferencing the acquired signals,” including GPS signals), 4:66-5:2, 12:24-29, Fig.1 (“block diagram of... imaging system” including “GPS Receiver 20,” and “GYRO” 26), Fig.3; EX1003, ¶¶48-50:



EX1015 (published April 15, 1999) 1:4-10 & 2:10-18 (“capture and automatic georeferencing of a camera and/or [“captured”] images” using, *e.g.*, “data unit containing... (GPS) antenna/receiver,... compass and inclinometer,”); 3:3-6; Fig.1 (geo-locating devices 15a-b, 12, 14, 16), Fig.2 (step 103); EX1003, ¶51:

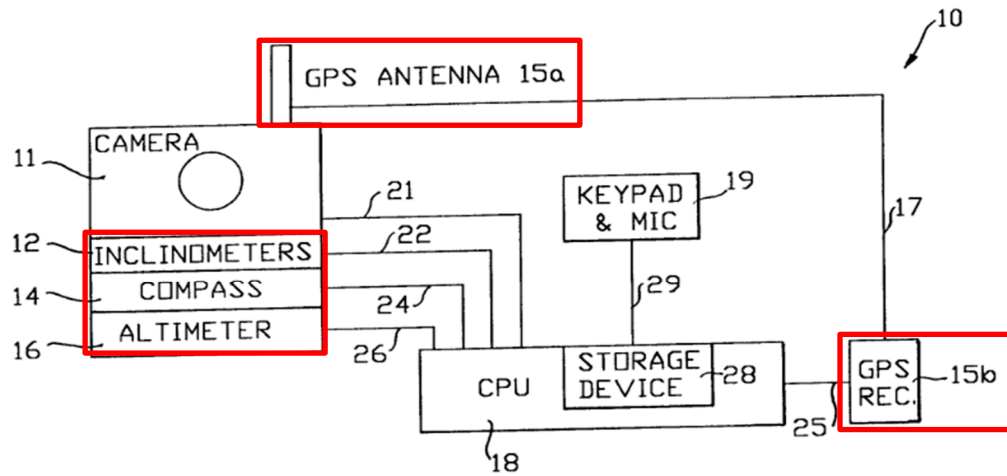


FIG. 1

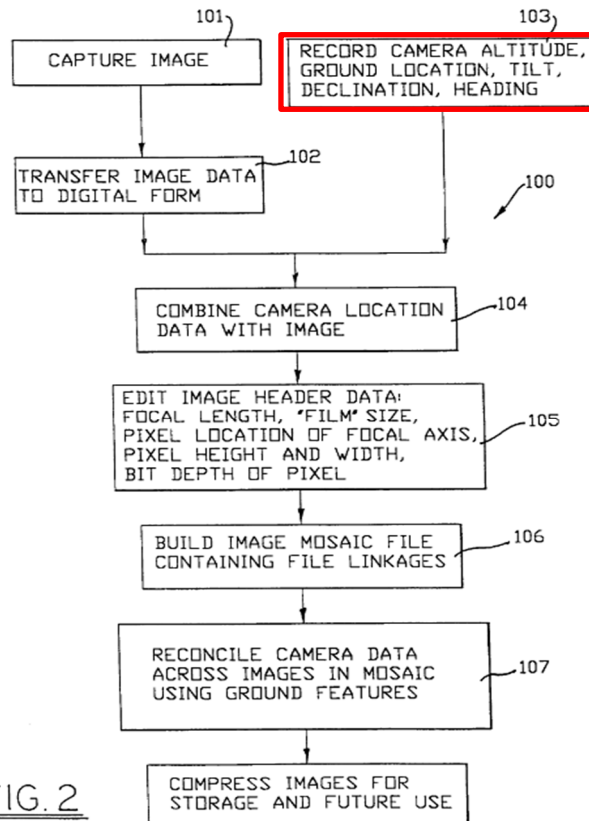
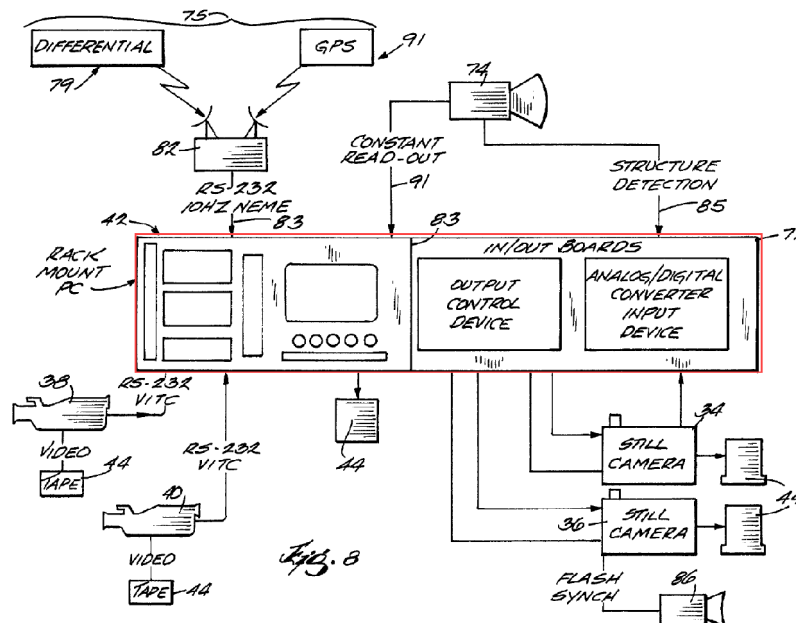


FIG. 2

4. A computer system that receives and stores image-data and/or geo-locating signals (e.g., EX1002, 112, 114, 257):

- Loewen disclosed its onboard computer receives and stores both image-data and geo-locating signals: “*longitude and latitude coordinates*” are “*transmitted to the onboard computer* and... embedded... the geographic location of the tower is associated with the image of that tower,” and “*cameras... write their information directly to the onboard computer*” (EX1004, 3:38-49, 6:45-51, 7:17-20, 3:51-54, Fig.8 (“Rack Mount PC” (“Onboard Computer 42”) connected to “Still Camera[s]” and “GPS”); EX1003, ¶53):



- Garrot similarly disclosed its “Airborne Computer Unit (ACU)” “effect[s] centralized control of GPS timing and position data” and

includes “[s]oftware for real-time logging of data (GPS and data-logger, sensors)”; its “Data Logger Unit,” *e.g.*, “logs the Imaging Platform’s pitch and roll [and] magnetometer (to calculate aircraft heading).”

EX1006, 7:36-38, 7:53-54, 8:62-65, Fig.1; EX1003, ¶54.

- Various other prior art references also disclosed receiving and storing geo-locating signals. *See* EX1011, 1 (“camera control system... for... timing the cameras, and acquiring data from a radar or laser altimeter[,] [t]he disk drive stor[ing]...height data from the flight”), 2, Fig.2; EX1008, Abstract (“processing unit and a storage unit” “determines geographic data referenced to the sensor data in response to the GPS data and IMU data”), 5:30-31 (“GPS receiver 46 suppl[y]ing GPS data... to... system computer 30”), Fig.1; EX1003, ¶¶55-56:

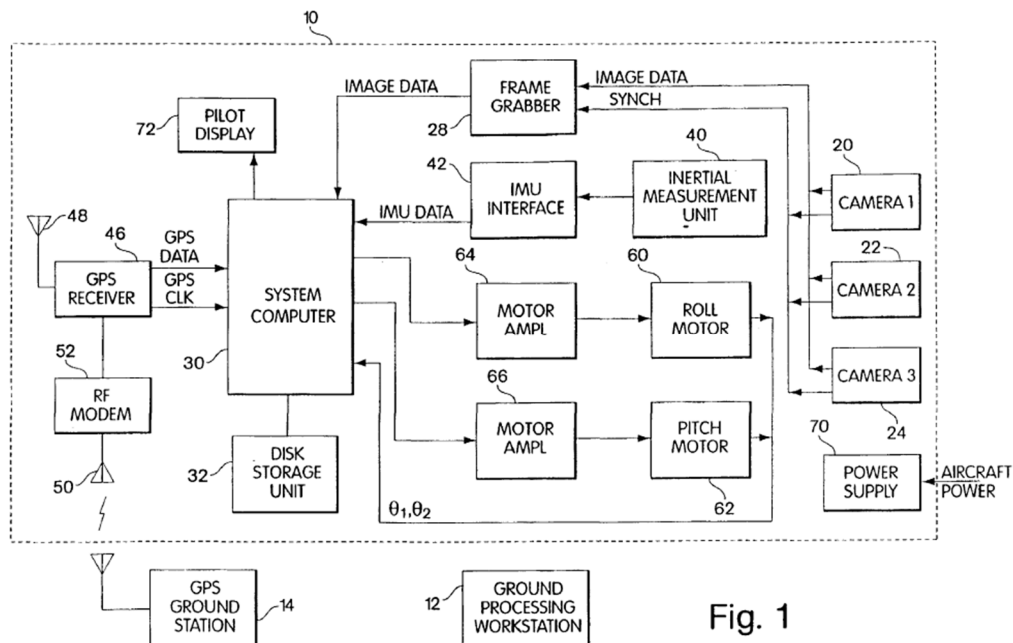


Fig. 1

EX1015, 3:3-16 (“data regarding depression angle, global position, heading (or bearing) and image are interpolated and combined with the shot time. This digitized image and other information are then stored...”), Figs.1 (“CPU 18,” “Storage Device 28,” “Camera 11,” *e.g.*, “GPS Receiver,” “Compass”), 2; EX1003, ¶57:

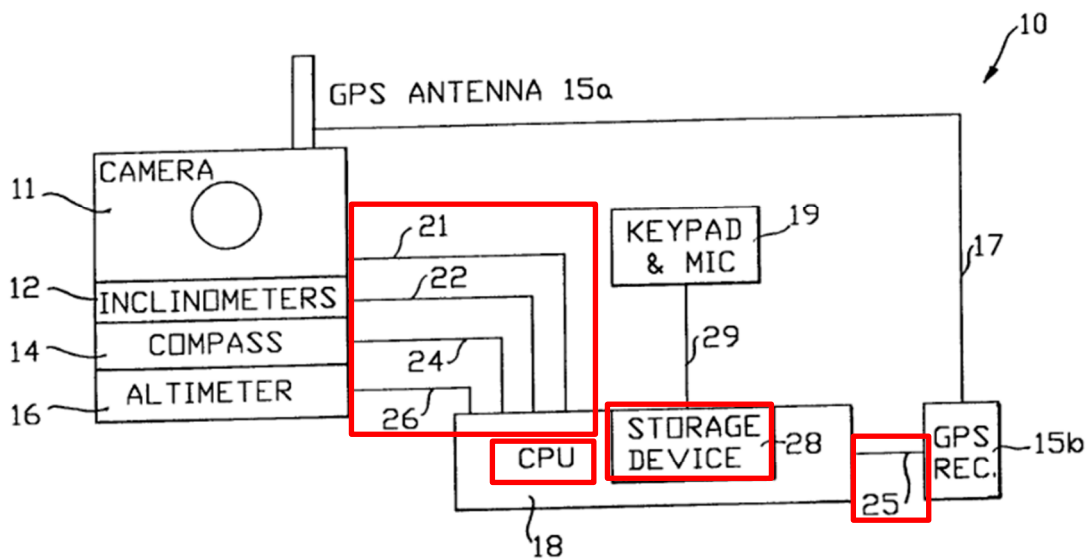
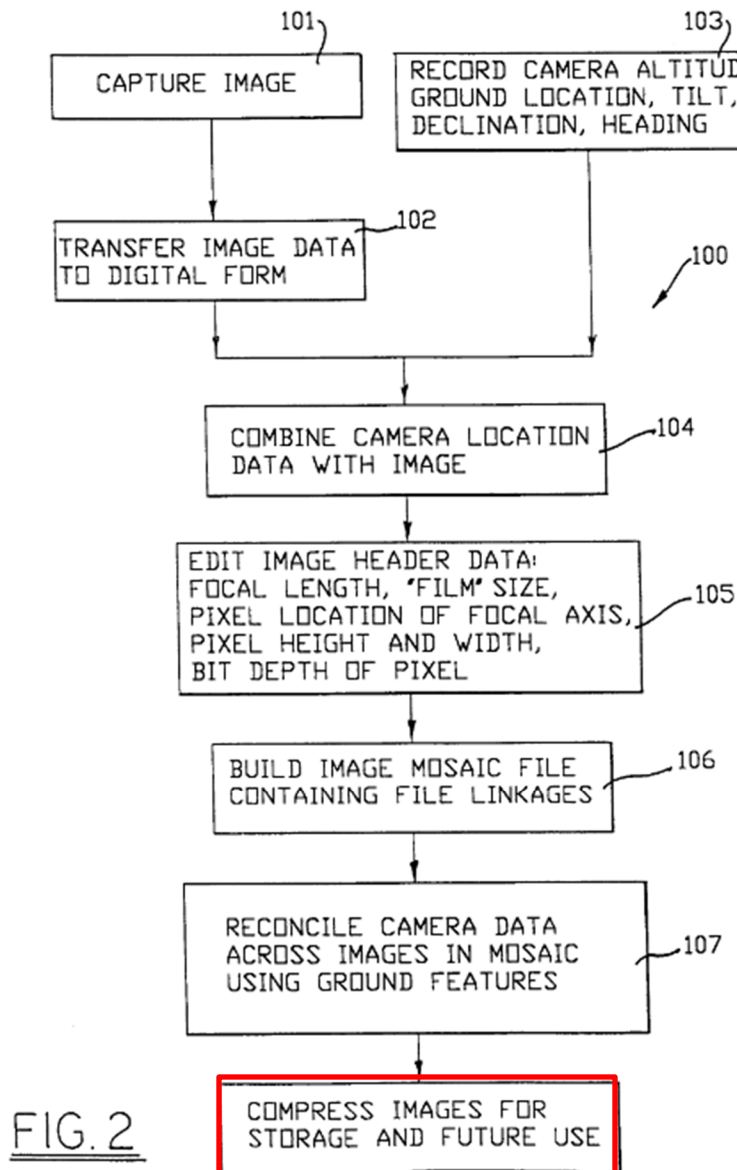


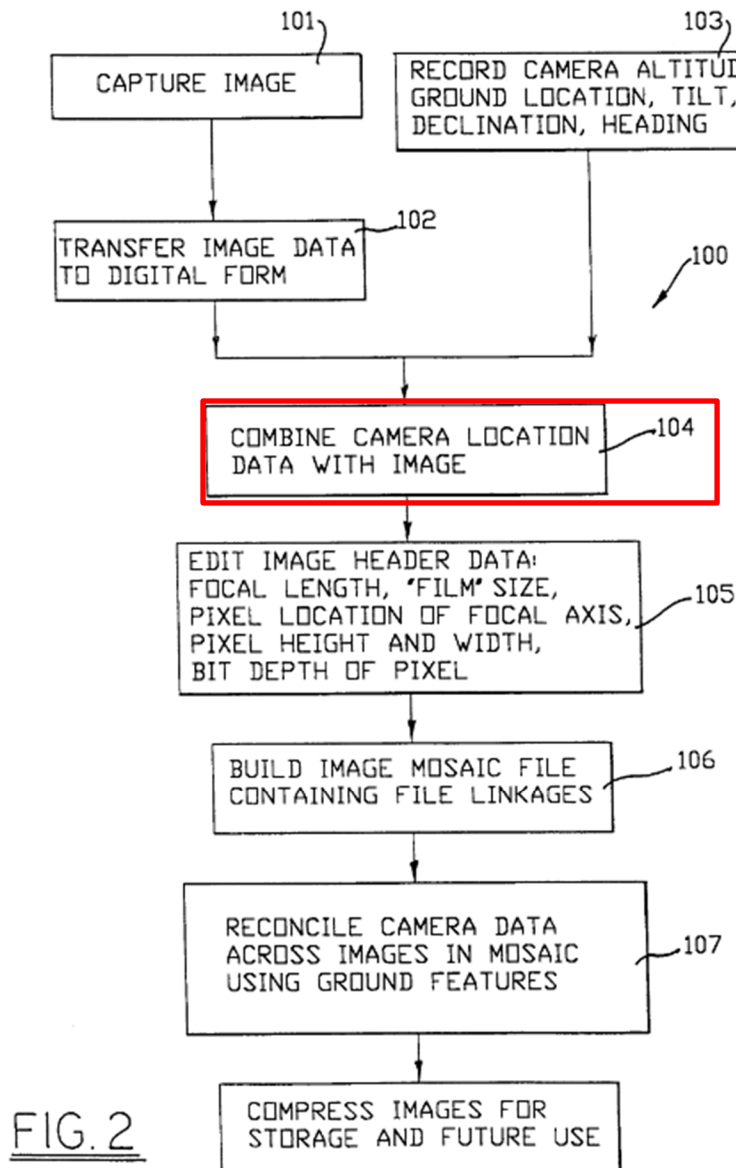
FIG. 1



5. A computer system that *associates image-data signals to corresponding geo-locating signals* (e.g., EX1002, 112, 114, 256):

- Loewen disclosed its “onboard computer... containing operational software operatively connected to the cameras and the tower detecting device” associates image-data signals to corresponding geo-locating signals, and “embed[s] the longitude/latitude coordinates for... the still

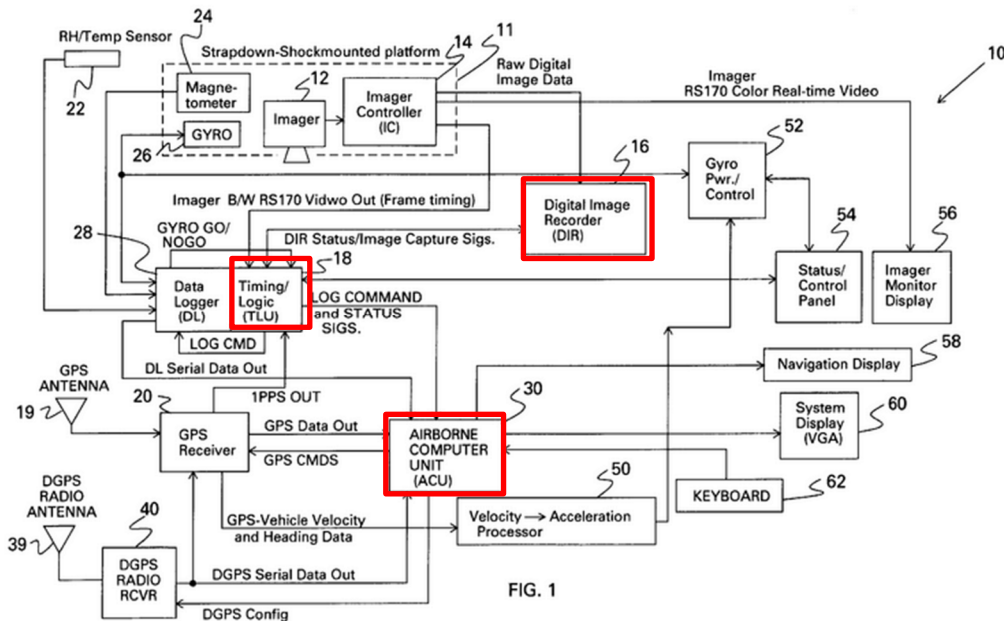
- camera output.” EX1004, 3:3-7, 3:37-50 (“GPS... data is transmitted to the onboard computer and... embedded in the collected data in association with the image....”), 9:7-11; EX1003, ¶59.
- Various other prior art references also disclose this limitation. *E.g.*, EX1006, Abstract (“system for **georeferencing the acquired signals**”), 4:66-5:2; EX1009, ¶34 (“precise attitude and position of... camera assembly... correlated with the pixels of the image”); EX1008, 2:14, 19-22 (“recording... image signal and position information on magnetic tape”); EX1015, Abstract (“produc[ing] automatically computationally georeferenced digital image”), 1:4-10, 2:14-18, 3:6-10 (“microprocessor... links the shot data from the instruments with a digital image file”), Fig.2 (“**combine** camera location data with image”); EX1003, ¶¶60-63:



6. A computer system that *transmits image-capture signals to the image-capturing devices* to cause the image-capturing devices to capture images (e.g., EX1002, 257-258):

- Loewen disclosed “a mechanism 74 for triggering the still cameras to acquire the images” wherein the “still cameras, computer, and detection capability are operationally interconnected to automatically activate the

still cameras at the exposure points....” EX1004, 7:14-17, 3:7-10, Figs.9-10. See also EX1005, ¶0006, Fig.3; EX1011, 1-2; EX1012, 5 (discussion *supra* pp.6-9); EX1009, ¶¶23, 31 (“*cameras... triggered by the controller*”); EX1006, 6:48-56, Fig.1 (“Airbone Computer Unit (ACU) 30 produces an image strobe command” “received by a Timing and Logic Unit (TLU) 18 and a corresponding signal is sent to a Digital Image Recorder (DIR) 16 just before the desired image frame”); EX1003, ¶¶65-70:



III. MANDATORY NOTICES (§42.8)

Petitioner and Real-Parties-in-Interest (§42.8(b)(1)): Nearmap US, Inc., is sole petitioner and Nearmap Australia Pty Ltd, and Nearmap Pty Ltd are real parties-in-interest.

Related Matters (§42.8(b)(2)): PO asserted '657 against Petitioner in *Eagle View Technologies Inc., and Pictometry International Corp v. Nearmap US, Inc., Nearmap Australia Pty Ltd, and Nearmap Ltd*, C.A. No. 2:21-cv-00283-TS-DAO (D. Utah).

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IV. STANDING (§42.104(a))

Petitioner certifies '657 is eligible for, and Petitioner is not barred or estopped from requesting, IPR. Neither Petitioner nor any RPI or privy was served more than one year before this Petition or initiated a civil action challenging '657's validity.

V. GROUNDS (§§42.22 and 42.104(b))

The Claims are unpatentable under pre-AIA §103 (EX1003, ¶¶81, 111, 195-196, 241-242, 267-269, 276-279, 290-292, 299-301, 308-310, 322-324, 332-334, 340-342, 352-353, 356):

Ground	Claim(s)	References/Basis
1	1, 5, 14, 19, 20, 21	Obvious over Loewen in view of Fujimoto
2	2, 3	Obvious over Loewen in view of Fujimoto, the '356 Patent, and Mostafa
3	4, 26	Obvious over Loewen in view of Fujimoto and Kain 1997
4	5, 19, 20, 21	Obvious over Loewen in view of Fujimoto and Mostafa
5	26	Obvious over Loewen in view of Fujimoto, Mostafa, and Kain 1997
6	27	Obvious over Loewen in view of Fujimoto and Kain 2003
7	27	Obvious over Loewen in view of Fujimoto, Mostafa, and Kain 2003

§VI.C.7 provides charts specifying how the art renders the Claims obvious.

In further support, the expert declaration of Dr. David A. Forsyth (EX1003) is attached (expanded-quotation claim charts at App’x C).

VI. DETAILED REASONS FOR RELIEF

There is a reasonable likelihood Petitioner will prevail with respect to at least one Claim (§314(a)), because all are obvious. EX1003, ¶¶86, 110, 356.

A. Claim Construction

In addition to the following, Petitioner herein construes all other terms per *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*); §42.100(b), presuming terms have their “ordinary and customary meaning [to POSITA] at the time of the invention.” *David Netzer Consulting Eng’r LLC v. Shell Oil Co.*, 824 F.3d 989, 993 (Fed. Cir. 2016):

“the computer system controls the first and second image-capturing devices separately” (all): control data sent by the computer system that cause image-capturing devices to capture images at different instants and/or at different intervals. Petitioner’s construction, requiring use of a separate signal for each image-capturing device rather than a single signal controlling all devices, is compelled by ’657’s prosecution history, which makes clear “the invention does not include a particular feature.” *Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021, 1024 (Fed. Cir. 2015); *SciMed Life Sys., Inc. v. Advanced*

Cardiovascular Sys., Inc., 242 F.3d 1337, 1341 (Fed. Cir. 2001). While “the standard for disavowal is exacting,” “[d]isavowal can be effectuated by language in the specification or... prosecution history”: “an inventor may disavow claims lacking a particular feature when the specification” or prosecution “distinguishes or disparages prior art based on the absence of that feature.” *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016). That is the case here: EagleView disavowed a broader construction during prosecution to distinguish cited art. EX1002, 290-292.

Specifically, the Examiner rejected ’657’s then-pending claims based on Nims, which disclosed “a system for capturing images” with a “known technique of multiple camera setup and controlling first and second image-capturing devices separately.” EX1002, 255-258; EX1016, ¶¶36-39. EagleView distinguished Nims by arguing “[t]his type of ‘slaving’ of cameras was used in the past” and “Nims does not disclose any method to control the cameras.... Therefore, it is possible [Nims’s] cameras are slaved together and signaled to take images at the same time....” EX1002, 290-291. This is clear and unmistakable disavowal of using one signal sent simultaneously to multiple cameras. The Examiner accepted EagleView’s arguments and allowed the then-pending claims. EX1002, 326-327. Having relied on these statements to secure the Claims, EagleView cannot recapture the scope it disavowed.

Petitioner's construction is also supported by '657's specification, which explains "the present invention can be alternatively configured to separately cause the image-capturing devices to capture images at different instants and/or at different intervals." EX1001, 14:38–41; *see Pacing Techs., LLC*, 778 F.3d at 1024 (explaining courts find disavowal from "clear and unmistakable statements by the patentee that limit the claims, such as 'the present invention includes...' or 'the present invention is....'").

"oblique aerial image(s)" (all): an aerial image capturing a generally trapezoidal area or view of the subject surface or object, with the foreground of the trapezoid having a substantially smaller ground sample distance (i.e., a higher resolution) than the background of the trapezoid. Petitioner here adopts '657's express definition, which is also consistent with '657's other descriptions of oblique aerial images. *E.g.*, EX1001, 2:42-46, 4:36-44, 6:49-67, Figs.1, 7-10.

B. Level Of Ordinary Skill

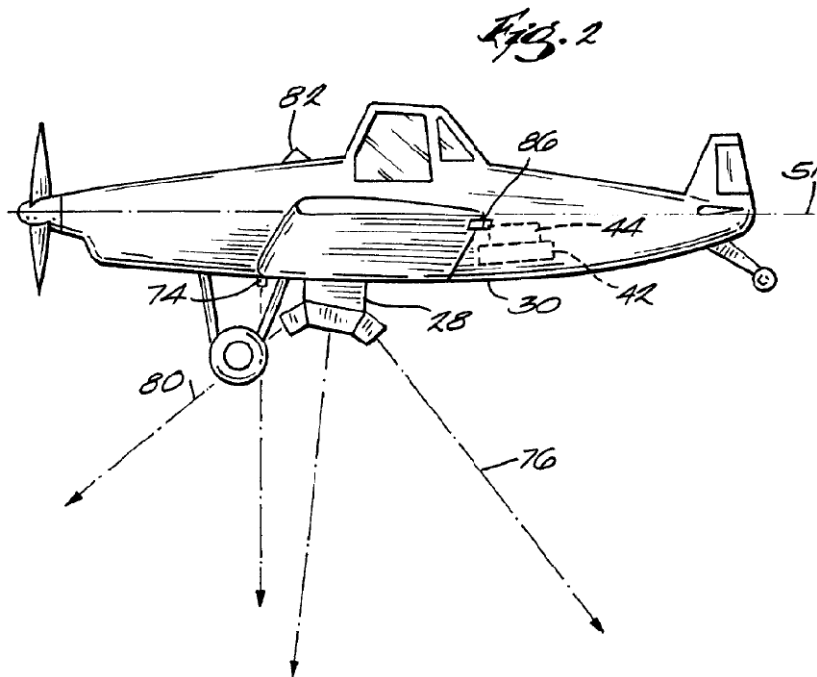
POSITA would have had a bachelor's degree or higher in computer science, computer engineering, computer vision or visualization, physics, electrical engineering, or an equivalent educational background, or at least five years of industry experience in imaging technology. EX1003, ¶12. POSITA are presumed knowledgeable of all relevant art, and thus to have been familiar with each reference herein and its full range of teachings.

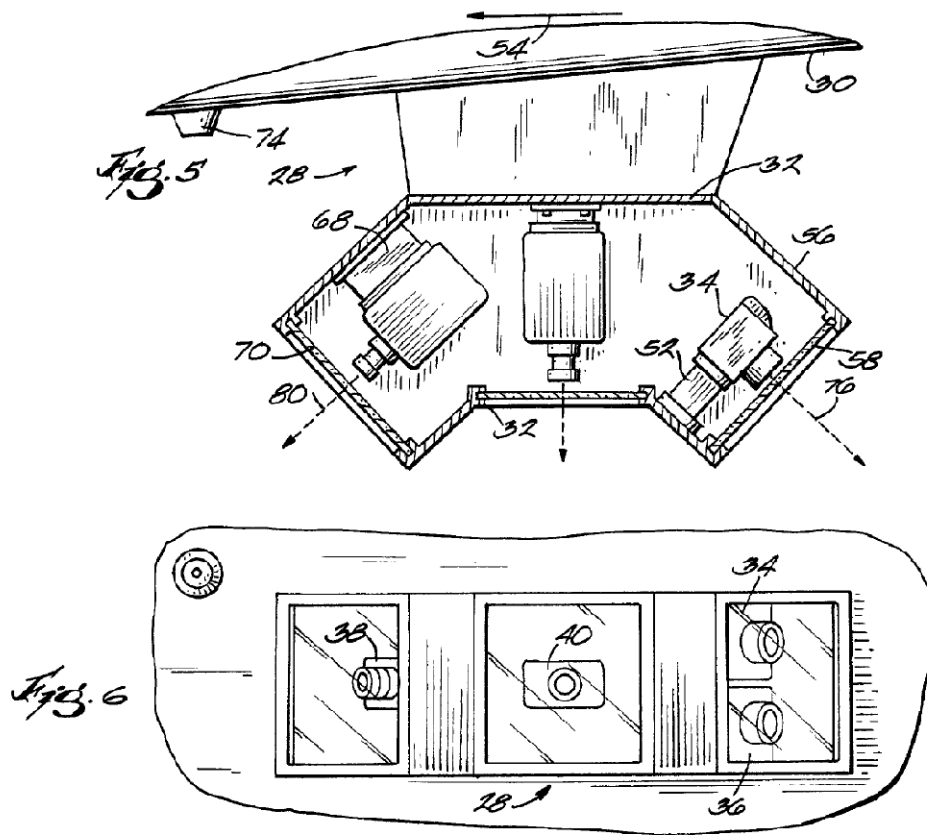
C. Obviousness Grounds

1. Loewen (EX1004)—at least pre-AIA §102(e) art

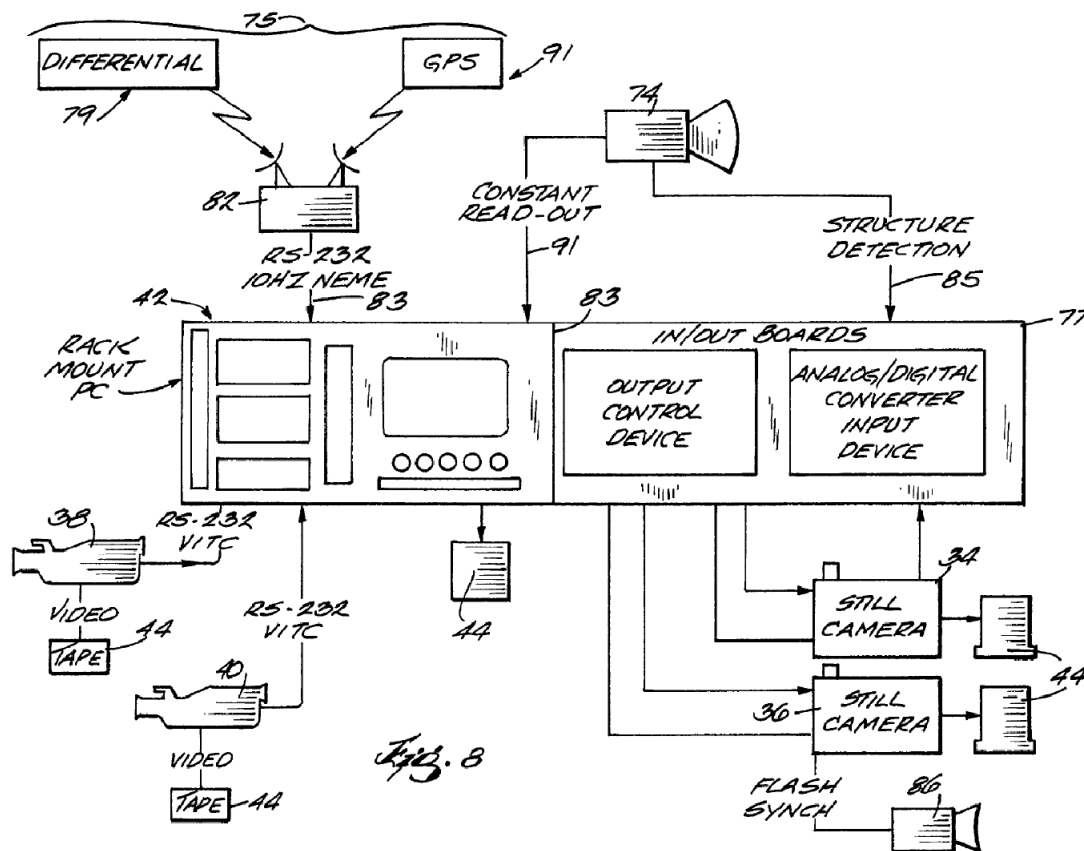
Primary reference Loewen (all Grounds, all Claims) is relied on—as in prosecution—for its teachings relating to, *inter alia*, all claim 1 limitations except separate camera control. EX1003, ¶85.

Loewen (a U.S. Patent filed September 6, 2002, claiming non-provisional priority to June 15, 2001) discloses a multi-camera system for “acquiring images of electric transmission line tower structures,” including at least two still cameras “arranged to take pictures along an exposure line that is at an angle of substantial 30–60 degrees to the horizontal.” EX1004, Abstract, 2:39-49, 3:51-57, Figs.2, 5-6; EX1003, ¶82:





In addition to still cameras, Loewen discloses additional video cameras (EX1004, Figs. 5-6), and expressly discloses “[t]he number and arrangement of the cameras can vary.” EX1004, 5:66-67; EX1003, ¶83. “The still camera exposure is automated by... an onboard computer... containing operational software and operatively connected to the cameras... to automatically activate the still cameras at the exposure points along the transmission line.” EX1004, 3:4-10; EX1003, ¶83. Loewen further discloses its cameras, *e.g.*, “write their information directly to the onboard computer system.” EX1004, 6:49-51, Fig.8 EX1003, ¶83:



Loewen discloses its “cameras provide the image-acquiring portion of the overall system,” which “also includes a geographic positioning system” that, “in combination with the onboard computer, continuously provides the position of the aircraft in longitude and latitude coordinates”—“that data is transmitted to the onboard computer and... embedded in the collected data in association with the image of a particular tower structure” for “images captured by both the still and video cameras.” EX1004, 3:38-51, EX1003, ¶84; *supra*, §II (addressing Loewen).

2. **Fujimoto (EX1005)—at least pre-AIA §102(b) art**

Secondary Reference Fujimoto (all Grounds, all Claims) is relied on for, *inter alia*, its teachings relating to separate, independent control for each camera. EX1003, ¶89.

Fujimoto (European Application published 1982) discloses “*a computerized control for aerial photography* for use... with aerial cameras mounted in an aeroplane [that] take photographs in succession at different altitudes and speeds along the line of flight under the computerized control”—“not only vertically but also obliquely to the ground....” EX1005, ¶¶0001, 0021, Figs.1, 3; EX1003, ¶86:

FIG. 1

“[T]wo cameras are mounted in the aeroplane, one being with an angle of α while the other being with an angle of β .”

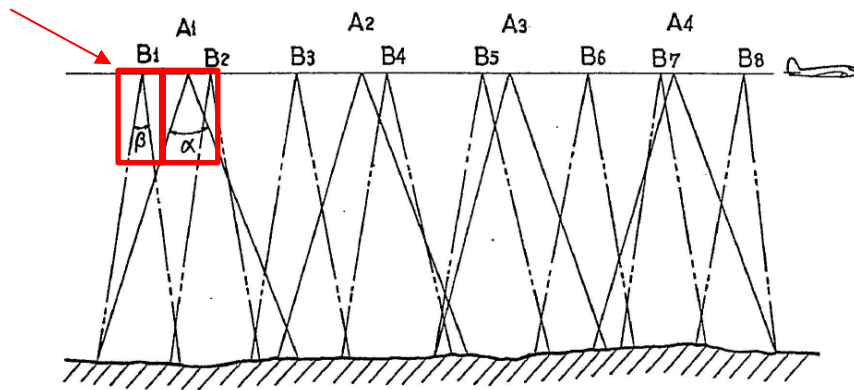
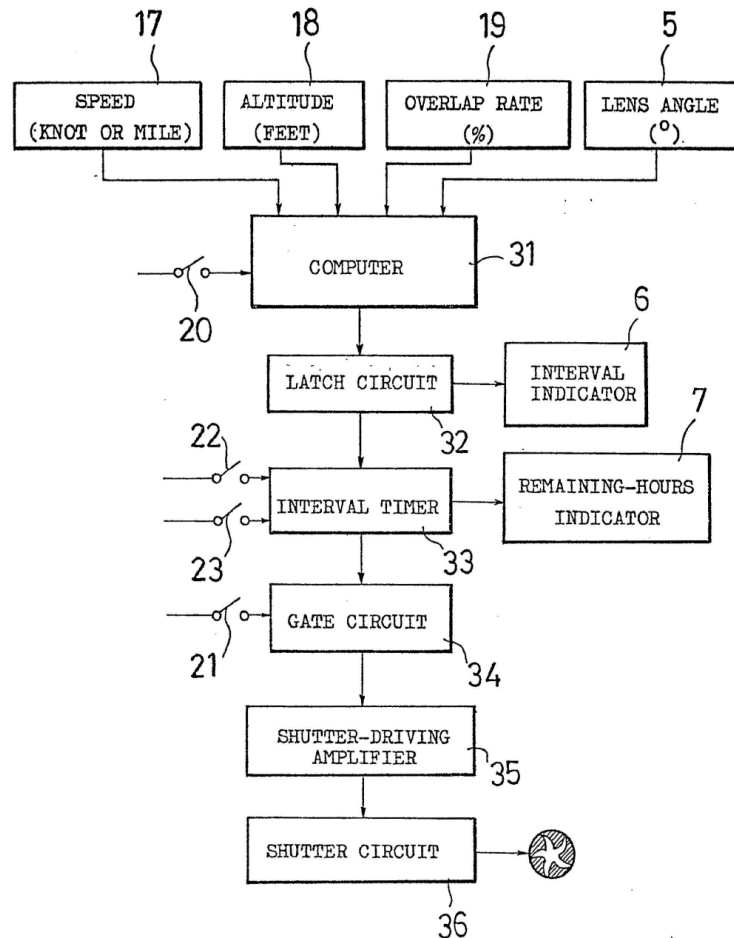
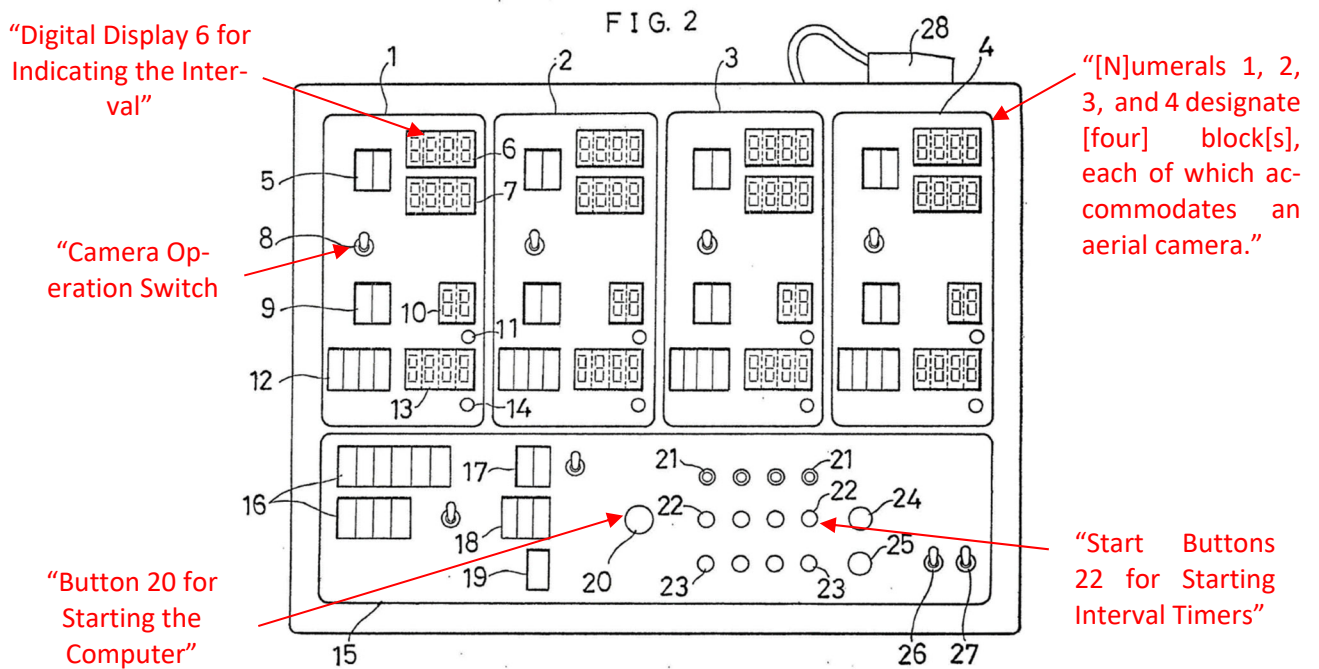


FIG. 3



Fujimoto discloses independent camera control—*e.g.*, “provid[ing] a computerized control for *opening the shutters of a plurality of cameras independently of one another*... to secure a series of photographs of the ground without the waste of film.” EX1005, ¶0004, cl.1 (“*[e]nabling each shutter to be driven at independently different interval time*”), Fig.2 (four “blocks” “each... accommodat[ing] an aerial camera,” EX1005, ¶0008); EX1003, ¶87; *supra*, §II:



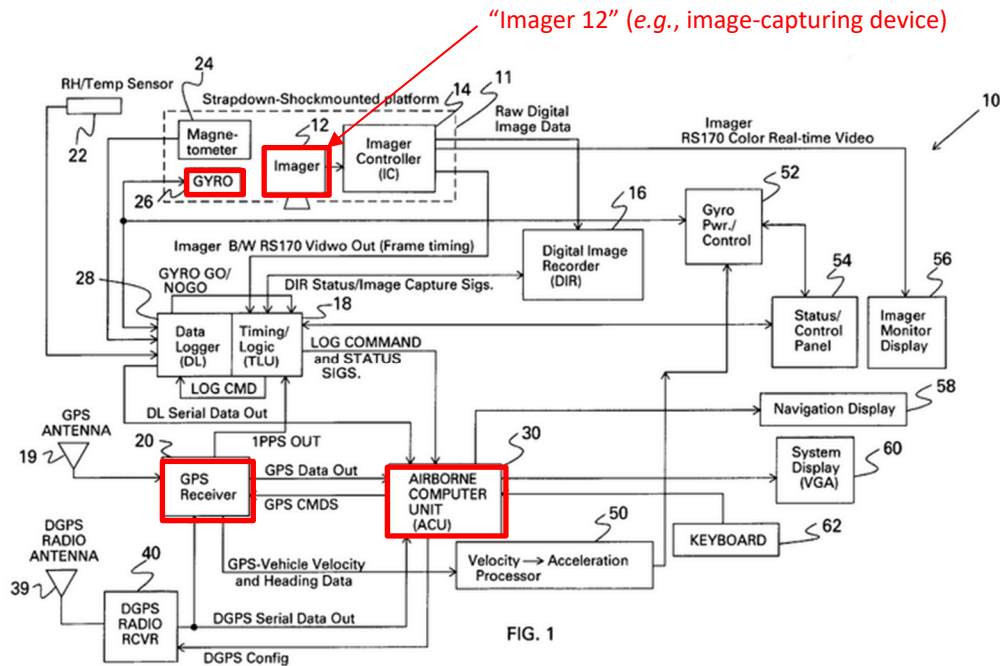
Fujimoto further discloses “various data, such as camera numbers and dates,” and “Hour-Minute-Second” from an “Electronic Clock” “is transcribed... with the images of the ground.” EX1005, ¶0005, Figs.6, 8; EX1003, ¶88.

3. Garrot (EX1006)—at least pre-AIA §102(b) art

Secondary Reference Garrot (Ground 2, cls.2-3) is relied on for its disclosures of a “gyroscope” and “compass.” EX1003, ¶91.

Garrot, “Aircraft Based Infrared Mapping System for Earth Based Resources,” disclosed “[a]n aircraft based imaging system comprising a sensor mounted in the aircraft... circuitry for acquiring signals generated by the sensor... a system for georeferencing the acquired signals; and a system for compensating for tilt in the acquired signals” including a “compass” and “gyroscope.” EX1006,

4:66-5:9, 6:14-47, 8:18-60 (“vertical gyro 26 resides on the imaging platform 11 and produces pitch and roll data needed for an accurate projection of each logged image frame”), 12:24-29, 13:45-48, 13:56-59, 19:49-58, Fig.1, Fig.3 (“Airborne Raw Dat[a]” includes “Compass file”), EX1003, ¶90:



4. **Mostafa (EX1007)**—at least pre-AIA §102(b) art

Secondary Reference Mostafa (Grounds 2, 4-7, claims 2-3, 5, 19-21, 26-27) is relied on for its disclosure of an image-capturing device capturing orthogonal aerial images and an “inertial navigation system.” EX1003, ¶94.

Mostafa, “Digital image georeferencing from a multiple camera system by GPS/INS” (published June 2001 in a regularly-published journal, EX1003, ¶92), disclosed “an airborne fully digital multi-sensor system for digital mapping data

acquisition.... The system acquires two streams of data, namely, navigation (georeferencing) data and imaging data.” EX1007, Abstract. Mostafa discloses “imaging data are acquired by two low-cost digital cameras” that “capture strips of overlapping nadir and oblique images.” EX1007, Abstract, 4 (“image data is collected by two low-cost Kodak DCS420c digital cameras,” “one of which is nadir, and the other is oblique”), 12 (describing “*industrial computer system* that can accommodate the necessary boards *for simultaneous navigation and image data acquisition*”), Fig.6; EX1003, ¶92:

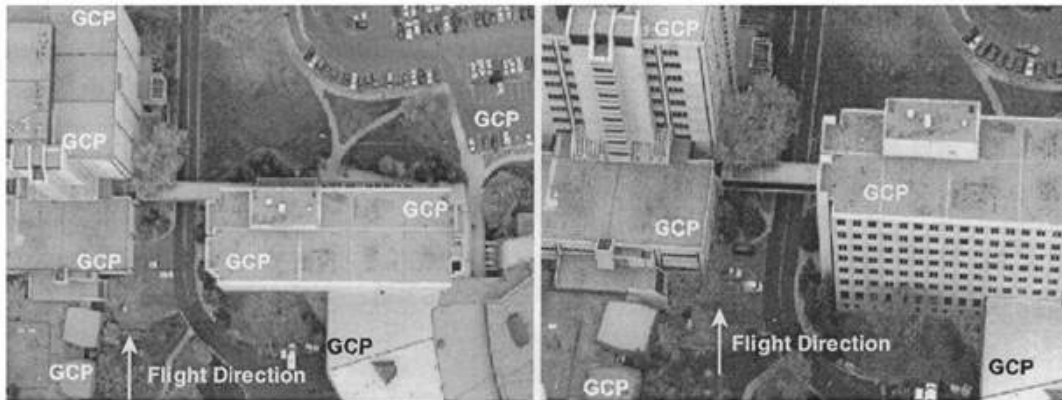


Fig. 6. A nadir digital image (left) and an oblique digital image (right), October 1998 flights.

Mostafa further discloses “navigation data are obtained by integrating an accurate strapdown *inertial navigation system* [(“INS”)] with a differential GPS system (DGPS).... The GPS/INS-derived trajectory contains the full translational and rotational motion of the carrier aircraft.” EX1007, Abstract, 2 (“3D vector of coordinates of the exposure station E, of any imaging sensor, at the instant of exposure”), 4 (“navigation data is collected using... *inertial navigation system*, and... GPS”), 9 (“GPS/INS interpolated position and attitude angles at each

exposure station”), Fig.8 (INS and image-capturing devices mounted together),
EX1003, ¶93:



Fig. 8. The multi-sensor system used in the October 1998 test flights.

5. **Kain 1997 (EX1008)—at least pre-AIA §102(b) art**

Secondary Reference Kain 1997 (Grounds 3, 5, claims 4, 26) is relied on for its disclosure of, *inter alia*, “one foot per pixel image resolution.” EX1003, ¶96.

Kain 1997, “Airborne Imaging System” (International Application published 1997), disclosed a “remote data collection system, which may be used in a vehicle such as an aircraft,” “include[ing] a directional sensor, such as one or more cameras” and a “(GPS) receiver for providing GPS data representative of the position of the sensor, [and] an inertial measurement unit (IMU) for providing IMU data representative of the attitude of the sensor.” EX1008, Abstract, 5:32-6:1; EX1003, ¶95. Kain 1997 further disclosed “a processing unit and a storage

unit” that “determines geographic data referenced to the sensor data in response to the GPS data and IMU data” and “record[s] an image signal and position information on magnetic tape.” EX1008, Abstract, 2:14-22. Kain 1997 also expressly disclosed “*one foot per pixel image resolution*” (*i.e.*, a ground sample distance of 1 foot/pixel). EX1008, 10:11-14; EX1003, ¶95.

6. Kain 2003 (EX1009)—at least pre-AIA §102(e) art

Secondary Reference Kain 2003 (Grounds 6-7, claim 27) is relied on for its disclosure of neighborhood-level imagery. EX1003, ¶98.

Kain 2003 “Digital imaging system for airborne applications,” disclosed an “aerial imaging system [with] image storage medium locatable in an aircraft,” having “multiple cameras,” “(GPS)... detecting the position of the imaging system and providing a corresponding input to the controller,” and an “inertial measurement system (IMU)... fixed in position relative to the camera assembly” that “detects acceleration and rotation rates of the camera assembly and provides an input signal to the controller.” EX1009, Abstract, ¶¶9, 23, 31; EX1003, ¶97. “[T]he precise attitude and position of the camera assembly is known at the time the cameras are triggered... [and] may be correlated with the pixels of the image to allow the absolute coordinates on the image to be determined.” EX1009, ¶¶26 (“system uses various sensor data to track... [camera] orientation... relative to the camera trigger times”), 34. Kain 2003 expressly discloses a ground sample

distance (“GSD”) of 0.196 ft (2.352 inches/pixel) at 500 ft altitude and 0.391 feet (4.692 inches/pixel) at 1000 ft altitude, along with corresponding image heights and areas. EX1009, Table 3; EX1003, ¶¶97.

7. The Cited Art Is Analogous To ’657

As discussed (§I.A), ’657 relates to “[a] system for capturing images and geo-location data corresponding thereto.” EX1001, 4:17 (“[i]mage-capturing and geolocating system”), cl.1, Figs.1, 2; §I.A; EX1003, ¶100. ’657 also states it relates to “photogrammetry,” which, according to ’657, “involve[s] coupling the photographs with other data, such as data representative of latitude and longitude.” EX1001, 1:38-40; EX1003, ¶100. Like ’657, Loewen, Fujimoto, Garrot, Mostafa, Kain 1997, and Kain 2003 all relate to “photogrammetry” (as used by ’657) and are directed to imaging systems, including aerial imaging systems and computerized control thereof, and geolocating of images (*e.g.*, using latitude/longitude data) taken using those aerial image systems (including oblique images). *E.g.*, EX1004, Abstract, 3:38-51, Figs.2, 5-6, 8; EX1005, ¶¶0001, 0004, 0005, 0014, Figs.1-3, 6, cl.1; EX1006, 1:6-9, 5:10-25; EX1007, Abstract, 4, Fig.6, Fig.8; EX1008, Abstract, 2:14-22; 5:32-6:1; EX1009, Abstract, ¶¶9, 23, 26, 31, 34; EX1003, ¶¶100. Thus, Loewen, Fujimoto, Garrot, Mostafa, Kain 1997, and Kain 2003 are analogous art to ’657 (and each other) because they are in the same

field—and only Loewen and Kain 1997 (cited as U.S. Patent 5,894,323) were before the Examiner during prosecution. EX1003, ¶¶99-100, 109.

Additionally, each of Loewen, Fujimoto, Garrot, Mostafa, Kain 1997, and Kain 2003 is analogous to '657 because each is reasonably pertinent to the problem faced by '657's named inventors. EX1003, ¶101. '657 described this problem as a “need[] in the art” for “a method and apparatus for photogrammetry that enables geo-location and accurate measurements within oblique images” and “utilizes more intuitive and natural images,” explaining “[p]hotogrammetry may also involve *coupling the photographs with other data, such as data representative of latitude and longitude.*” EX1001, 1:38-40, 2:62-63, 3:1-3; EX1003, ¶101. Each asserted reference likewise relates to this solution of photogrammetry: Loewen discloses “provid[ing] reliable and accurate images of the tower structures of an electric transmission line and related equipment” and “provid[ing] aerial images of ground structures, apparatus, and roadways... in an accurate, reliable, and cost-effective manner,” together with obtaining “a record of the respective locations of the power line towers” and other structures, including by associating geo-location information with each image (including oblique images). EX1004, 1:16-20, 2:11-26, 2:30-36; EX1003, ¶102. Fujimoto discloses computerized, independent camera control “applicable in surveying the land,” and “making maps” to allow its cameras—“employed for taking photographs not only vertically but also obliquely

to the ground”—to “secure a series of photographs of the ground without waste of film,” and transcribing in those images “camera numbers and dates,” and other information (*e.g.*, time), thus creating more intuitive and useful images (including oblique images) by, *e.g.*, including geo-location information. EX1005, ¶¶0001, 0004, 0005, Fig.6; EX1003, ¶103. Garrot similarly observes “[c]onventional aircraft based infrared imaging systems have a limiting mapping capability” and their “images... are *not georeferenced or corrected for tilt*,” and thus “do not generate large accurate maps at a high level of resolution on a repeatable basis.” EX1006, 4:34-56. Garrot states it addresses these problems, thereby increasing the intuitiveness and usefulness of captured imagery. *E.g.*, EX1006, 4:59-65; EX1003, ¶104. Mostafa, which relates to “digital photogrammetry,” discloses “development and testing of an airborne fully digital multi-sensor system for *digital mapping data*,” which acquires imagery and geo-location data, including “GPS/INS-derived trajectory [that] contains the full translational and rotational motion of the carrier aircraft,” for association with captured imagery (*e.g.*, “data logging software... downloads the GPS/INS/imagery data... and time tags the imagery and INS records by the GPS receiver-derived time pulse”), thus “eliminat[ing] the need for ground control (GCP) when computing 3D positions of objects that appear in the field of view of the system imaging component” (EX1007, Abstract, 1, 4), thereby increasing the intuitiveness of captured imagery. EX1003, ¶105. Kain 1997

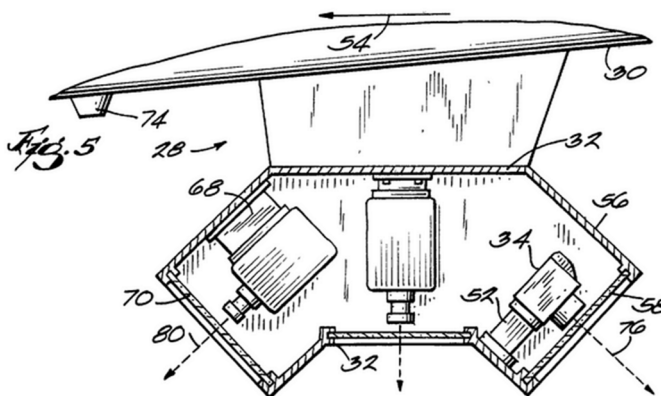
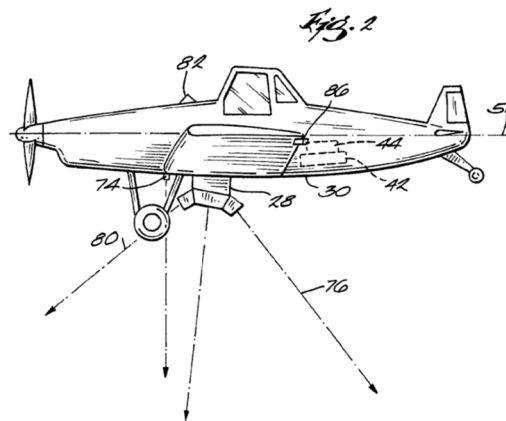
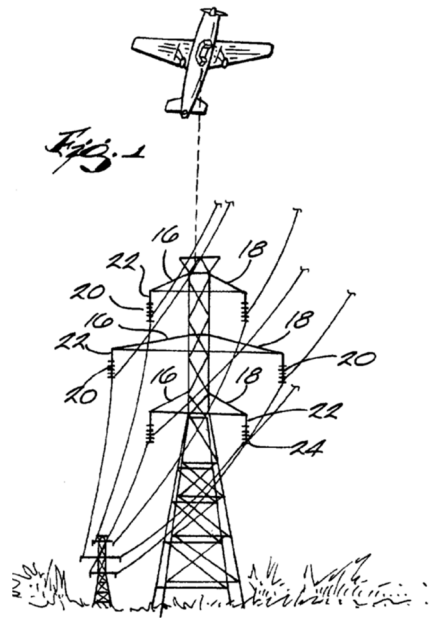
observes the “cost of data and... response times for obtaining data has limited the broad applicability for use in day-to-day business operations,” and that prior solutions often did not provide sufficient imagery. EX1008, 1:9-11, 2:5-8; EX1003, ¶106. Kain 1997’s system addresses such issues, including “image data [that] can immediately be registered because position coordinates for each image pixel are known,” such that “[m]aps showing roads, cultural features, hydrology and the like can easily be overlaid on the image,” thus increasing intuitiveness of imagery. EX1008, 8:6-9, 13:6-15; EX1003, ¶106. Kain 2003 observes that, “[t]raditionally, the mounting of airborne cameras has required special aircraft modifications,” but, “[r]ather than attempt to keep the camera assembly oriented perpendicularly... [its] system uses various sensor data to track [camera] orientation... relative to the camera trigger times.” EX1009, ¶¶6, 26; EX1003, ¶107. “This allows each pixel of each camera to be ray-traced onto a ‘digital elevation model,’” allowing “creation of a composite mosaic image... from all geo-registered frames” (EX1009, ¶26), thus increasing intuitiveness and naturalness of captured imagery. EX1003, ¶107. Loewen, Fujimoto, Garrot, Mostafa, Kain 1997, and Kain 2003 are thus reasonably pertinent to the problem faced by ’657’s named inventors, and analogous to ’657 for this additional reason. EX1003, ¶¶108-109.

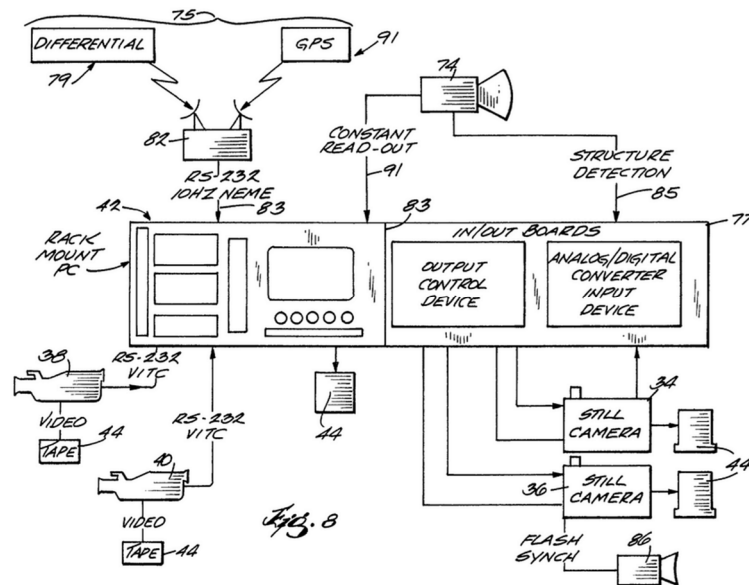
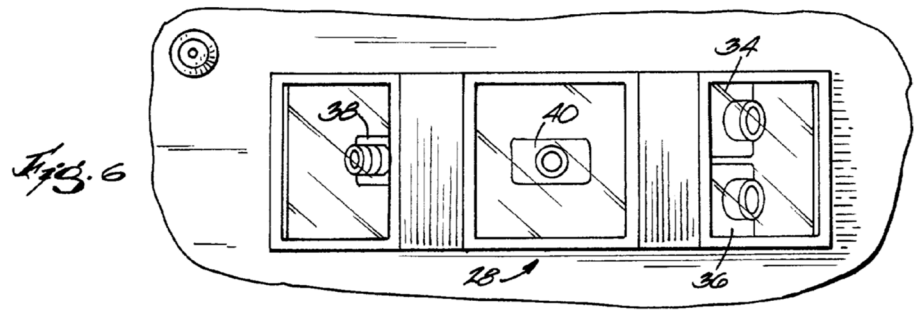
(a) Claim 1 (Ground 1)

[1.pre]³:	To the extent limiting, Loewen discloses the preamble. EX1003, ¶112. Loewen discloses a system for capturing images⁴ (e.g., EX1004, Abstract (“system... for acquiring images of electric transmission line tower structures, equipment..., ...transmission lines”); 1:16-24 (“airborne inventory and inspection system designed to obtain high resolution images... with a record of the respective location of the power line towers”)) and geo-location data corresponding thereto (e.g., EX1004, Abstract (EX1004, Abstract (“laser altimeter or... GPS unit... supplies continuous longitude/latitude coordinates for the aircraft location”); 3:37-50 (“GPS... continuously provides the position of the aircraft in longitude and latitude... [and] is embedded in the collected data in association with the image... recording... longitude/latitude coordinates in association with the image”); 8:15-24 (“height of the aircraft”)). <i>See</i> EX1003, ¶¶113-118; EX1004, 9:6-13, Cl.1, Fig.1, Fig.6, Fig.8; <i>see also id.</i> 2:22-25, 2:30-38, 3:3-10, 3:51-57., 4:1-13, 4:23-30, 4:31-34, 5:43-54, 5:62-6:2, 6:31-58, 7:13-31, 7:34-55, 7:56-58, 9:14-31, 10:4-13, 10:24-43, 10:50-67, 11:36-40, Cl.4, <i>supra</i>, pp.9-10, 13-14 (discussing Loewen).
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³ *See* Claim Appendix.

⁴ The bolded language in Petitioner’s charts tracks the language of the Challenged Claims and the parenthetical quotations come from the corresponding asserted prior art references relied on herein.





See also *id.* 2:22-25, 2:30-38, 3:3-10, 3:51-57., 4:1-13, 4:23-30, 4:31-34, 5:43-54, 5:62-6:2, 6:31-58, 7:13-31, 7:34-55, 7:56-58, 9:14-31, 10:4-13, 10:24-43, 10:50-67, 11:36-40, Cl.4.

[1.a]:⁵

Loewen discloses or renders obvious this limitation.
EX1003, ¶119.

⁵ Loewen expressly discloses “oblique aerial images.” EX1003, ¶¶127-128. Loewen discloses its system as, *e.g.*, solving the problem of “inspect[ing] both the right-

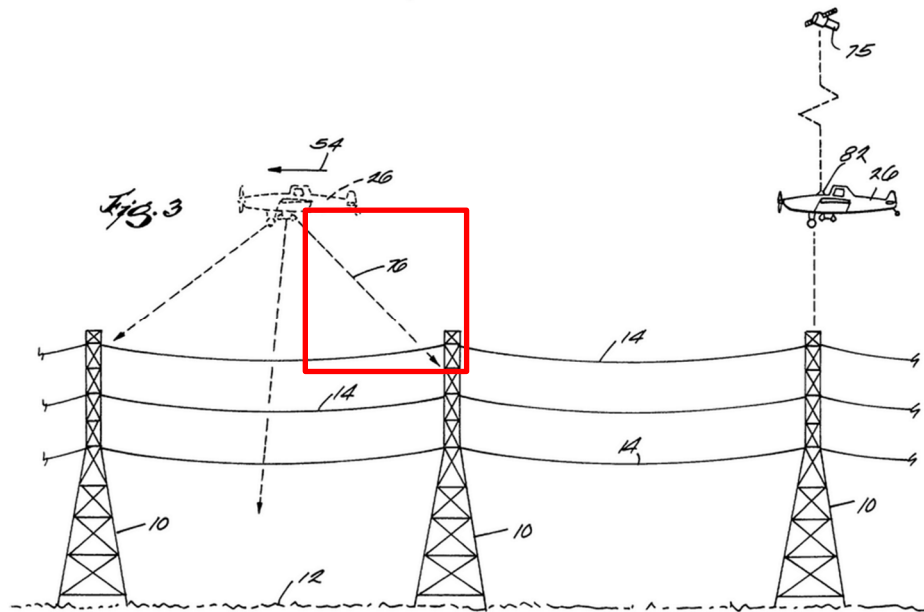
of-way... and the tower structures and related equipment” including “to detect problems... and defects....” EX1004, 1:28-53, 5:7-24, 5:33-42; EX1003, ¶127. POSITA wishing to obtain aerial images of, *e.g.*, towers and long stretches of power transmission lines and/or right-of-way for this purpose (*e.g.*, looking for downed wires, damage, or large obstructions) as Loewen describes would have readily understood Loewen discloses implementing its system using Loewen’s expressly-disclosed parameters along with additional conventional camera parameters well-known to POSITA (*e.g.*, “field of view” (“FOV”)) to provide such views as Loewen contemplates. EX1003, ¶127. For this Loewen-disclosed purpose, starting with, *e.g.*, Loewen’s expressly-preferred 45 degree still camera angle (*e.g.*, EX1004, Abstract, 2:46-49, cl.10), POSITA would have understood Loewen to disclose using a relatively large FOV (*i.e.*, at the higher end of the conventional and well-known range (*see, e.g.*, EX1005, ¶0011 (“lens angles” (*i.e.*, fields of view) from “10° to 90°”), Fig. 1) to capture these desired features, yielding an oblique aerial image as defined in ’657. EX1003, ¶127. For example, implementing Loewen’s preferred 45-degree camera angle with a conventional and well-known 60 degree FOV, yields a ground sample distance in the image’s background approximately 3.73 times that of the

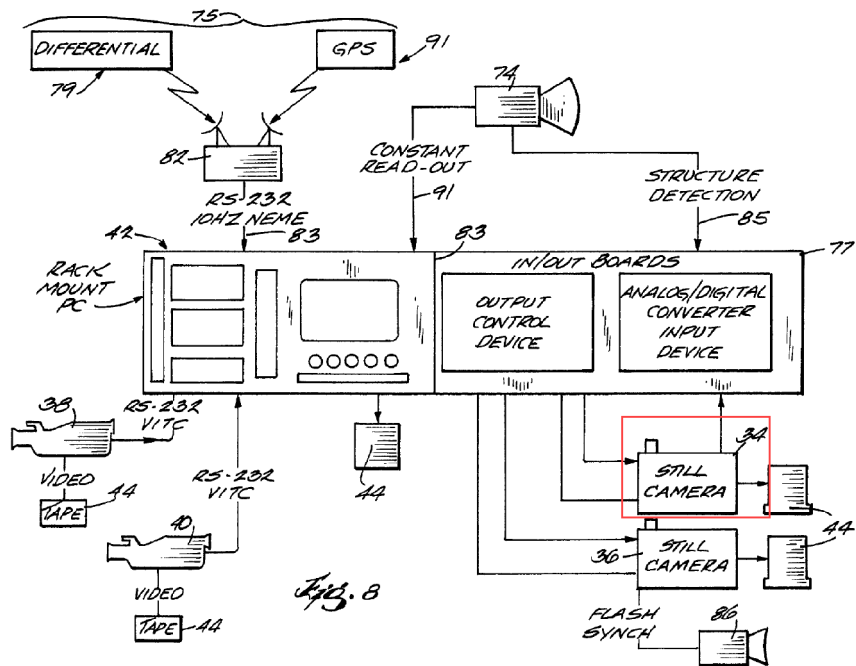
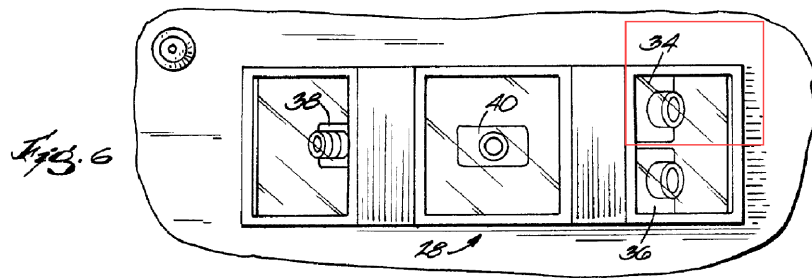
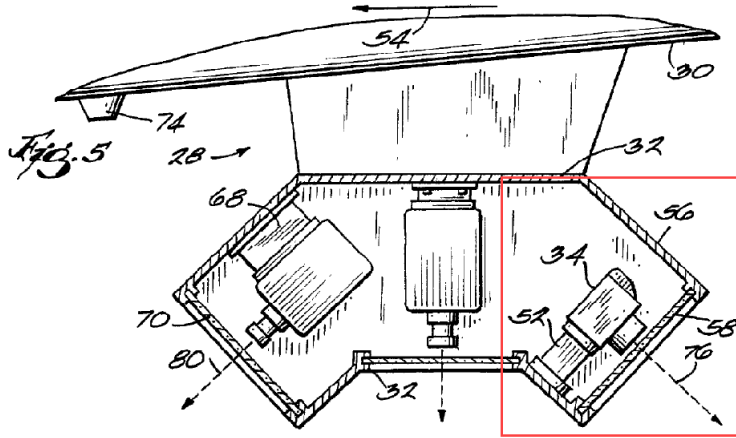
foreground, and thus an oblique image. EX1003, ¶127; EX1001, 13:55-59 (“approximately one-foot per pixel in the foreground” to “approximately four-feet per pixel in the background”). POSITA would have understood Loewen, in describing this angle and desired application, to disclose using a relatively large FOV yielding an oblique aerial image. EX1003, ¶127. Further, “oblique aerial images” (§VI.A) have long been known, along with selecting basic camera parameters like FOV to obtain oblique aerial imagery with properties POSITA would have found beneficial for a particular desired use. EX1003, ¶¶123-124, 126; EX1019, 1-4. For example, POSITA wishing to increase ground area covered during an aerial survey would have known how to do so with appropriate parameters like increased FOV. EX1003, ¶¶123, 127 n.7-8. POSITA would have understood such oblique imagery would have been useful to, *e.g.*, capture images of the layouts of roads or other structures (such as transmission towers) or obtain views of larger portions of the right-of-way between towers than would have been possible using smaller fields of view at the same camera angle, and would have enabled capturing of the entire area of interest, *e.g.*, using fewer photographs. EX1003, ¶125. If further disclosure is required, for the reasons above, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s disclosed angled still

	Loewen discloses a first image-capturing device (e.g., EX1004, Abstract (“still camera”) (e.g., Fig. 1(“still camera[] 34”)), said first image-capturing device capturing oblique aerial images (e.g., EX1004, Abstract (conventional “still camera[] point[s] rearwardly... and take[s] a picture from between two adjacent towers and along an exposure line directed downwardly at an angle to the line of flight, 30–60 degrees and preferably 45 degrees”); 2:39-49 (“still cameras... arranged to take pictures along a line 76 at an angle to the line of flight... in the range of 30–60 degrees, preferably 45 degrees”; Figs.2-3, 5) at image-capturing events (e.g., EX1004, Abstract (event in which “still camera is activated at the exposure point to acquire an image”); 7:13-31 (“still camera” “trigger[ed]... to acquire the images”); 7:49-54 (“computer... perform[s] real time coordination of camera tripping”); 3:3-10 (“still cameras” “automatically activate[d]... at the exposure points along the transmission line”); 11:15-18 (“cameras... trigger[ed] based on actual detection of the presence of the tower structure”)), said first image-capturing device issuing first image-data signals corre-
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camera using a relatively large FOV yielding an “oblique aerial image[]” to capture these features and beneficially achieve the above-discussed objectives. EX1003, ¶129. POSITA would have recognized increasing the FOV would have advantageously permitted the user to increase the area of ground visible in each of Loewen’s captured images, as appropriate to the specific application. EX1003, ¶129. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS. *See* n.13; EX1003, ¶129.

sponding to captured images (e.g., EX1004, 6:31-58 (“cameras... write their information directly to the onboard computer”); Abstract (“data corresponding to the [camera’s] acquired image is transmitted to a data storage unit”); 4:31-34 (“data generated by the still cameras is transmitted, in digital form, to a data storage system on board the aircraft”)). See EX1003, ¶¶121-133; EX1004, 7:62-8:7, Fig.3, Figs.5-6, Figs.8-10 (annotated below); see also EX1004 2:30-38, 3:11-15, 4:1-13, 4:31-345:62-6:2, 10:50-67, 11:1-14, 11:41-51, *supra*, pp.9-10 (discussing Loewen).





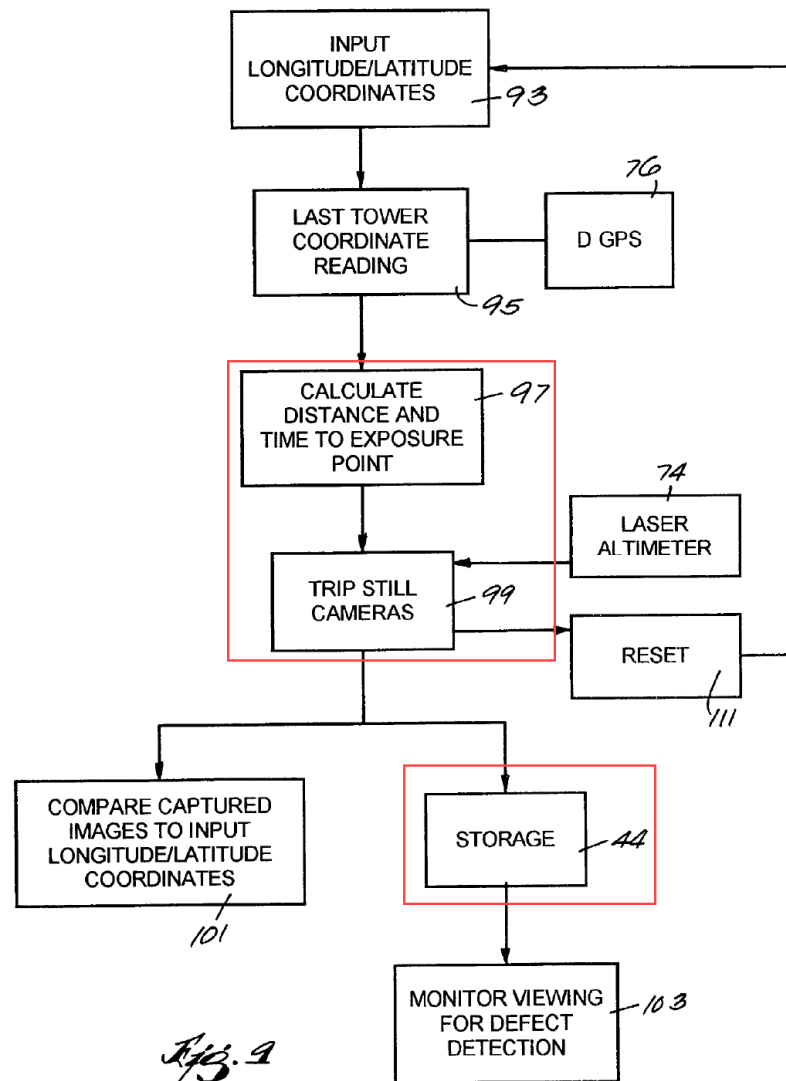
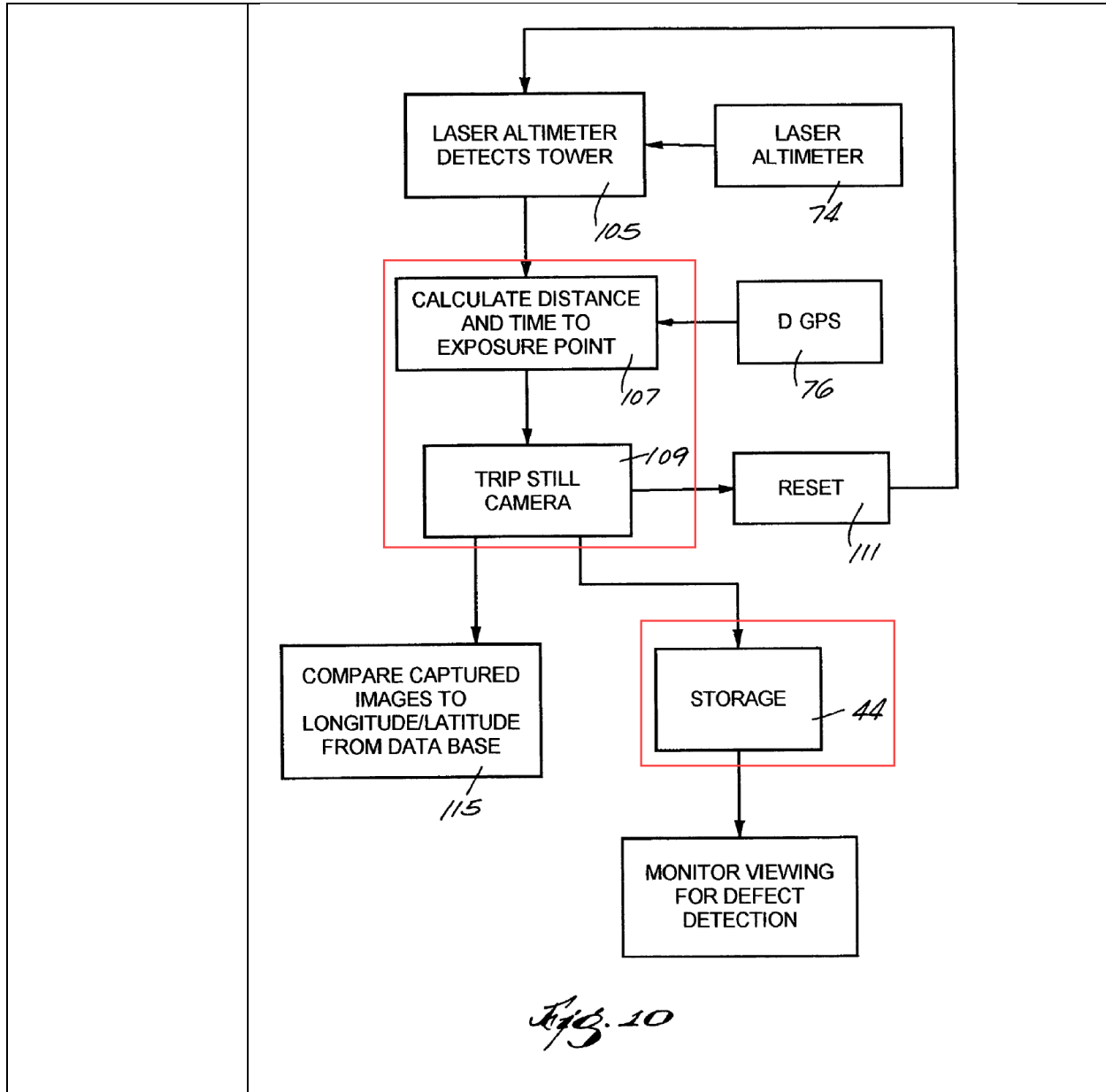


Fig. 9



[1.b]

Loewen discloses this limitation. EX1003, ¶134.

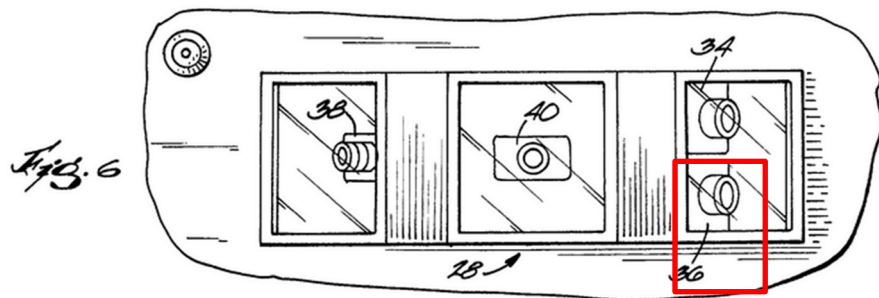
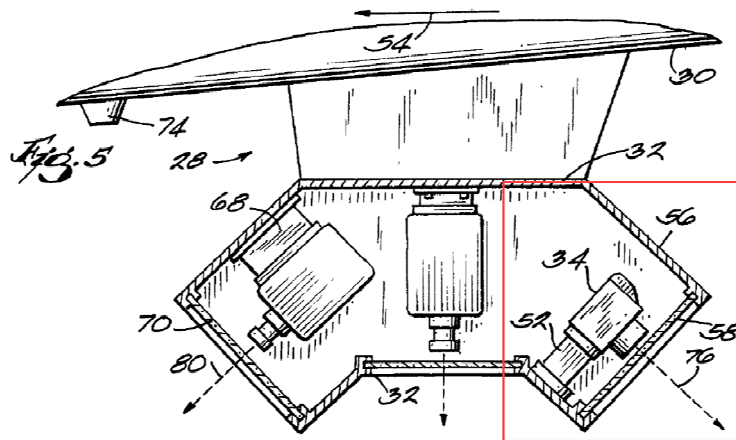
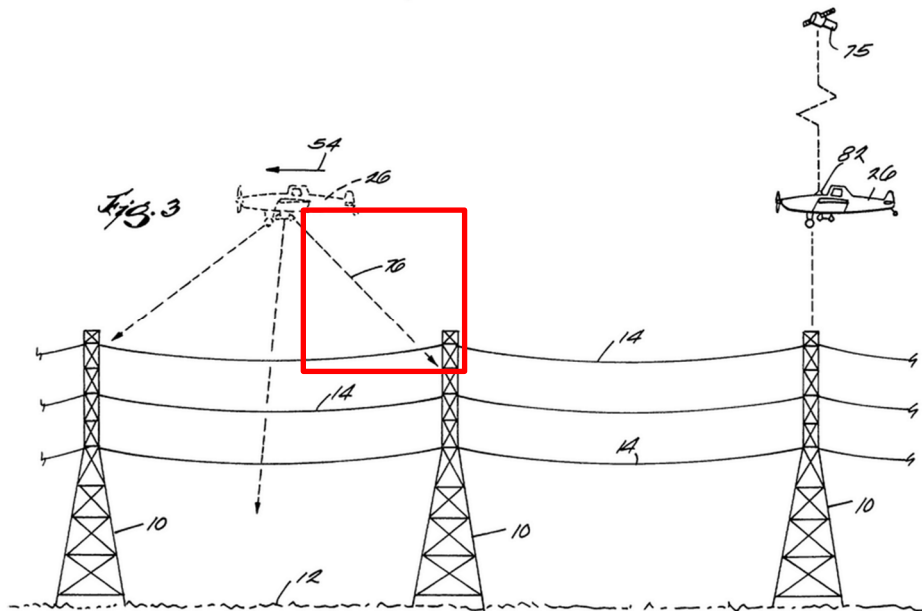
Loewen discloses a second image-capturing device (e.g., EX1004, 5:62-6:2 (second “still camera[.]”) (e.g., Fig.6 (“still camera[.] 36”)); any additional still camera (e.g., EX1004, 2:30-

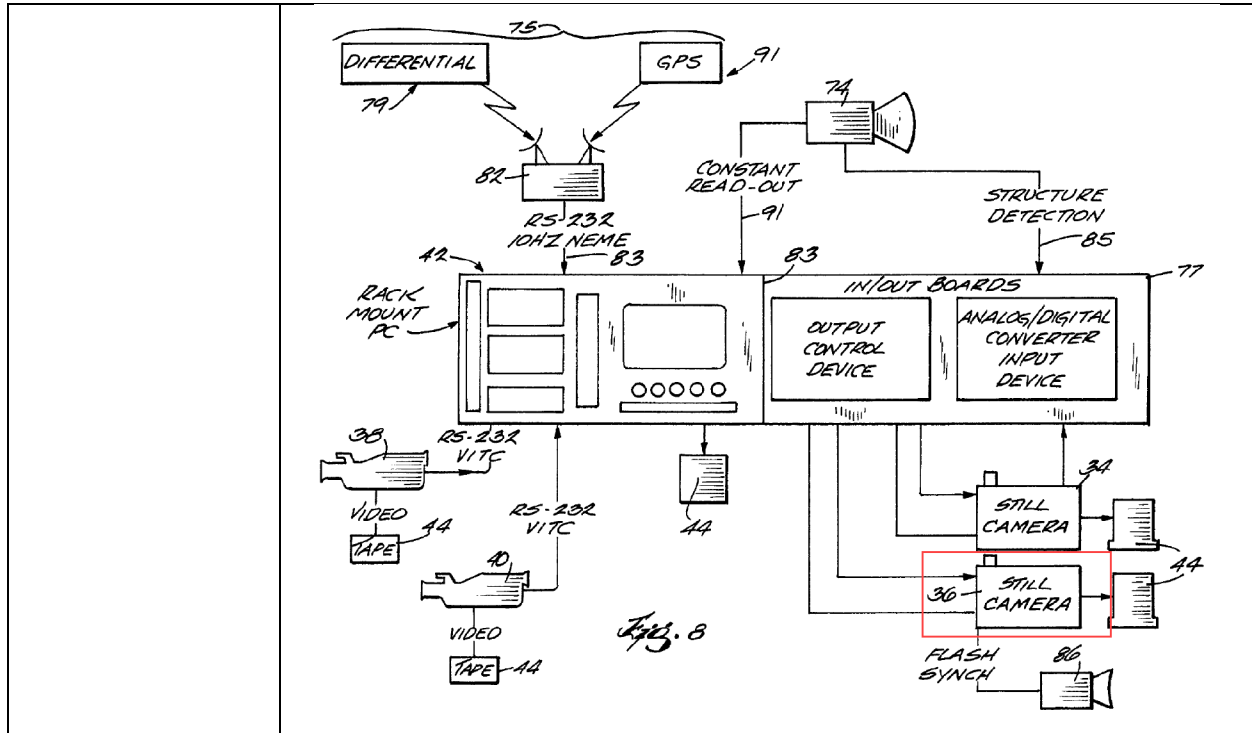
	38 (“more still cameras”) ⁶), said second image-capturing device capturing images at image-capturing events (<i>see</i> cl.1.a), said second image capturing device issuing second image-data signals corresponding to captured images (<i>see</i> cl.1.a) ⁷ . <i>See</i> EX1003, ¶¶135-144; EX1004 ⁸ , Figs.3, 5-6, 8-10, <i>supra</i> , pp.9-10 (discussing Loewen).
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⁶ POSITA would have understood Loewen’s reference to “one or more still cameras” (EX1004, 2:36-38)—instead of “one or two still cameras”—to disclose at least three still cameras. EX1003, ¶136 n.9. Alternatively, POSITA would have found it obvious to implement Loewen’s teachings using three still cameras (instead of, *e.g.*, two still cameras and a video camera) in light of Loewen’s express disclosures (*e.g.*, EX1004, 2:36-38). EX1003, ¶136 n.9. Loewen thus discloses or at minimum renders obvious three still cameras on which the claim 20-21, 26, and 27 Grounds rely. EX1003, ¶136 n.9.

⁷ Loewen expressly discloses each camera issues image-data signals corresponding to images it captures. *E.g.*, EX1004, 4:31-34, 6:31-58; EX1003, ¶141.

⁸ While cl.1 does not require that the second image-capturing device capture oblique aerial images, the disclosures here are pertinent to cl.1’s broader requirements and narrower later limitations (*e.g.*, cl.4, cl.20-cl.21, cl.26); EX1003, ¶137 n.10.





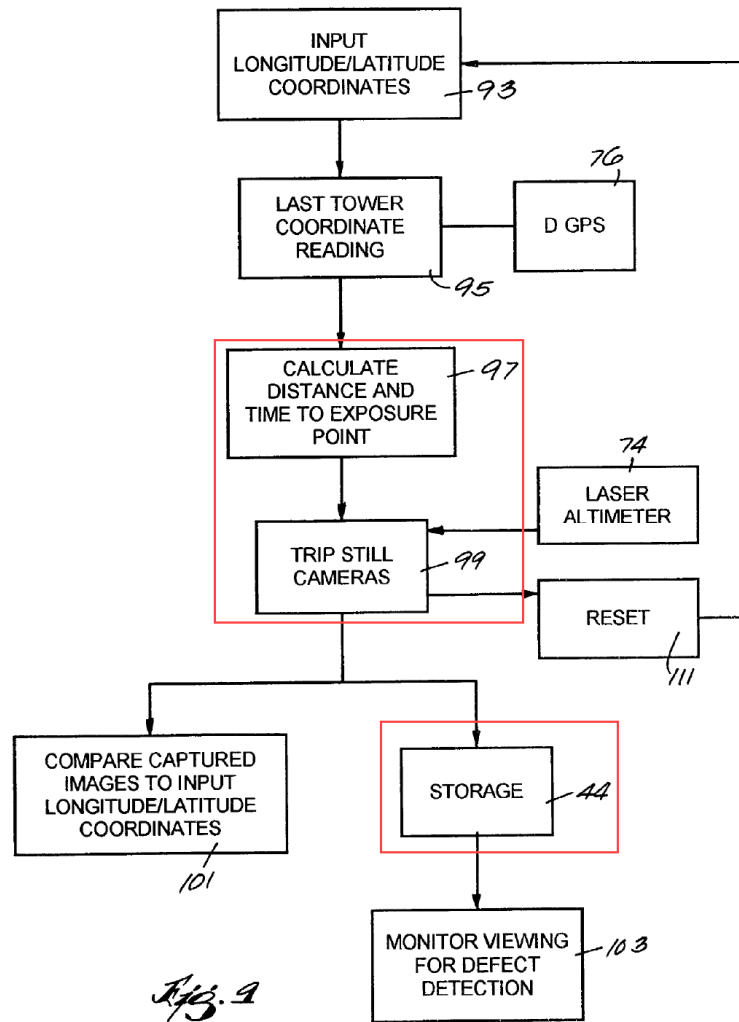
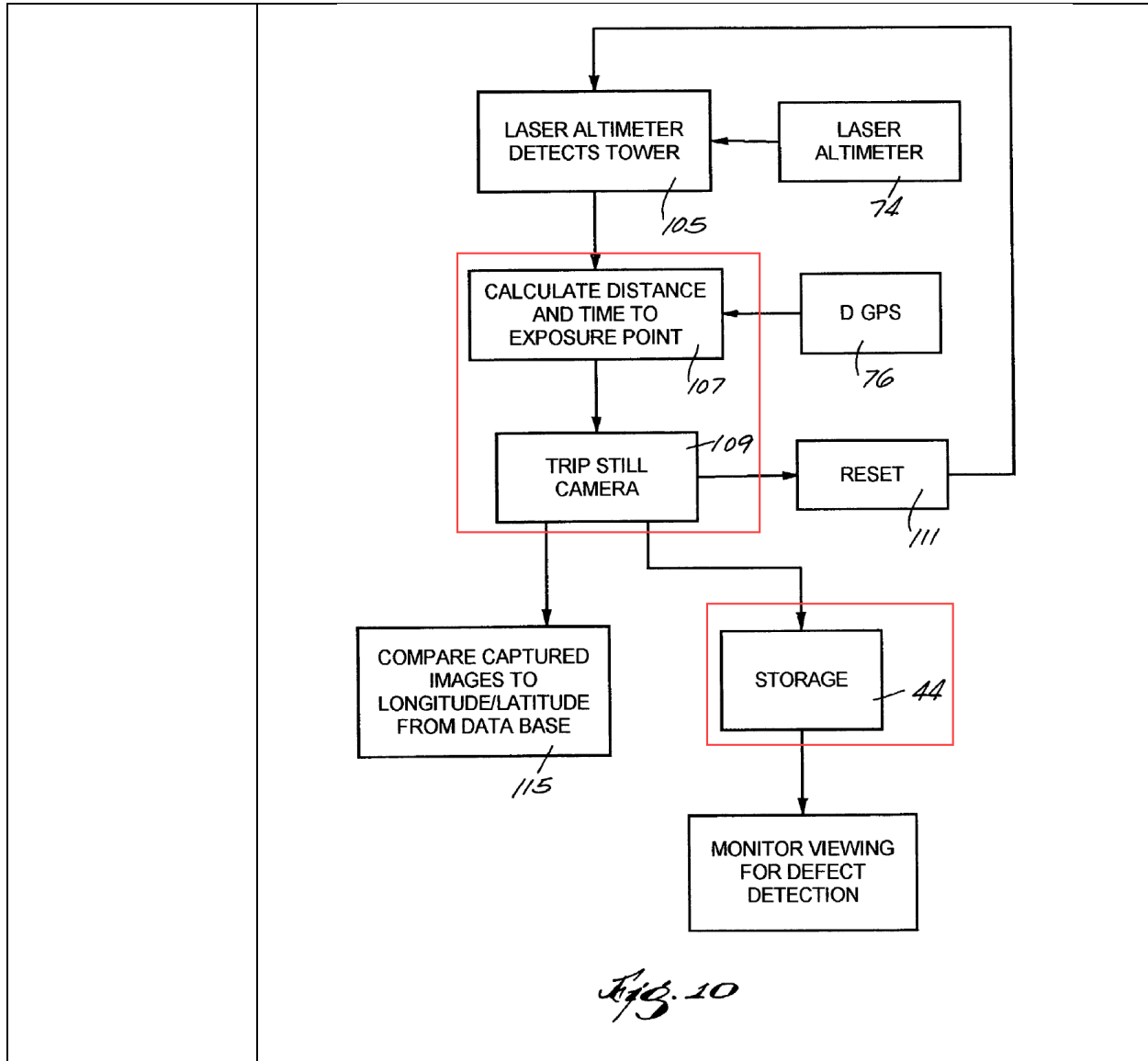


Fig. 9



[1.c]:

Loewen discloses this limitation. EX1003, ¶145.

Loewen discloses at least one geo-locating device (e.g., EX1004, passim (“GPS,” “laser altimeter”), each said at least one geo-locating device issuing a corresponding at least one geo-locating signal (e.g., EX1004, 3:37-50 (“GPS, in combination with the onboard computer, continuously provides [signal including] the position of the aircraft in longitude and latitude coordinates... transmitted to the onboard computer”); 4:14-22 & 8:65-9:5 (“signal is generated by the laser altimeter” containing “continuous laser readings”); 9:32-39 (“input from the laser altimeter”); 9:65-10:3 (“continuous signal [from laser altimeter]

	back to the computer”)), each said at least one geo-locating signal being indicative⁹ at least in part of a geo-location of said first image-capturing device during each first image capturing event (e.g., 3:37-50 (“GPS... continuously provides the position of the aircraft in longitude and latitude coordinates... [and] is embedded in the collected data in association with the image...recording... longitude/latitude coordinates in association with the image”); 8:15-34 & 9:65-10:3 (“data” signal from “laser altimeter” indicating “height of the aircraft” and “topography of the terrain... along the right-of-way,” “distance in feet above the terrain”); see cl.1.a). See EX1003, ¶¶146-157; EX1004, Abstract, Fig.8; see also <i>id.</i> 3:11-15, 3:51-57, 4:1-13, 7:13-31, 7:34-55, 8:65-9:5, 9:6-13, 9:14-31, 10:24-43, 10:50-67, <i>supra</i> , pp.13-14 (discussing Loewen).
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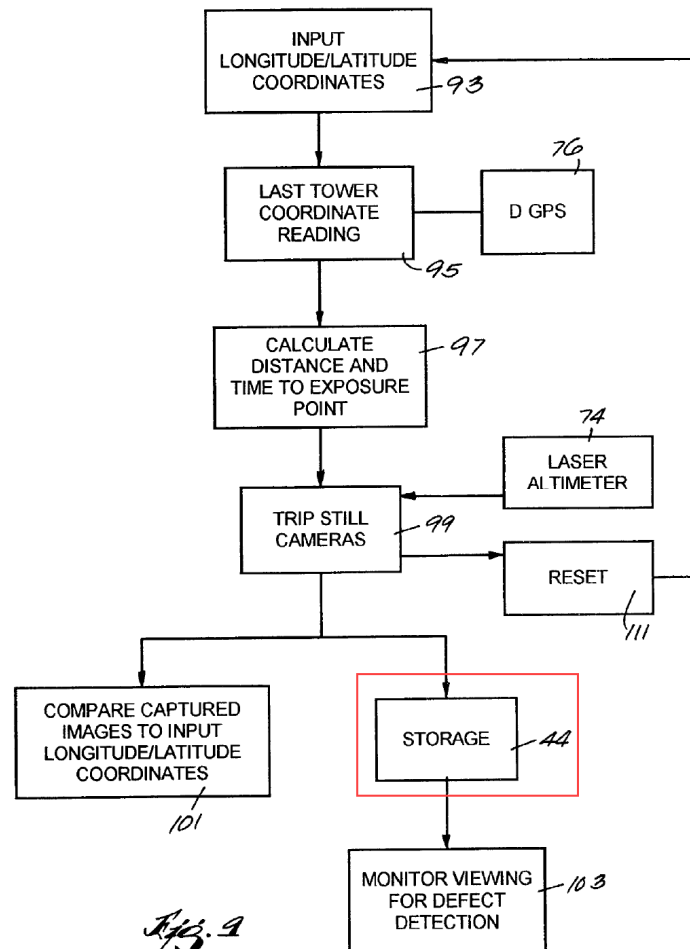
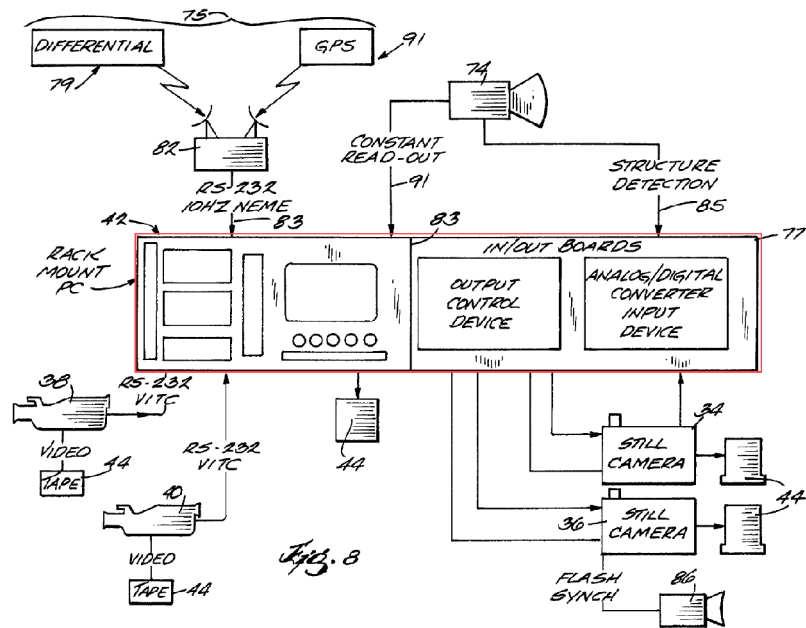
⁹ POSITA would have understood Loewen discloses geolocating devices (GPS and laser altimeter) each issuing a signal indicative at least in part of both a geolocation ***of the first camera*** (EX1004, Abstract (“GPS... supplies continuous longitude/latitude...”), 3:37-50) during the first image-capturing event ***and*** of a geolocation ***of the photograph’s subject*** (e.g., photographed tower structure (EX1004, 8:65-9:5, 9:14-31, 9:65-10:3)) during that event. EX1003, ¶¶154, 156. As Loewen expressly discloses, the geolocation of the photograph’s subject (e.g., tower/terrain), has a fixed, known relationship to the camera’s geolocation when this image is captured. EX1003, ¶¶154, 156.

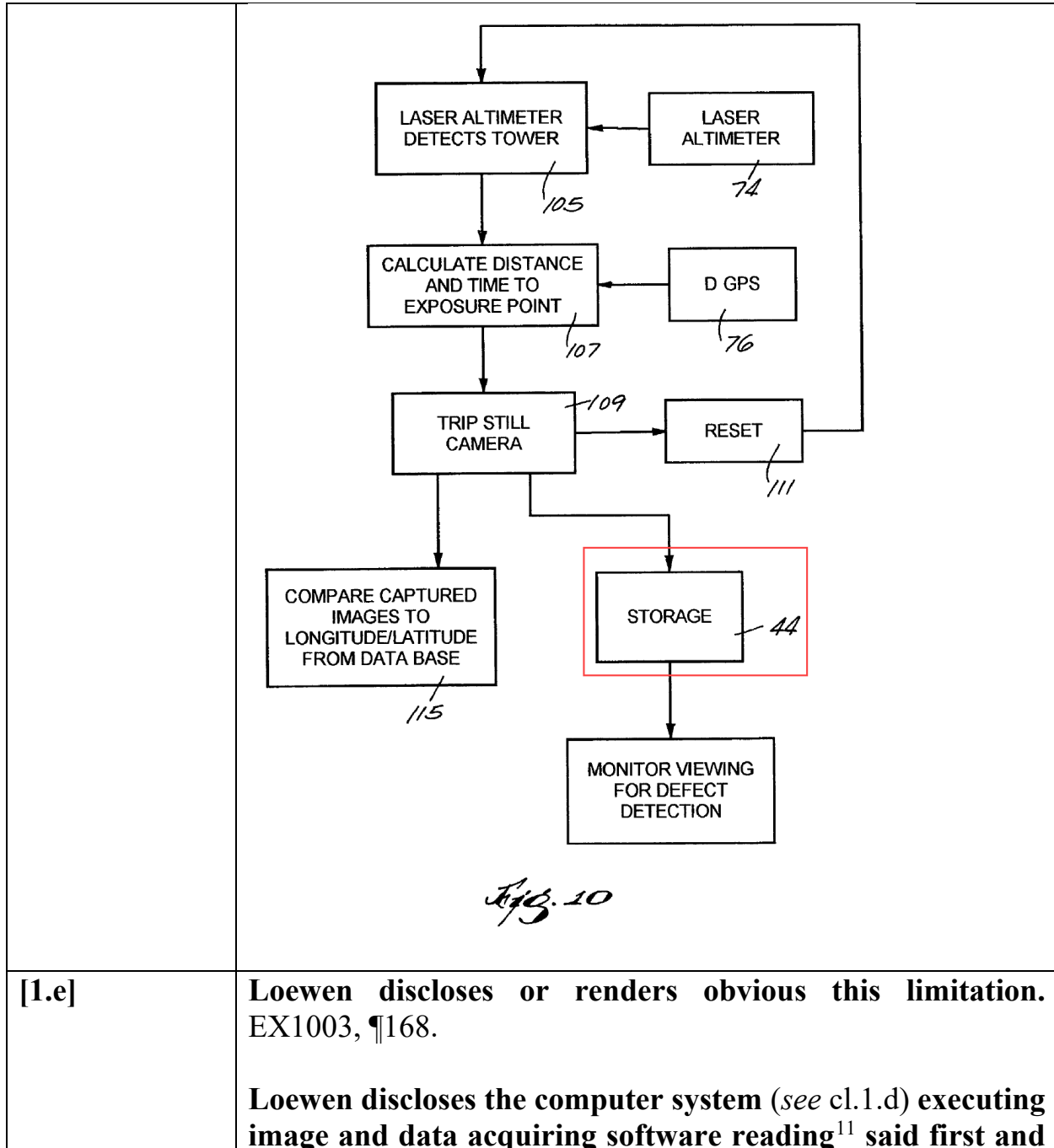
	Fig. 8
[1.d]	Loewen discloses this limitation. EX1003, ¶158. Loewen discloses a computer system (e.g., EX1004, 3:3-10 (“onboard computer (a central processing unit) containing operational software”); 7:13-31 (“onboard aircraft computer 42” (Fig.8)); Abstract (“central processing unit containing operational software”))¹⁰ receiving and storing said first and sec-

¹⁰ Loewen expressly discloses its “cameras... writ[ing] their information directly to the onboard computer” (e.g., EX1004 6:49-51), and thus its onboard computer receives and stores the image-data signals from Loewen’s image-capturing devices. EX1003, ¶159 n.14. Loewen further discloses, alternatively, that such data can be

	ond image-data signals and said at least one geo-locating signal (<i>e.g.</i>, EX1004, 3:51-57 (“still and video images, along with the geographic coordinates are transmitted to data storage units on board the aircraft”); 8:65-9:5 (“computer recording all the GPS data strings as well as continuous laser readings [] into a text file... file also contains... time stamp of the time when the laser altimeter located a transmission tower structure, and in cooperation with the GPS, the longitude/latitude coordinates of each tower”); 3:37-50 (“position of the aircraft in longitude and latitude coordinates” is “transmitted to the onboard computer”); 6:31-58 (“cameras... write their information directly to the onboard computer”); 7:13-31 (“onboard aircraft computer 42 is interconnected with the GPS and trigger system, and also the data storage unit”); Fig.8 (“onboard aircraft computer 42”)). <i>See</i> EX1003, ¶159-167; EX1004, 7:34-55, Figs.8-10; <i>see also id.</i> 1:16-24, 2:50-3:2, 3:3-10, 4:31-34, 7:59-61, 9:14-31, 9:32-39, 9:40-47, 11:19-28, <i>supra</i>, p.18 (discussing Loewen).
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stored on “data storage units 44” “incorporated and operatively associated with the onboard computer.” *E.g.*, EX1004, 6:45-49; EX1003, ¶159 n.14. Such “data storage units” (*e.g.*, “CDs and/or removable hard drives... interconnected with the onboard computer,” EX1004, 7:59-61) are thus part of the same “onboard computer” system running software executing Loewen’s functions. *E.g.*, EX1003, ¶159 n.14.





[1.e]	Loewen discloses or renders obvious this limitation. EX1003, ¶168. Loewen discloses the computer system (see cl.1.d) executing image and data acquiring software reading¹¹ said first and
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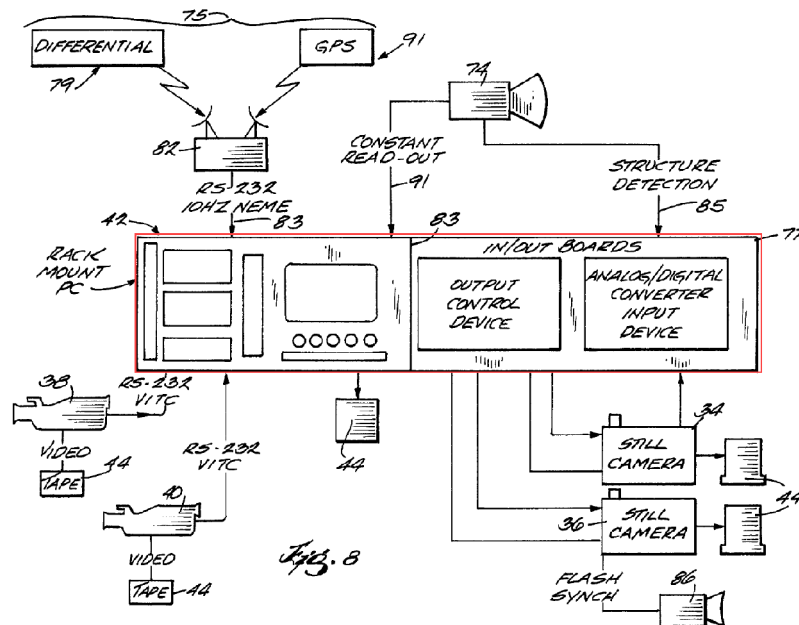
¹¹ POSITA would have understood Loewen’s reference to “reading” data as accessing it. EX1003, ¶171 n.15. This is consistent with ’657’s use of “reading”

	second image-data signals and said at least one geo-locating signal (<i>e.g.</i>, EX1004, 3:3-10 (“an onboard computer (a central processing unit) containing operational software and operatively connected to the cameras and the tower detecting device” (<i>e.g.</i>, GPS and/or laser altimeter); 8:47-53 & 8:65-9:5 & 9:6-13, 9:40-47 (“airborne inspection software” including “airborne capture software” that, <i>e.g.</i>, “has the computer recording all the GPS data strings as well as continuous laser readings” and receives the “image of a particular tower” and “post processing software module” that, <i>e.g.</i>, “extract[s] latitude/longitude readings of every tower structure” and “coordinate[s] the capture images with the original trip file”); 9:6-13 (“software programming... embedding the longitude/latitude coordinates for... the still camera output... pursuant to operational instructions, in association with the image of a particular tower”); 8:35-43 (“interaction between the onboard computer and the various pieces of system equipment are all coordinated and rendered operable on the basis of appropriate operating or executable software programs”))), said image and data acquiring software associating each said first or second image-data signal with a corresponding said at least one geo-locating signal for each image-capturing event (<i>e.g.</i>, EX1004, 9:6-13 (“[w]ith the appropriate software programming as mentioned above, ... embedding the longitude/latitude coordinates for... the still camera output pursuant to operational instructions, in association with the image”); 9:40-47 (“coordinat[ing] the captured images with the original trip file containing the tower locations... label all images to pre-determined standards”); 3:37-50 (“embedding of geographical location... with images captured by both the still and video cameras”); 3:37-50 (“recording... tower location in longitude/latitude coordinates in association with the image of each tower”); 10:4-13 (“longitude/latitude coordinates are iden-
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(*e.g.*, EX1001, 3:15-17; 5:33-38), as well as its common usage by POSITA.

EX1003, ¶171 n.15.

tified by the GPS and embedded in the imaging database in association with the particular tower structure”). See EX1003, ¶¶169-178; EX1004, Fig.8; see also, EX1004, 1:16-24, 3:51-57, 7:13-31, 7:34-55, *supra*, pp.21-22 (discussing Loewen).



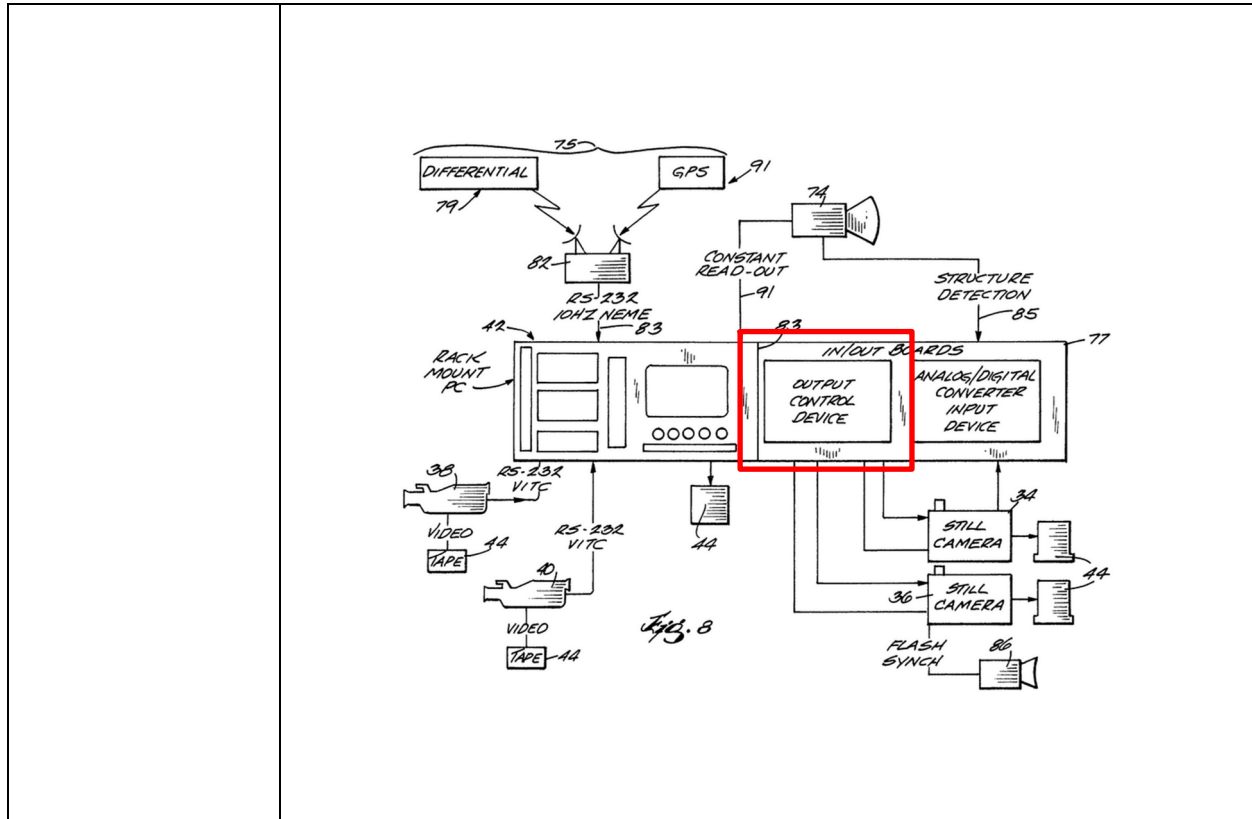
Loewen's altimeter generates "continuous laser readings" stored in "a text file" that "also contains the time stamp of the time when the laser altimeter located a transmission tower structure, and in cooperation with the GPS, the longitude/latitude coordinates of each tower," EX1004, 8:65-9:5, and the information in the text file is used in post processing to "provide a database of the right-of-way, all of the towers along the right-of-way, and the longitude/latitude coordinates for each tower,"

	EX1004, 8:54-64. EX1003, ¶174. Loewen further explains that its “post processing software... coordinate[s] the captured images with the original trip file containing the tower locations” (which POSITA would have understood to be the “integrated text file for post processing,” which contains the “continuous laser readings” from the laser altimeter), and “labels all images to pre-determined standards.” EX1003, ¶174. Thus Loewen expressly discloses that its computer system (including software) associates (as a result of either or both of Loewen’s “co-ordinat[ing]” and “label[ing]”) each image-data signal from Loewen’s image-capturing devices (<i>e.g.</i>, still cameras) with the corresponding geo-locating signals generated by Loewen’s laser altimeter. EX1003, ¶174. If further disclosure is required, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s computer system associating geo-locating signals (such as GPS signals) with captured image-data signals using Loewen’s additional disclosure of laser altimeter signals corresponding to each image-capturing event, such that
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	Loewen’s computer system additionally associates each image-data signal with a corresponding laser altimeter signal. EX1003, ¶177. This would have advantageously permitted POSITA to record the system’s height and the height of objects captured in images to derive more accurate georeferenced imagery. EX1003, ¶177. Further, associating an additional geolocating signal with Loewen’s image-data signals would have added further precision to the georeferencing performed by Loewen’s computer system. EX1003, ¶177. This would have been an obvious, routine implementation choice, and clear this would work, predictably yielding the expected functionality with REOS. <i>See</i> n.13; EX1003, ¶177.
[1.f]]	Loewen plus Fujimoto discloses or renders obvious this limitation. EX1003, ¶179. Loewen discloses that the computer system (<i>see</i> cl.1.d) transmits image-capture signals to the first image-capturing device and the second image-capturing device (<i>see</i> cl.1.a-cl.1.b) to cause the first and second image-capturing devices to capture images (<i>e.g.</i>, EX1004, 3:3-10 (“still cameras exposure is automated by including in the system a capability for detecting a tower structure and an onboard computer (a central processing unit) containing operational software and operatively connected to the cameras and the tower detecting device”; “still cameras, computer, and detection capability are operationally interconnected to automatically activate the still cameras at the exposure points along the transmission line”); 7:13-31 (“still camera”

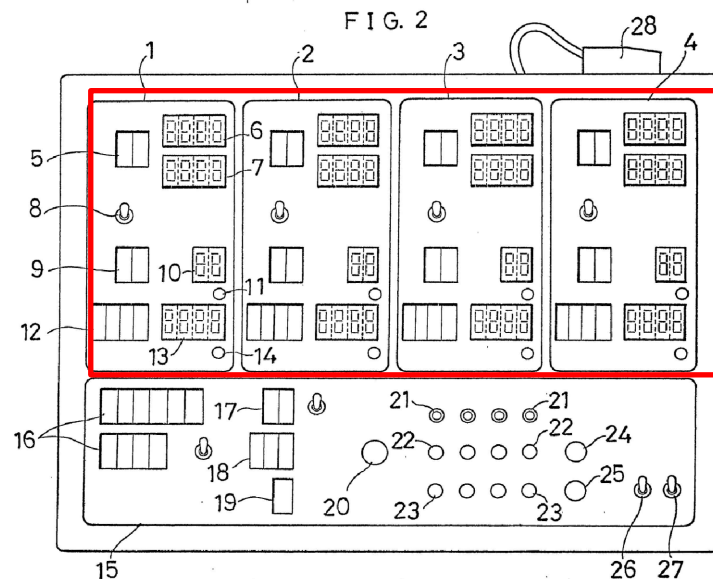
	“trigger[ed]... to acquire the images”); 6:31-58 (“[to] fire the still cameras, the computer must pre-arm the camera prior to... the actual trip”); 11:15-18 (“cameras... trigger[ed] based on actual detection of the presence of the tower structure”); <i>see also</i> cl.1.a; cl.1.b). ¹² <i>See</i> EX1003, ¶¶180-187, 194; EX1004, Abstract, Fig.8; <i>see also</i> EX1004 4:1-13, 7:34-55, 10:50-67, 11:1-14, <i>supra</i> , p.23-24 (discussing Loewen).
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¹² Loewen expressly discloses a GPS and altimeter transmitting signals to Loewen’s computer system to trigger still cameras capturing images of, *e.g.*, “exposure points along the transmission line,” including when the onboard computer detects a “tower structure.” *E.g.*, EX1004, Abstract, 3:3-10; EX1003, ¶182. Based on Loewen’s altimeter disclosures (*e.g.*, EX1004, 8:65-9:5, 8:27-35), POSITA would have understood Loewen’s laser altimeter would also have detected, *e.g.*, the presence of structures/objects in the right-of-way, and upon detection of such structures/objects would send a signal to Loewen’s computer, in turn triggering Loewen’s still cameras to capture images of such detected structures/objects, consistent with Loewen’s teachings that its system obtains information about and “inspect[s] the right-of-way to “to detect problems in the right-of-way,” such as an unauthorized structure/vehicle. *E.g.*, EX1004, 1:28-53, 2:19-21, 5:34-42; EX1003, ¶183. If argued further disclosure is required, **POSITA would have been motivated and found it obvious**, straightforward, and advantageous to implement Loewen’s computer system to



cause the first and second image-capturing devices to capture images in response to Loewen's altimeter detecting structures/objects in the right-of-way. EX1003, ¶184. This would have advantageously triggered image capture when Loewen's altimeter sensed such structures/objects, furthering Loewen's express goals. EX1004, 2:19-21; EX1003, ¶184. This would have been an obvious, routine implementation choice and (particularly given Loewen's express disclosure of triggering image capture using altimeter signals) clear this would work, predictably yielding the expected functionality with REOS. See n.13; EX1003, ¶184.

Fujimoto discloses controlling multiple image-capturing devices separately (e.g., EX1005, ¶0004 (“a computerized control for opening the shutters of a plurality of cameras independently of one another”); Cl.1 (“computerized control for aerial photography... each shutter... driven at independently different interval time”). See *id.*, ¶Fig.2; see also EX1005, Abstract, ¶0001, ¶0006, ¶0008, ¶0010; EX1003, ¶¶188-191:



POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s computer system using Fujimoto’s advantageous teachings of using *separate* controls for multiple image-capturing devices. EX1003, ¶192. This would advantageously prevent capturing wholly- or partially-unnecessary and/or duplicative images that would be captured by simultaneous triggering of both cameras,

	thus reducing the storage space, increasing the number of structures that can be captured, and reducing the need to process unnecessary and/or duplicative data. EX1003, ¶192; <i>see also</i>, EX1005, ¶¶0003, 0004; EX1003, ¶192. Reducing duplicative imagery would also enable the capture of higher-resolution images (which Loewen expressly discloses are advantageous, EX1004, 2:30-64, 11:47-51), enabling the combined system to provide more detail of captured structures or other capture objectives, increasing the usefulness of such imagery by allowing a user to discern more information from such images. EX1003, ¶192. Additionally, controlling both cameras independently would advantageously account for the different capture timing requirements and overlap rates that would arise in a system employing cameras with differing parameters. EX1003, ¶192. This would efficiently capture additional usable information not available if the cameras were triggered together. EX1003, ¶192. Further, this would have beneficially accounted for situations where one camera's view could be at least partially obscured if it were triggered together. EX1003, ¶192. This would have
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	been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS. ¹³ EX1003, ¶192.
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(b) Claim 3 (Ground 2)

[3.pre]	Loewen plus Fujimoto renders obvious the system of cl.1 and includes at least one geo-locating device and said at least one geo-locating signal respectively comprise (<i>see</i> cl.1). The particular geo-locating device and geo-locating signals of the remaining of cl.3 are discussed below. EX1003, ¶¶197-198.
[3.a]	Loewen discloses or renders obvious this limitation. EX1003, ¶199.

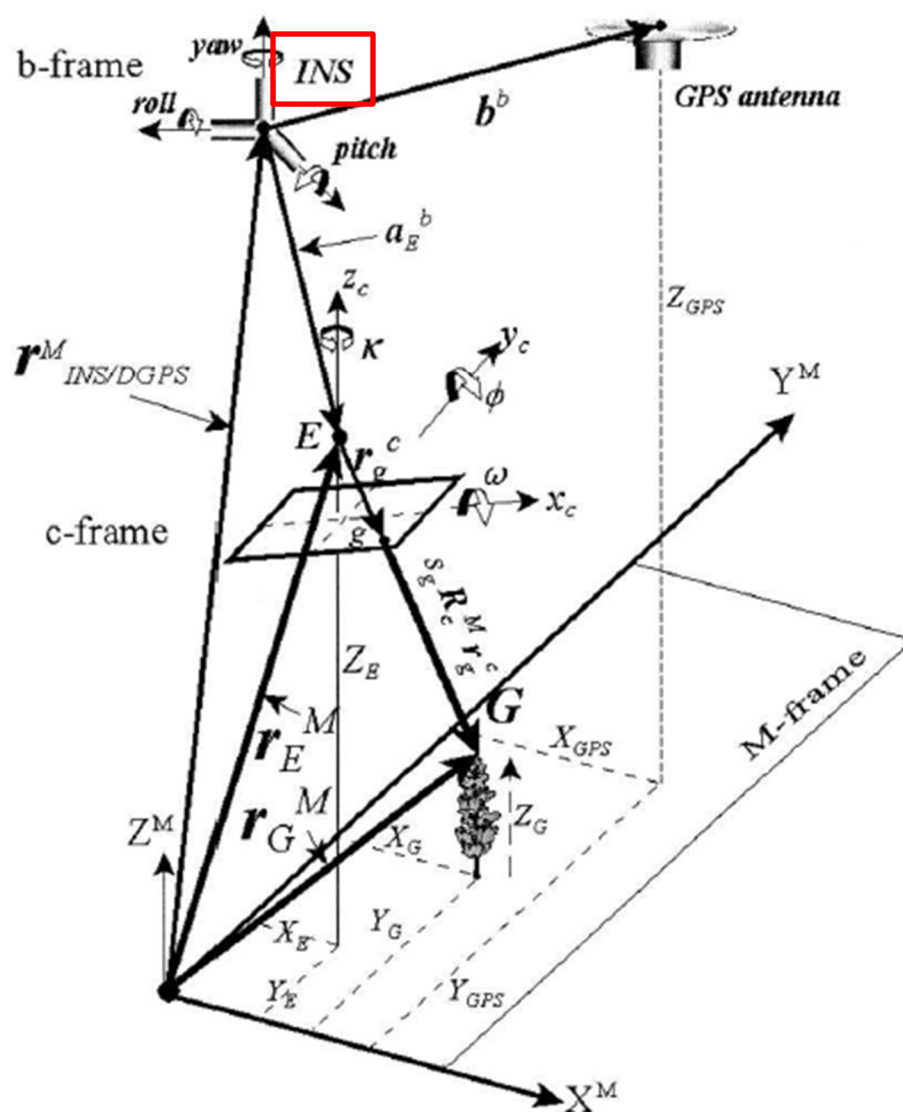
¹³ This and the other combinations are implemented in well-understood, wholly-predictable technology (*e.g.*, hardware and software), further underscoring REOS for each. EX1003, ¶193.

	Loewen discloses a clock¹⁴ issuing to said image-capturing computer system time data signals¹⁵ indicative of a time of each said image-capturing event; (<i>e.g.</i>, EX1004, 9:14-31 (“During the camera trip the computer program records the time and location of the trip into a separate file for post processing of the images.”); 9:32-39
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¹⁴ If argued further clock disclosure is required, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s system (in the Loewen-Fujimoto system (cl.1.f)) using a clock (a well-known component of image-capturing systems, *e.g.*, EX1005, ¶¶9, 17), issuing to Loewen’s computer system time data signals indicative of each image-capturing event’s time. EX1003, ¶205. This would have advantageously provided additional data, adding further precision to Loewen’s georeferencing. EX1003, ¶205. Additionally, this would have provided information about the time-of-day an image was captured (consistent with Loewen (EX1004, Abstract, 4:26-30, 6:54-57, 9:29-31)), increasing the images’ usability and the system’s efficiency. EX1003, ¶205. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS. EX1003, ¶205.

¹⁵ Loewen discloses its system “records the time” of the “camera trip” into a “separate file,” thus expressly disclosing transmitting a time data signal indicative of a geo-location of Loewen’s image-capturing devices at each image-capturing event from the clock to the separate data file. EX1004, 9:29-31, EX1003, ¶201.

	(“the program records the time of the [camera] trip along with the geographic longitude/latitude coordinates of that tower location”). <i>See id.</i> , 8:65-9:5, 9:6-13; EX1003, ¶¶200-204, 206.
[3.b]	Loewen discloses this limitation. EX1003, ¶207. Loewen discloses a global-positioning system (GPS) receiver receiving GPS signals and issuing to said image-capturing computer system location data signals indicative of a longitude and latitude of said first or second image-capturing devices at each said image capturing event; (<i>see</i> cl.1.c (mapping Loewen’s “GPS”)). EX1003, ¶¶208-209.
[3.c]	Loewen plus Mostafa renders obvious this limitation. EX1003, ¶210, 216. Loewen discloses issuing to said image-capturing computer system geo-location data signals indicative of a geo-location of said first or second image-capturing devices at said each image-capturing event (<i>see</i> cl.1.c). EX1003, ¶211. Mostafa discloses an inertial navigation unit (INU) issuing velocity data signals indicative of a velocity of image-capturing devices at image-capturing events (<i>e.g.</i>, EX1007, 3-4 (“navigation data is collected using a Honeywell LRF III inertial navigation system”); Abstract (“The GPS/INS-derived trajectory contains the full translational and rotational motion of the carrier aircraft.”)) to an image-capturing computer system. <i>See id.</i> Fig.1. Fig.2, Fig.5; EX1003, ¶¶212-214.



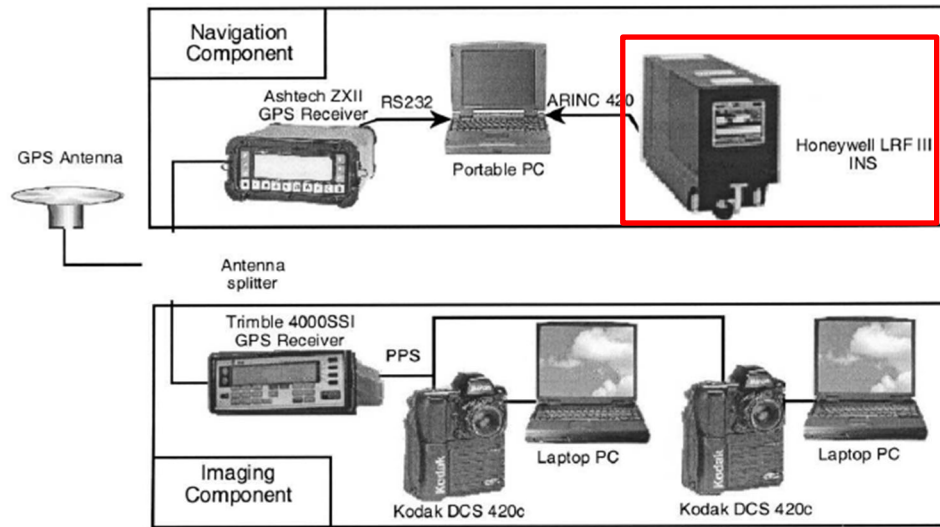


Fig. 2. Hardware configuration.

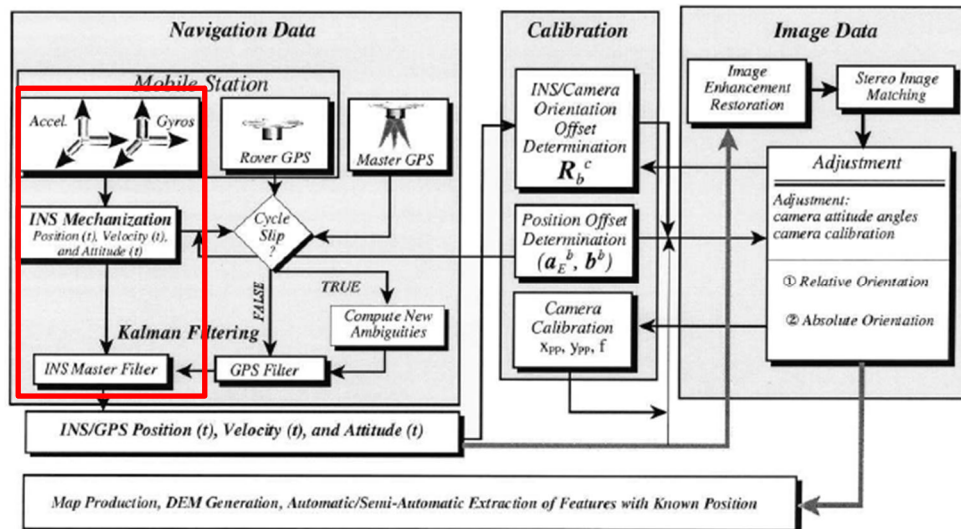


Fig. 5. The multi-sensor system data-flow (in-flight calibration case).

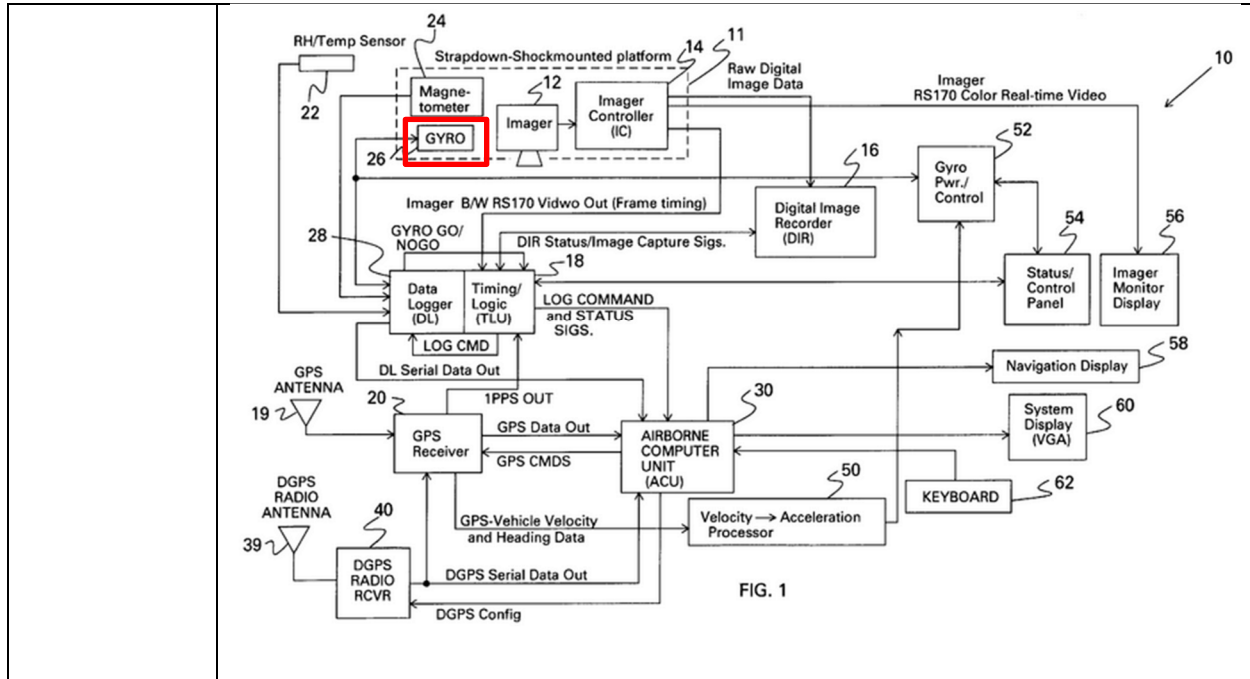
See also EX1007, 9, 12.

POSITA would have been motivated and found it obvious, straight-forward, and advantageous to implement Loewen's system for acquiring images in association with, *e.g.*, a GPS-detected location and

	an altimeter (in Loewen-Fujimoto, <i>see</i> cl.1.f) using Mostafa’s advantageous teachings of an inertial navigation unit (INU) (a well-known, conventional component of aerial imaging systems (EX1008, 2:29-32), issuing velocity data signals indicative of a velocity of an image-capturing device at image-capturing events. EX1003, ¶215. Implementing the Loewen-Fujimoto system with this additional INU input (as taught in Mostafa) would have increased imagery accuracy and provided a backup if, <i>e.g.</i>, contact with the GPS satellite were lost. EX1003, ¶215; <i>see</i> EX1007, 11 (“improved... ground positioning accuracy...”). EX1003, ¶215. Moreover, Fujimoto (in Loewen-Fujimoto, <i>see</i> cl.1.f) discloses using “speed of flight” and a “speedometer” (EX1005, 2, 7), further confirming incorporating velocity information would have been routine and beneficial. EX1003, ¶215. Adding sensors would add further precision to Loewen-Fujimoto’s performed georeferencing.
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	EX1003, ¶215. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS. ¹⁶ EX1003, ¶215.
[3.d]	Loewen plus Garrot renders obvious this limitation. EX1003, ¶217, 226. Loewen discloses issuing to said image-capturing computer system geo-location data signals indicative of a geo-location of said first or second image-capturing devices at said each image-capturing event (<i>see</i> cl.1.c). EX1003, ¶218. Garrot discloses a gyroscope issuing a pitch signal, a roll signal, and a yaw signal respectively indicative of a pitch, roll and yaw of image-capturing devices at image-capturing events; (<i>e.g.</i>, EX1006, 19:35-20:7 (“For each image event this file contains:... 5. Gyro pitch; 6. Gyro roll”); 10:25-32 (“pitch, roll, yaw”)) to a computer. <i>See id.</i>, Fig.1, Fig.8c; <i>see also id.</i>, 4:66-5:9, 6:14-47, 6:48-7:12, 8:18-60, 10:61-11:18, 15:30-40; EX1003, ¶¶219-223:

¹⁶ *See* n.13.



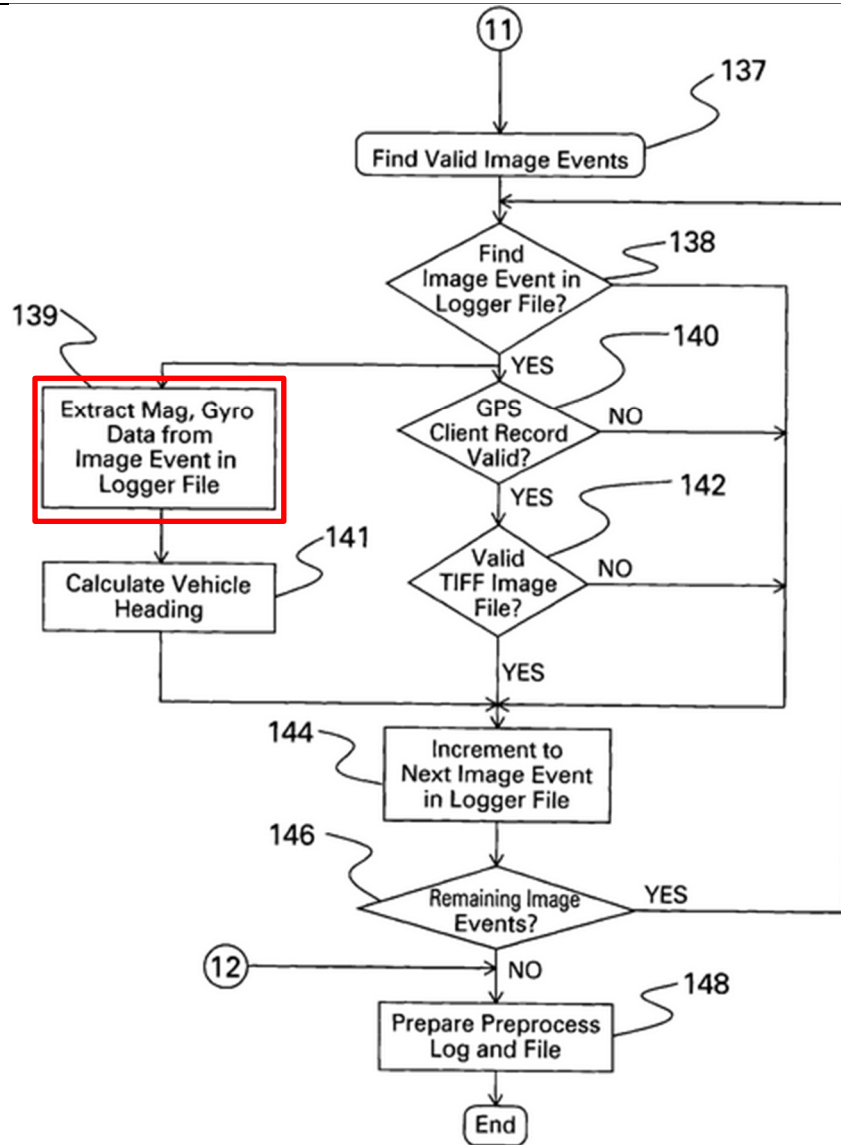


FIG. 8C

POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen's system (in Loewen-Fujimoto-Mostafa, *see* cl.1.f, cl.3.c) using Garrot's advanta-

	geous teachings of a gyroscope issuing to an image-capturing computer system signals indicating pitch, roll, and yaw of image-capturing devices at image-capturing events. EX1003, ¶¶224-225. Implementing the combined Loewen-Fujimoto-Mostafa system with these additional gyroscope signals (as taught in Garrot) would permit more accurate recording of the system's heading as it captured imagery and deriving more accurate georeferenced imagery. EX1003, ¶225; <i>see also</i> EX1006, 6:14-47. Adding sensors would add further precision to Loewen-Fujimoto-Mostafa's performed georeferencing. EX1003, ¶225. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS.¹⁷ EX1003, ¶¶224-225.
[3.e]:	Loewen plus Garrot renders obvious this limitation. EX1003, ¶¶227, 234. Loewen discloses issuing to said image-capturing computer system geo-location data signals indicative of a geo-location of said first or second image-capturing devices at said each image-capturing event (<i>see</i> cl.1.c). EX1003, ¶228. Garrot discloses a compass (<i>e.g.</i>, “compass”) issuing heading data signals indicative of a heading (<i>e.g.</i>, EX1006, 12:20-37 & 19:58-59 (“raw input files of... compass” from which “Heading” is

¹⁷ *See* n.13.

	“derived”) of an image-capturing device at image-capturing events (e.g., 19:35-61 (“For each image event this file contains... Heading (derived from... compass)”) to a computer. <i>See also id.</i>, 13:34-51; EX1003, ¶¶229-232. POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s combined system (see cl.3.c-cl.3.d) using Garrot’s advantageous teachings of a compass issuing to an image-capturing computer system heading data signals indicative of a heading (including of an image-capturing device at image-capturing events). EX1003, ¶233. Implementing Loewen-Fujimoto-Mostafa-Garrot with this additional compass input (as taught in Garrot) would permit more accurate recording of the system’s heading as it captured imagery, and deriving more accurate georeferenced imagery. <i>See</i> EX1006, 6:14-47; EX1003, ¶233. Adding sensors would add further precision to Loewen-Fujimoto-Mostafa-Garrot’s performed georeferencing. EX1003, ¶233. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS.¹⁸ EX1003, ¶233.
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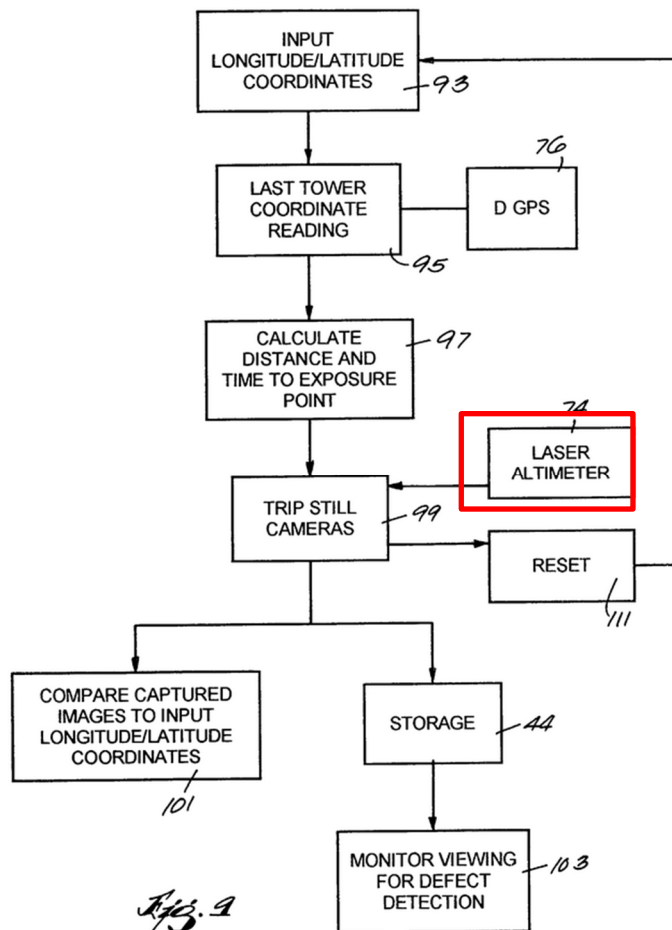
¹⁸ *See* n.13.

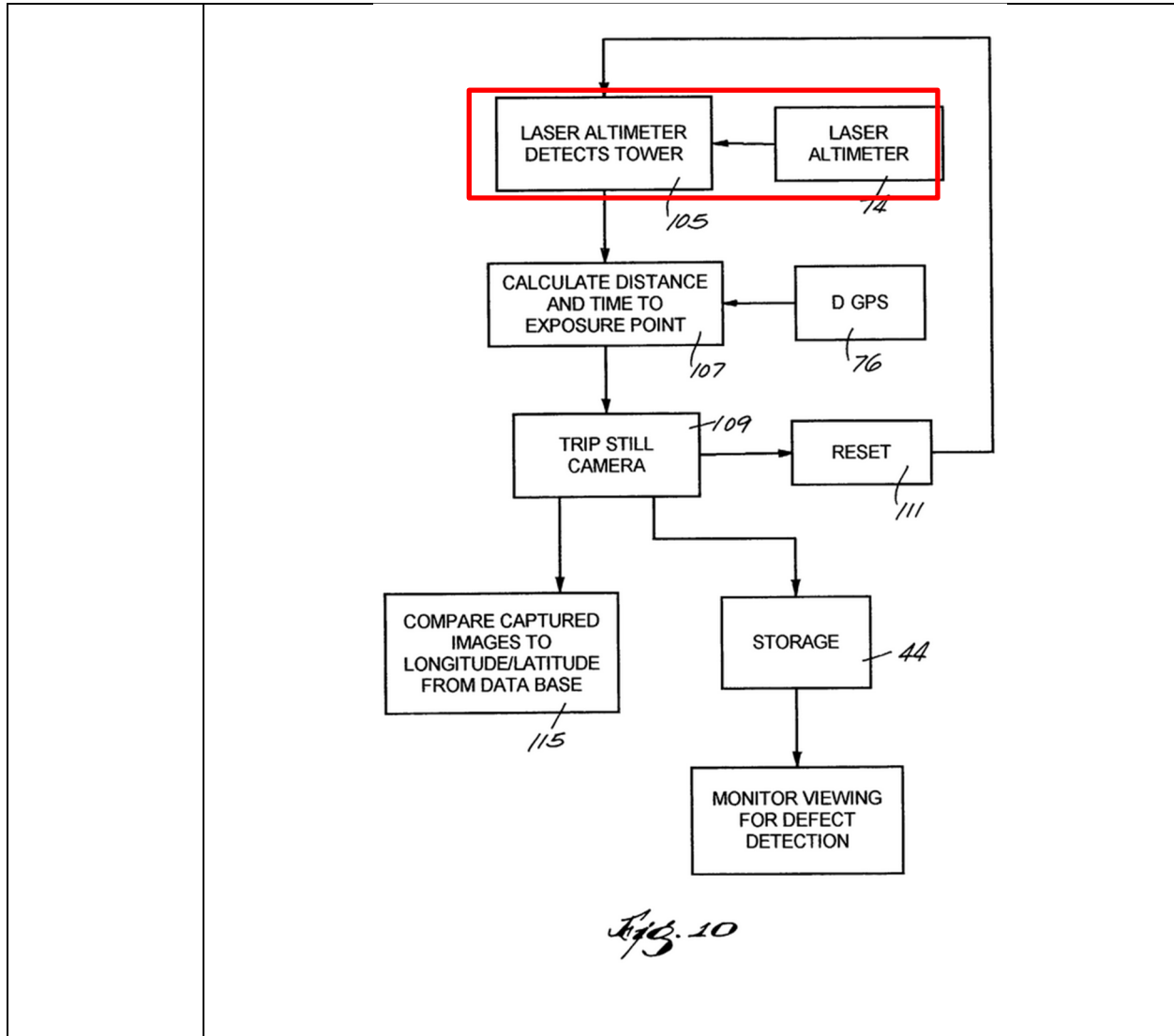
[3.f]	Loewen discloses this limitation. EX1003, ¶¶235, 240. Loewen discloses an altimeter¹⁹ issuing to said image-capturing computer system altitude data signals indicative of an altitude of said first or second image-capturing device²⁰ at each said image-capturing event (<i>e.g.</i> , EX1004, 10:4-13 (“the laser altimeter 74 will detect the passage of the aircraft over a tower structure and generate a signal”); 8:15-34 (“laser altimeter detects the major differ-
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¹⁹ Loewen expressly discloses its system has both a laser altimeter and GPS. *E.g.*, EX1004, 3:11-15, Figs.8 (altimeter 74, GPS 91), 9-10. EX1003, ¶238.

²⁰ POSITA would have understood Loewen discloses a geolocating device (altimeter) issuing altitude data signals indicative of an altitude of Loewen’s image-capturing devices (including first camera) at each image-capturing event because Loewen discloses its altimeter determines the height of the aircraft/pod housing Loewen’s cameras. EX1003, ¶237. Moreover, “the laser altimeter generates a signal in response to” sensing a “difference in height of the aircraft above a tower,” and this “is transmitted to the onboard computer establishing... that the aircraft has passed over a tower” such that an image should be captured (*e.g.*, EX1004, 8:31-34), and thus POSITA would have further understood the altitude data signals are indicative of an altitude of Loewen’s image-capturing devices *at each image-capturing event*. EX1003, ¶237; *e.g.*, EX1004, 8:65-9:37, 10:14-16, 10:30-34, 11:1-14.

ence in height of the aircraft above a tower... [and] generates a signal in response to that difference which is transmitted to the onboard computer"); 8:65-9:5 ("laser survey module... has the computer re-coding... continuous laser readings [] into a text file... [which] also contains the time stamp of the time when the laser altimeter located a transmission tower structure"); *see* cl.1.e). *See also id.*, Abstract, 3:11-15, 4:14-22, 7:56-58, 8:47-53, 9:32-39, 9:65-10:3, 10:14-16, 10:24-43, 11:1-14, Figs.9-10; EX1003, ¶¶236-239:





(c) Claim 2 (Ground 2)

[2]	For the reasons in cl.3 (which is broader than cl.2 because it requires all of (not just “at least one of”) the recited “geo-locating device[s] and said at least one geo-locating signal[s]”) cl.2 is rendered obvious by Loewen plus Fujimoto, Mostafa, and Garrot. EX1003, ¶¶242-267.
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(d) Claim 4 (Ground 3)

[4]	Loewen plus Fujimoto renders obvious the system for capturing images and geo-location data corresponding thereto of cl.1 (<i>see</i>
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cl.1), wherein the first or second image-capturing devices captures oblique aerial images (*see* cl.1.a). EX1003, ¶271.

Kain 1997 discloses capturing community-level aerial images (*e.g.*, EX1008, 10:11-18 (“one foot per pixel image resolution”); 12:13-22 (“one foot image resolution”)). EX1003, ¶¶272-237.

POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s disclosed first image-capturing device using Kain’s advantageous teachings of capturing images including one-foot-per-pixel image resolution (a community-level aerial image consistent with ’657 (EX1001, 13:46-60)) such that the first image-capture device captures community-level oblique aerial images in appropriate contexts, including for larger structures where small detail is of lesser concern, such as photographing the right-of-way (*i.e.*, path defined by the tower structures and transmission cables between towers) “to determine, for example, if things such as trees and other plant growth or the like have encroached...,” and “provide aerial images of ground structures... roadways and the like.” EX1004, 2:23-26, 5:37-41; *see also id.* at 2:19-21. EX1003, ¶274. Capturing community-level oblique aerial images of one-foot-per-pixel in the image’s foreground (where, as noted, higher-resolution images are not required), two-feet-per-pixel

	in the mid-ground, and four-feet-per-pixel in the background²¹ would have reduced storage requirements, thereby allowing more images to be captured and stored while providing sufficient detail for various uses (<i>e.g.</i>, to identify downed transmission towers following severe storms, requiring less-detailed imagery). EX1003, ¶274. This would have been an obvious, routine implementation choice, particularly given that obtaining images of different resolution was well-known and conventional by varying well-known camera parameters (<i>e.g.</i>, field-of-view, sensor size) and distance from which
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²¹ As discussed (n.5), using Loewen’s oblique aerial images (cl.1.a) and Kain 1997’s “one foot per pixel image resolution,” oblique images captured by Loewen’s image-capturing devices would have had a GSD of one-foot-per-pixel in the image foreground, and decreasing resolutions (*e.g.*, more feet-per-pixel) in the mid-ground and background due to well-understood geometric principles. EX1003, ¶275; *see also* EX1009, ¶39.

	an image is taken (EX1003, ¶274), and clear this would work, predictably yielding the expected functionality with REOS. ²² EX1003, ¶274.
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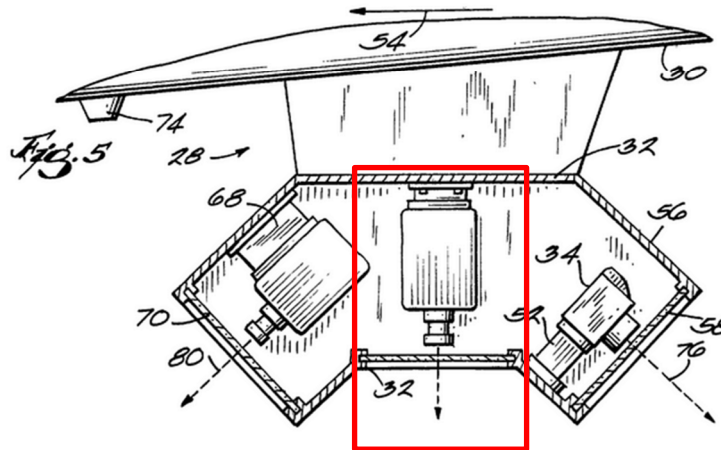
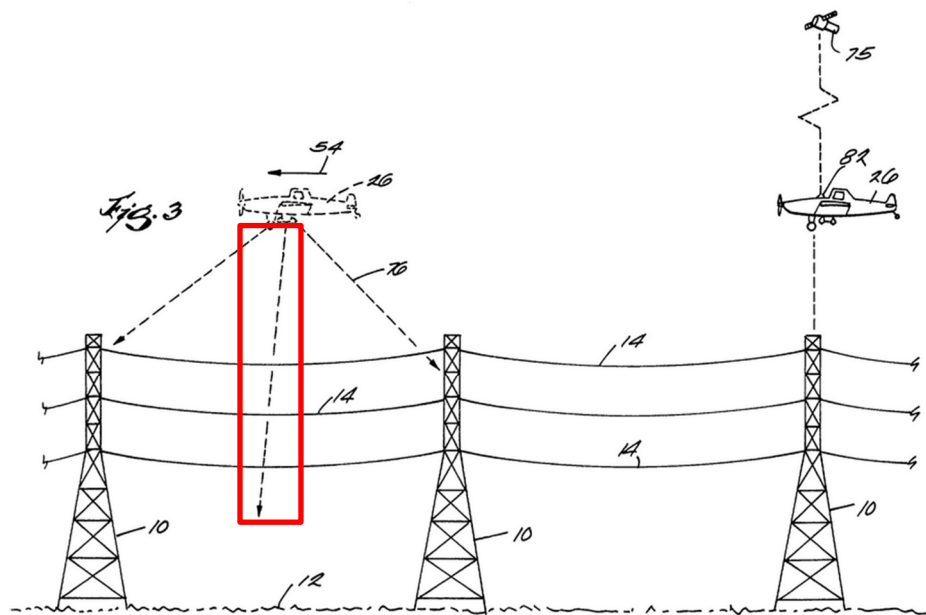
(a) Claim 5 (Grounds 1 and 4)

[5]	Loewen plus Fujimoto renders obvious cl.1’s system for capturing images and geo-location data corresponding thereto (cl.1), and Loewen discloses the second image-capturing device captures images at image-capturing events (cl.1.b). Loewen renders obvious the second image-capturing device capturing <i>orthogonal</i> images at image-capturing events. EX1003, ¶¶280-281. POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement one of Loewen’s multiple still cameras using Loewen’s advantageous teachings of downward-facing video cameras such that in the resulting system Loewen’s second image-capturing device captures <i>orthogonal</i> images at image-capturing events. Loewen expressly discloses the “number and arrangement of cameras can vary,” EX1004, 5:62-6:2, and video cameras that point downward. EX1004, 8:8-14; 3:23-36; 6:3-30; Figs.3, 5-6; EX1003,
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²² See n.13.

¶282. Loewen further expressly discloses its disclosed downward-pointing video cameras advantageously produce still images. EX1004, 8:54-57, 5:38-42, 6:3-7; EX1003, ¶282. Using a downward-facing still camera for periodic orthogonal still photographs, rather than a video camera (which is replaced by the second image-capturing device (still camera) in this combination), would have reduced the memory used, thus allowing the system to take higher-resolution (and more detailed and useful) downward-facing photos. EX1003, ¶282. Using one of Loewen’s still cameras rather than a video camera would have also reduced hardware costs and complexity, fulfilling Loewen’s express “cost eff[icacy]” goal. EX1004, 2:19-21; EX1003, ¶282. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS.²³ EX1003, ¶282.

²³ See n.13.



Loewen plus Mostafa also renders this limitation obvious based on the same Loewen disclosures immediately above in addition to the Mostafa disclosures below, including in particular a “digital camera[]... which is nadir” (for which Petitioner relies on Mostafa for Ground 4). EX1003, ¶284.

Mostafa discloses an image-capturing device capturing orthogonal images at image-capturing events (e.g., EX1007, 4

& Fig. 6 (“digital camera[]... which is nadir” and captures “nadir digital image[s]”).²⁴ See also *id.*, Abstract, 6 (“nadir camera”), 9 (“nadir... images”), 10. EX1003, ¶¶285-288.

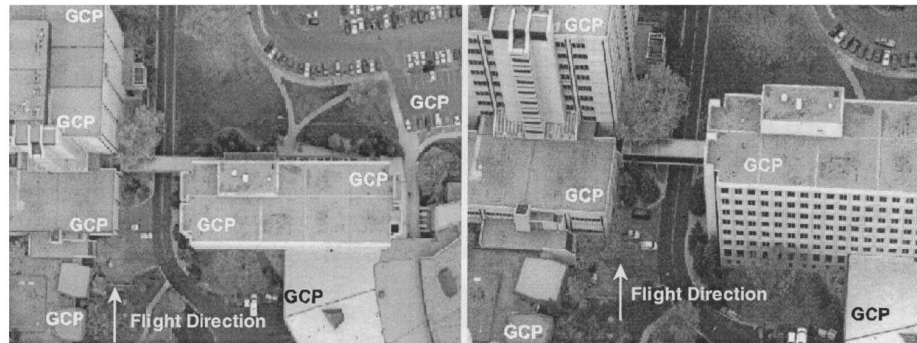


Fig. 6. A nadir digital image (left) and an oblique digital image (right), October 1998 flights.

For the reasons immediately above, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement one of the multiple still cameras of Loewen-Fujimoto—which captures oblique aerial images using “still, digital cameras,” and orthogonal images using, *e.g.*, a video camera “arranged at 90 degrees” for, *e.g.*, “filming the right-of-way” (EX1004, 2:30-36, 5:38-42, 5:62-6:2, 8:8-14, 8:54-57)—using Mostafa’s advantageous disclosure of a downward-facing (*e.g.*, “nadir,” EX1007, Abstract) still camera. EX1003, ¶¶289.

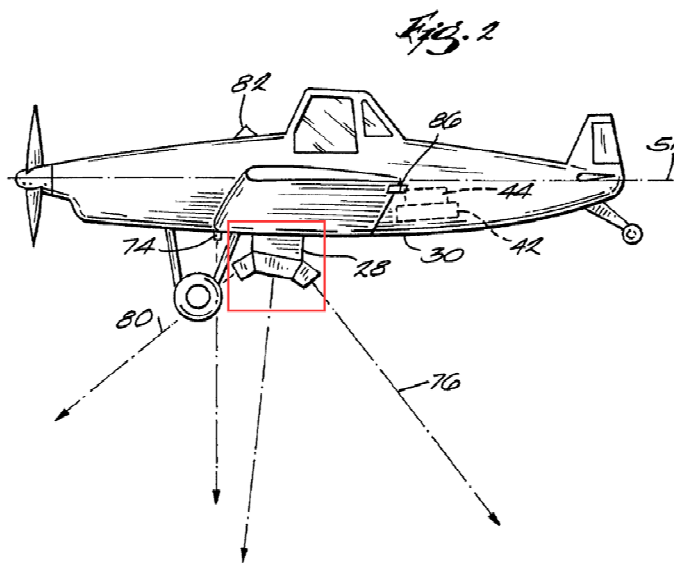
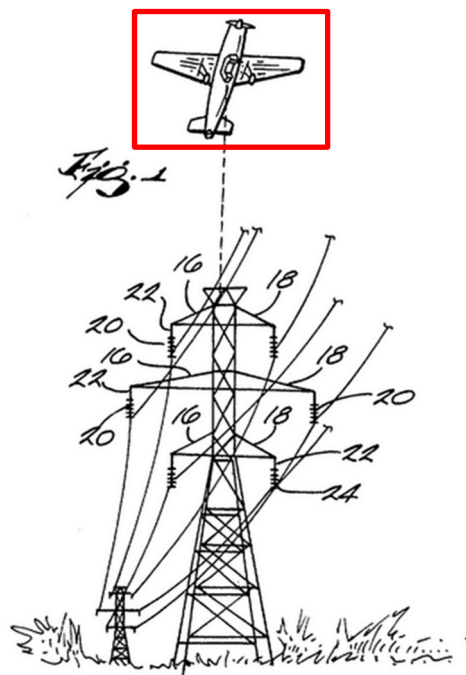
²⁴ “Nadir” means pointing directly down, and thus Mostafa discloses capturing “orthogonal” images. EX1003, ¶¶286; EX1018.

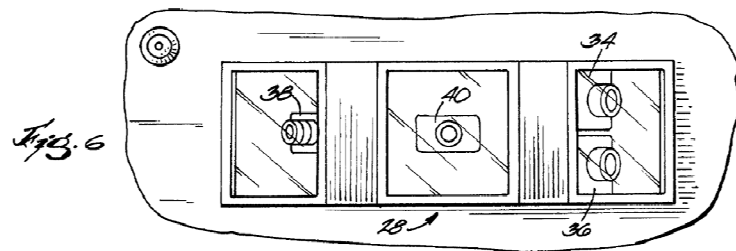
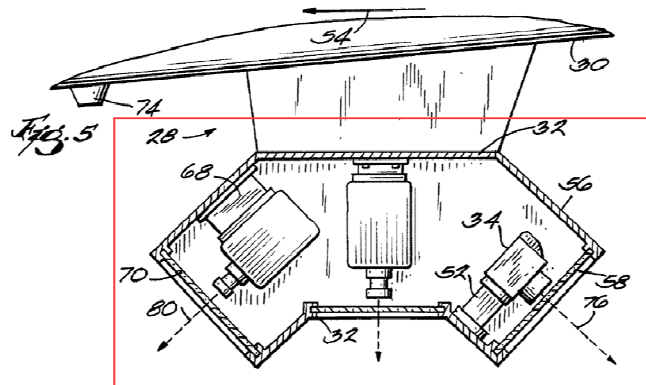
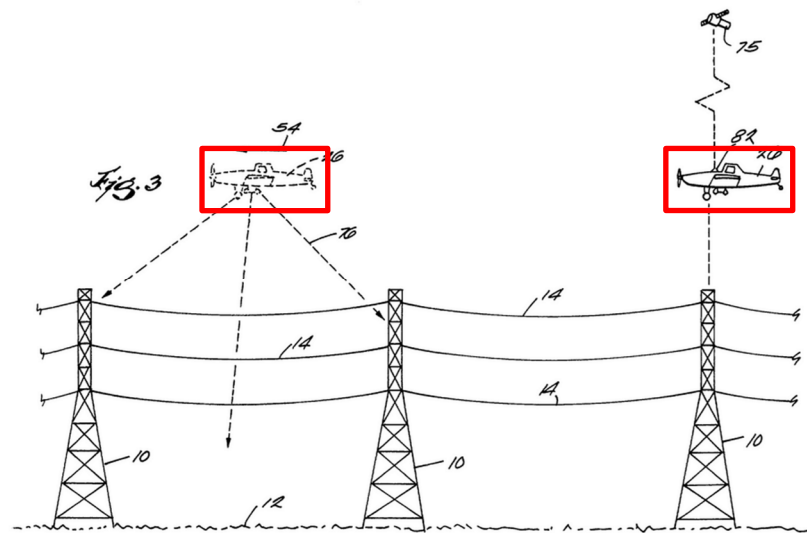
	Moreover, Mostafa expressly discloses that using a nadir digital still camera “allows for covering the same ground scene with a nadir and an oblique image that, when simultaneously processed, provides a wider intersection angle and thus better height accuracy.” EX1007, 4; EX1003, ¶289.
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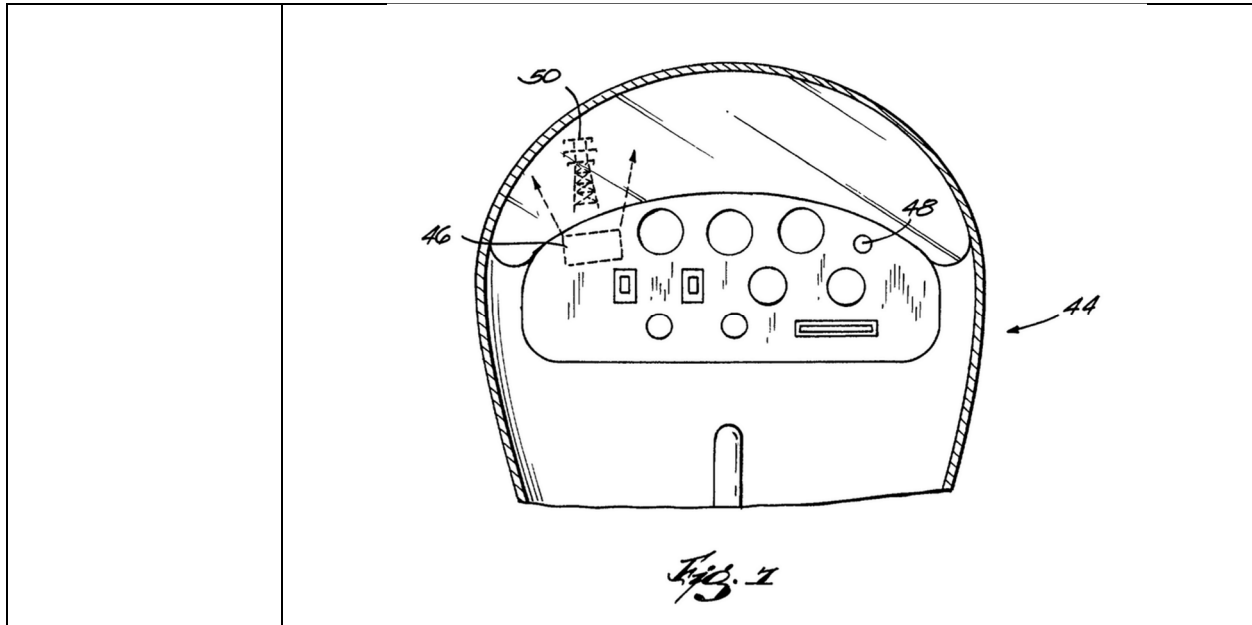
(b) Claim 14 (Ground 1)

[14]^[25]	Loewen plus Fujimoto renders obvious the system for capturing images and geo-location data corresponding thereto of cl.1 (see cl.1), and Loewen further discloses a platform carrying the first and second image capturing devices (see cl.1.a., cl.1.b) through a controlled flight (e.g., EX1004, 2:30-38 (“fixed wing aircraft... flown in close proximity to the towers to enable an arrangement of still, digital cameras on the aircraft to capture high resolution images”); Abstract (“fixed wing aircraft and an arrangement of at least one still camera”); 5:43-54 & 5:61-64 (“fixed wing aircraft... pod... fixed to the underside... of the aircraft fuselage” that “includes a number of cameras”); see cl.1.a, cl.1.b). See also <i>id.</i>, 2:39-49, 2:50-3:2, 4:31-34, 4:35-40, 4:48-64, 5:55-61, 6:31-40, cl.31, Figs.1-3, 5-7; EX1003, ¶¶293-288.
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²⁵ ’657 explains “platform” includes an “airplane.” EX1001, 4:4-16; EX1003, ¶295. If argued that “platform” requires a “pod” or other aircraft-affixed structure, Loewen expressly discloses this. *E.g.*, EX1004, 5:43-66, Figs.2, 5-6; EX1003, ¶295.







(c) Claim 19 (Grounds 1 and 4)

[19]	Loewen plus Fujimoto renders obvious the system for capturing images and geo-location data corresponding thereto of cl.14 (see cl.14), and Loewen further discloses first and second image-capturing devices (see cl.1.a, cl.1.b) each directed at a 30-60 degree angle to the line of flight (e.g., “still cameras are arranged to take pictures... at an angle to the line of flight... in the range of 30–60 degrees”; 11:45-47 (“still photographs are taken along a line which is 30–60 degrees to the horizontal”); see cl.1.a-1.b, cl.5). See also <i>id.</i>, Abstract, 2:46-49; EX1003, ¶¶303-304. As discussed below, Loewen renders obvious or Loewen plus Mostafa renders obvious those image-capturing devices having different angles of declination. EX1003, ¶307. Loewen renders obvious this limitation. EX1003, ¶305. POSITA would have been motivated and found it obvious,
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	straightforward, and advantageous to implement Loewen's disclosure of first and second image-capturing devices pointing rearward and downwardly at a 30-60 degree declination angle (EX1004, Abstract; <i>see</i> cl.1.a, cl.1.b) using different declination angles for the first and second devices. EX1003, ¶305. Using different angles would improve the variety of imagery data and detail produced with fewer surveys, allowing users to extract additional information (from employing a variety of perspectives) while balancing survey costs. EX1003, ¶305. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS.²⁶ EX1003, ¶305. Alternatively, Loewen renders obvious this limitation, at minimum, because Loewen renders obvious the system described in cl.5, <i>i.e.</i>, having the first device directed at an oblique angle and the second directed orthogonally. EX1003, ¶306. POSITA would have understood this arrangement yields first and second
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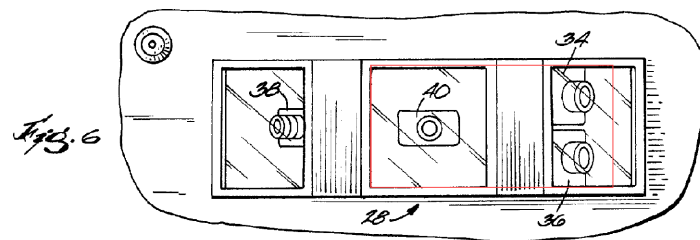
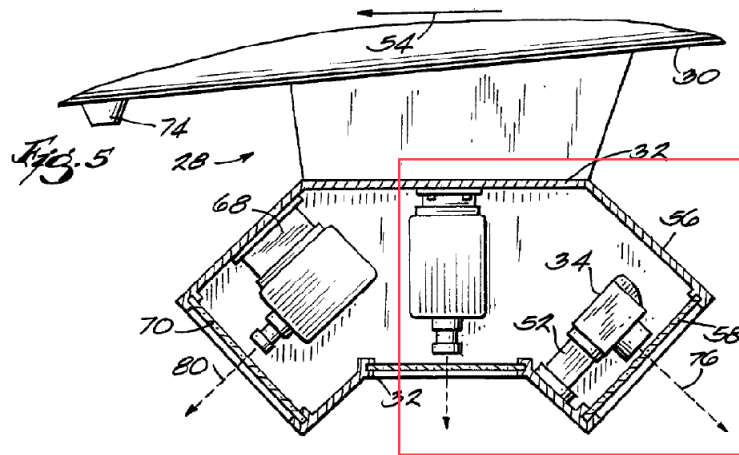
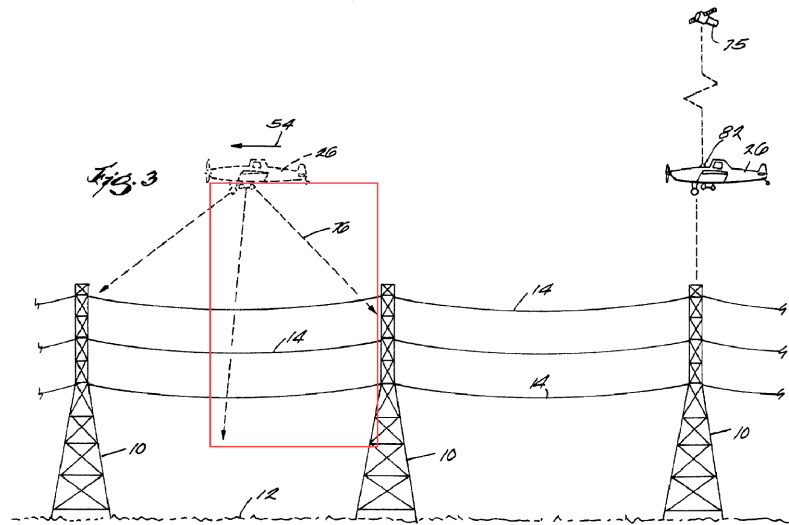
²⁶ *See* n.13.

	devices with different declination angles—the first with 30-60 degrees and the second 90 degrees. EX1003, ¶306. Alternatively, for the reasons immediately above and in cl.5, Loewen in view of Fujimoto and Mostafa renders obvious this limitation—<i>i.e.</i>, implementing Loewen-Fujimoto’s multiple still cameras using Mostafa’s advantageous disclosure of a downward-facing (“nadir”) still camera instead of Loewen’s downward-facing video camera. <i>See</i> cl.5; EX1003, ¶307.
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(d) Claim 20 (Grounds 1 and 4)

[20]	Loewen discloses the system for capturing images and geo-location data corresponding thereto of cl.14 (e.g., cl.14), further comprising a third image-capturing device²⁷ (e.g., EX1004, Abstract (“still camera”; “one or more still cameras”); 5:62-6:2 (“number and arrangement of the cameras can vary”)), wherein the first (e.g., cl.1.a) and second image-capturing devices (e.g., EX1004, 5:62-6:2 (second “still camera”); Fig.6 (“still camera 36” Fig.6); <i>see</i> cl.1.b) are capturing oblique aerial images (e.g., EX1004, Abstract (“The still camera points rearwardly relative to the line of flight of the aircraft and take a picture... at an angle to the line of flight, 30–60 degrees and preferably 45 degrees”)). <i>See id.</i>, 7:62-8:7; <i>see also id.</i>, 2:39-49, Figs.3, 5-6; EX1003, ¶¶312-314:
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²⁷ *See* n.6.



	Loewen renders obvious the third image-capturing device²⁸ capturing orthogonal aerial images (<i>see</i> cl.5). EX1003, ¶315. POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s disclosed two rear-facing still cameras (capturing oblique aerial images at image-capturing events)—which Loewen expressly discloses would have advantageously allowed one camera to be oriented to capture landscape-type images and the other portrait-type (<i>see</i> EX1004 (Loewen), 11:36-40)—using Loewen’s advantageous teachings of an additional downward-facing camera (in place of the video camera) such that in the resulting system Loewen’s first and second image-capturing devices capture oblique aerial images at image-capturing events and a third image-capturing device (<i>e.g.</i>, still camera) captures orthogonal im-
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²⁸ As in cl.5, Loewen renders obvious a “still camera” (“image-capturing device”) capturing orthogonal images at image-capturing events. EX1003, ¶316. Petitioner relies on those same disclosures for “capturing orthogonal aerial images” in cl.20, and the disclosures here for “third image-capturing device.” EX1003, ¶316.

	ages at image-capturing events. EX1003, ¶317. Loewen expressly discloses using “one or more” still cameras and that the “number and arrangement of cameras can vary,” EX1004, 2:36-38, 5:62-6:2, and expressly discloses downward-pointing cameras. EX1004, 8:8-14 (“video camera... perpendicular to the horizontal....”); 3:23-36, 6:3-30; Figs.3, 5-6; EX1003, ¶317. Loewen further expressly discloses its disclosed downward-pointing video cameras—used, <i>e.g.</i>, “for filming the right-of-way” to “inspect [its] integrity... [and] determine... if things such as trees and other plant growth or the like have encroached... and... present[] potential interference”—advantageously produce still images. EX1004, 8:54-57, 5:38-42, 6:3-7; EX1003, ¶317. Using a downward-facing still camera to take periodic orthogonal still photographs (triggered by, <i>e.g.</i>, Loewen’s laser altimeter detecting an object in the right-of-way and sending a signal to Loewen’s onboard computer, in turn triggering Loewen’s image-capturing devices, or configured to capture still images at set intervals, rather than continuous, memory-intensive video recordings), rather than a downward-facing video
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camera, would have been obvious, straightforward, and advantageous for the reasons in cl.5 regarding Loewen. *Supra*, pp.89-93; EX1003, ¶317.

Loewen plus Mostafa also renders this limitation obvious based on the same Loewen disclosures above and the Mostafa disclosures below, including in particular a “digital camera[.]... which is nadir” (for which Petitioner relies on Mostafa for Ground 4). EX1003, ¶318.

Mostafa discloses an image-capturing device capturing orthogonal images (see cl.5). EX1003, ¶¶319-320.

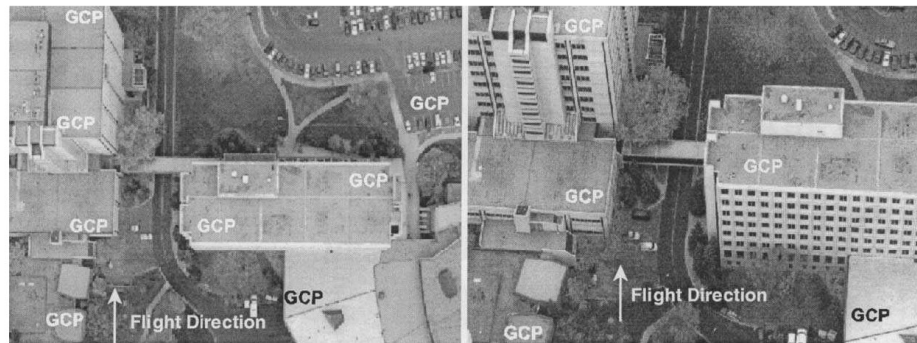


Fig. 6. A nadir digital image (left) and an oblique digital image (right), October 1998 flights.

POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement the combined Loewen-Fujimoto system, which relies on Loewen’s disclosures of capturing oblique aerial images using, *e.g.*, “still, digital cameras,” and capturing orthogonal images using, *e.g.*, a video camera “arranged at 90 degrees” for, *e.g.*, “filming the right-of-way”

	(EX1004, 2:30-36, 5:38-42, 5:62-6:2 (“number and arrangement of cameras can vary”), 8:8-14, 8:54-57) using Mostafa’s advantageous disclosure of a downward-facing still camera (<i>e.g.</i>, “nadir,” EX1007, Abstract) in place of Loewen’s downward-facing video camera. EX1003, ¶321. Using a downward-facing still camera, as Mostafa expressly disclosed (EX1007, Abstract), to take periodic orthogonal still photographs, rather than a downward-facing video camera (triggered by, <i>e.g.</i>, Loewen’s laser altimeter, as discussed above), would have been obvious, straightforward, and advantageous for the reasons discussed in cl.5. <i>Supra</i>, pp.89-93; EX1003, ¶321.
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(e) Claim 21 (Grounds 1 and 4)

[21] ²⁹	Additionally, Loewen plus Fujimoto and Mostafa renders obvious claim 21. ³⁰ EX1003, ¶324.
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²⁹ To the extent this claim requires independent camera control, Fujimoto discloses this for at least four cameras and renders this limitation obvious for the same reasons above. *See* cl.1.f; EX1005, 3-4, Fig.2; EX1003, ¶328.

³⁰ Cl.1 requires transmitting image-capture signals to first and second image-capturing devices, which Loewen discloses (cl.1.a-cl.1.b). EX1003, ¶327. The cl.1 analysis shows Loewen discloses a *third* still camera. EX1003, ¶327. Cl.20 depends from cl.1, and requires a third image-capturing device capturing orthogonal images. EX1003, ¶327. As shown above, cl.20 is obvious over Loewen plus Fujimoto, or alternatively, Loewen plus Fujimoto and Mostafa. EX1003, ¶327. With respect to the added requirement of sending an image-capturing signal to the third image-capturing device in cl.21, which depends from cl.20, as discussed below (and in cl.1), Loewen expressly discloses or renders obvious transmitting image-capturing signals to *each* of its image-capturing devices (*i.e.*, all three devices addressed in cl.20, cl.1). EX1003, ¶327. Additionally, Loewen plus Mostafa renders obvious transmitting image-capturing signals to each image-capturing device (cl.5, cl.20). EX1003, ¶327.

Loewen plus Fujimoto or Loewen plus Fujimoto and Mostafa render obvious the system for capturing images and geo-location data corresponding thereto of claim 20 (see cl.20), wherein the computer system (see cl.1.d-cl.1.f (rendered obvious by Loewen plus Fujimoto)) transmits image-capture signals to the first image capturing device and the second image-capturing device (see cl.1.a-cl.1.b (disclosed by Loewen)) and the third image-capturing device (see cl.20 (rendered obvious by Loewen plus Fujimoto or Loewen plus Fujimoto and Mostafa)) to cause the first, second, and third image capturing devices to capture images (see cl.1.f, cl.20). EX1003, ¶¶326-

Loewen discloses transmitting image-capture signals to each of its image-capturing devices to cause each image-capturing device to capture images. EX1003, ¶329. Indeed, Loewen discloses “triggering the still cameras” and “tripping the shutters,” and that “the computer is then able to perform real time coordination of camera tripping.” EX1004, 6:51-54, 7:13-17, 7:49-53. This is an express disclosure of triggering all of Loewen’s still cameras to capture images—which, as discussed (see cl.20) would have included a first, second, and third image-capturing device—by transmitting image-capturing signals to each camera, thus satisfying this limitation. EX1003, ¶329.

	If further disclosure of transmitting image-capture signals to the third image-capturing device to cause the third image-capturing device to capture images is required, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen's transmission of image-capture signals to its first and second-image capture devices to further transmit an image-capture signal to Loewen's third image-capture device, thus causing the third-image capture device to capture images. EX1003, ¶330. This would have advantageously provided imagery from a different viewpoint (orthogonal), which, as discussed, would have increased the usefulness of the system by providing still imagery from an additional viewpoint, thus providing the user of the system with additional views of and information about the structures or areas of interest being captured by the system. EX1003, ¶330. This would have been an obvious, routine implementation choice and clear this would
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	work, predictably yielding the expected functionality with REOS.³¹ EX1003, ¶330. As discussed (<i>see</i> cl.20), Loewen plus Mostafa renders obvious a third image-capturing device. EX1003, ¶331. If argued further disclosure of transmitting image-capture signals to the third image-capturing device to cause the third image-capturing device to capture images is required, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen’s disclosed transmission of image-capture signals to its first and second-image capture devices to further include transmitting a third image-capture signal to the combined Loewen-Fujimoto-Mostafa system’s third (orthogonal) image-capture device, thus causing the third-image capture device to capture images. EX1003, ¶331. This would have advantageously provided imagery from a different viewpoint (orthogonal), which, as discussed, would have increased the use-
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³¹ *See* n.13.

	fulness of the system by providing still imagery from an additional viewpoint, thus providing the user of the system with additional views of and information about the structures or areas of interest being captured by the system. EX1003, ¶331. This would have been an obvious, routine implementation choice and clear this would work, predictably yielding the expected functionality with REOS. ³² EX1003, ¶331.
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(f) Claim 26 (Grounds 3 and 5)

[26]	Loewen plus Fujimoto and Kain 1997, or Loewen plus Fujimoto, Mostafa, and Kain 1997 render obvious the system for capturing images and geo-location data corresponding thereto of claim 20 (see cl.20), wherein the first and second image-capturing devices (see cl.1a-1.b (citing Loewen)) capture community level oblique aerial images (see cl.4 (discussing “first or second image-capturing device captures community level oblique aerial images”), cl.20 (discussing “first and second image-capturing devices are capturing oblique aerial images”)).³³ EX1003, ¶336.
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³² See n.13.

³³ Cl.20, on which cl.26 depends, is obvious over Loewen plus Fujimoto or Loewen plus Fujimoto and Mostafa. Cl.26 additionally requires that Loewen’s first and second image-capturing devices (cl.1.a-1.b) capture community-level oblique

	As discussed (<i>see</i> cl.4) POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement the disclosed first and second image-capturing devices of Loewen-Fujimoto or Loewen-Fujimoto-Mostafa systems of claim 20 that capture oblique aerial images (<i>see</i> cl.20) using Kain's advantageous disclosure of capturing images including one-foot-per-pixel GSD (which is a community-level aerial image consistent with '657's explanation of that term) such that the first and second image-capturing devices in the resulting
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aerial images. EX1003, ¶337. Loewen plus Fujimoto and Kain 1997 renders obvious a first *or* second image-capturing device capturing community-level oblique aerial images (cl.4). EX1003, ¶337. Loewen plus Fujimoto or Loewen plus Fujimoto and Mostafa renders obvious the first and second image-capturing devices capturing oblique aerial images (cl.20). EX1003, ¶337. Cl.21 requires that *both* first and second image-capturing devices capture oblique aerial images (as in cl.20) at a community level (as in cl.4 as to at least one camera). EX1003, ¶337.

system captured community-level oblique aerial images (triggered by, *e.g.*, Loewen's laser altimeter, as discussed above) in appropriate contexts, including for larger structures where small detail is of less concern. EX1004, 2:23-26, 5:37-41; *see also id.* at 2:19-21; EX1003, ¶¶338-339. Capturing community-level oblique aerial images of one-foot-per-pixel in the foreground of the image (*e.g.*, where higher-resolution images are not required, such as capturing downed transmission towers following a severe storm), two-feet-per-pixel in the mid-ground, and four-feet-per-pixel in the background³⁴ using both the first and second image-capturing devices (which Loewen expressly discloses would have advantageously allowed one camera to be oriented to capture landscape-type images and the other camera to capture portrait photographs (EX1004, 11:36-40)) would have advantageously reduced storage requirements as compared to images captured at a higher-resolution, allowing for a greater number of images to be captured and stored while still

³⁴ *See* n.21.

	providing sufficient detail for the various above-discussed uses of such imagery including. EX1003, ¶339. Allowing a greater number of images to be captured would have, <i>e.g.</i>, advantageously allowed for more views of the structures or areas of interest and/or more to be captured in a single flight, thus increasing the coverage of the capture system. EX1003, ¶339. This would have been an obvious, routine implementation choice, particularly given that obtaining images of different resolution was well-known and conventional by varying well-known camera parameters (<i>e.g.</i>, field-of-view, sensor size) and distance from which an image is taken (EX1003, ¶339), and clear this would work, predictably yielding the expected functionality with REOS.³⁵ EX1003, ¶339.
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³⁵ See n.13.

(g) Claim 27 (Grounds 6 and 7)

[27] ³⁶	Loewen plus Fujimoto and Kain 2003 renders obvious claim 27. EX1003, ¶¶342, 352. Additionally, Loewen plus Fujimoto, Mostafa, and Kain 2003 renders obvious claim 27. EX1003, ¶¶342, 352. Loewen plus Fujimoto or Loewen plus Fujimoto and Mostafa renders obvious the system for capturing images and geo-location data corresponding thereto of claim 20 (<i>see</i> cl.20), and Loewen discloses wherein the first and second image-capturing devices captures oblique aerial images (<i>see</i> cl.1.a, cl.20 (citing Loewen)). EX1003, ¶344. Kain 2003 discloses capturing neighborhood-level aerial images (<i>e.g.</i>, “image” with “ground-sample-distance” of “0.196
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³⁶ POSITA would have understood from ‘657’s exemplary description of oblique neighborhood level-images (*see* EX1001, 13:65-9; EX1003, ¶346)— particularly that neighborhood-level images are “significantly more detailed than... community-level images” and that ‘657 does not describe a category with even-more-detailed imagery—that oblique aerial images including other lower GSDs (denoting higher resolution) also qualify as “neighborhood level....” EX1003, ¶346. As discussed (*see* n.37, *infra*), POSITA would have thus understood Kain 2003 expressly disclosed neighborhood-level aerial images. EX1003, ¶346.

	ft” (approximately 2.3 inches) ³⁷ or “0.391 ft” (approximately 4.69 inches)). EX1003, ¶¶345, 347-348.
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³⁷ Kain 2003 discloses an image with approximately 1.03 inches-per-pixel GSD at 220 feet (an altitude Loewen expressly disclosed (EX1004, 5:14-15, 5:57-61)) and an image with 4 inches-per-pixel GSD at approximately 841 feet, which POSITA would have been able to readily ascertain using simple ratios (*i.e.*, multiplication/division) based on Kain 2003’s other expressly-disclosed ground-sample distance values at other altitudes like 500 and 1000 feet. EX1003, ¶349; EX1009, Table 3. If argued further disclosure of GSDs including 4 inches-per-pixel at lower altitudes, such as 220 feet, is required, POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Kain 2003’s expressly-disclosed 4 inches-per-pixel GSD at approximately 841 feet at, instead, lower altitudes such as 220 feet for appropriate applications, as doing so would have allowed capture of higher-resolution images at lower altitudes that would be more likely to be below cloud cover, thereby increasing visibility and allowing image capture on more days per year. EX1003, ¶350. Moreover, Loewen discloses lower altitudes allow “the use of advantageous exposure parameters.” EX1004, 2:53-56; EX1003, ¶350. This would have been an obvious, routine implementation choice, particularly given that obtaining images at different resolutions was

EX1009, Table 3:

TABLE 3

Altitude (AGL ft)	GSD (m/ft)	Image Width (m/ft)	Image height (m/ft)	Area (acre/mi ²)
500	0.060/0.196	76.3/250.3	56.7/186.0	1.1/0.0017
1000	0.119/0.391	152.6/500.5	113.4/372.0	4.3/0.0067

TABLE 3-continued

Altitude (AGL ft)	GSD (m/ft)	Image Width (m/ft)	Image height (m/ft)	Area (acre/mi ²)
2000	0.238/0.782	305.1/1001.0	226.8/744.1	17.1/0.0267
3000	0.357/1.173	457.7/1501.5	340.2/1116.1	38.5/0.060
4000	0.477/1.564	610.2/2002.0	453.6/1488.1	68.4/0.107
6000	0.715/2.346	915.3/3003.1	680.4/2232.2	153.9/0.240
8000	0.953/3.128	1220.4/4004.1	907.2/2976.3	273.6/0.427
10000	1.192/3.910	1525.6/5005.1	1134.0/3720.3	427.5/0.668

POSITA would have been motivated and found it obvious, straightforward, and advantageous to implement Loewen's disclosed first and second image-capturing devices that capture

well-known and conventional and could be easily done by varying well-known camera parameters (*e.g.*, field-of-view, sensor size) and clear this would work, predictably yielding the expected functionality with REOS. EX1003, ¶350.

oblique aerial images (in Loewen-Fujimoto or Loewen-Fujimoto-Mostafa (*see* cl.20)) using Kain 2003's advantageous disclosures of neighborhood-level aerial images including GSDs of, *e.g.*, 1.03 inches-per-pixel, 2.3 inches-per-pixel, 4 inches-per-pixel, and 4.69 inches-per-pixel in the foreground, with increasing values (lower resolutions) in the mid-ground and background given Loewen's expressly-disclosed 30-60 degree camera angles (including, preferably, 45 degrees) (n.5; *see also* EX1009, ¶39) and what POSITA would have understood were fields of view at the upper end of the range of conventional and well-known fields of view, yielding oblique neighborhood-level images. EX1003, ¶351; n.5. Capturing more-detailed neighborhood-level oblique aerial images including GSDs of, *e.g.*, four-inches-per-pixel in the foreground would have produced higher-resolution images, advantageously allowing more highly-detailed viewing of structures/areas-of-interest, increasing image usability. EX1004, 2:34-36; EX1003, ¶351. This would have been an obvious, routine implementation choice, particularly because obtaining higher-resolution images was

	well-known and conventional and could be easily done by varying well-known parameters (<i>e.g.</i> , field-of-view, sensor size) and distance from which an image is taken— <i>e.g.</i> , it would have been beneficial to operate at higher altitudes to, <i>e.g.</i> , better capture downed towers or scattered wires following severe storms that would otherwise not be fully visible from, <i>e.g.</i> , 80-100 feet (the height of intact towers, per Loewen (EX1004, 5:14-15)) or to capture at higher altitudes where required by flight regulations that forbid lower-altitude flights over certain areas (<i>e.g.</i> , powerplants), where transmission towers are likely to be located (EX1003, ¶351)—and clear this would work, predictably yielding the expected functionality with REOS. ³⁸ EX1003, ¶351.
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* * *

Petitioner is aware of no evidence from PO of secondary considerations with a nexus to '657, and reserves the right to address any PO raises. EX1003, ¶354. *Petroleum Geo-Servs. Inc. v. WesternGeco LLC*, IPR2014-01475, Pap. 18, 28 (Mar. 17, 2015).

³⁸ See n.13.

VII. §325(d) DOES NOT APPLY

Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH, IPR2019-01469, Pap.6 at 7, 8-9 (Feb. 13, 2020) (precedential) (“*AB*”) does not support discretionary denial.

As to ***AB* part 1**, Fujimoto was *not* before ’657’s Examiner—of the references herein, only Loewen and Kain 1997 (U.S. Patent 5,894,323) were. *See generally* EX1002. Thus, none of Grounds 1-7—all of which include Fujimoto—was previously presented. *Throne Rsch., Inc. v. Trs. of Dartmouth*, IPR2021-00268, Pap.21, 9 (June 10, 2021) (“*combination* of prior art” “not the same or substantially the same... [so] we need not reach the second part of [*AB*]”); *Netflix, Inc. v. DivX, LLC*, IPR2020-00646, Pap.12, 51-55 (Sept. 15, 2020) (asserted combination “materially different” notwithstanding that one combined reference was cited in prosecution IDS; therefore, “grounds of unpatentability do not rely upon the same or substantially the same prior art or arguments”).

Although unnecessary, if the Board reaches ***AB* part 2**, discretionary denial is not warranted. As detailed herein, Loewen disclosed all limitations of ’657’s independent claim except separate camera control, and *the Examiner agreed*. EX1002, 257-258. Petitioner thus uses Loewen in Grounds 1-7 the same way the

Examiner did during '657's prosecution.³⁹ *Intel Corp. v. Godo Kaisha IP Bridge I*, IPR2018-00855, Pap.7, 28-35 (Nov. 6, 2018) (analyzing *Becton, Dickinson* factor (c) (relevant to *AB* part 2), determining petitioner's use of previously-cited references was not inconsistent with prosecution findings). And neither Fujimoto nor any cumulative reference was before the Examiner—thus, Fujimoto is not used inconsistently with any Examiner findings, and instead supplies the sole limitation PO argued the art lacked. EX1002, 290-292. And, in any event, the Examiner's failure to consider Fujimoto was material error. *Quasar Sci. LLC v. Colt Int'l Clothing, Inc.*, IPR2023-00614, Pap.8, 7-9 (Oct. 12, 2023) (finding material error because examiner "overlooked" teachings of reference "not before the Office during examination"). Thus, *AB* part 2 does not favor denial.

For at least these reasons and those presented *supra* (§I.B), the Board should not exercise its §325(d) discretion.⁴⁰

³⁹ Petitioner similarly relies on Kain 1997 only in Grounds 3 and 5 for claims 4's and 26's "community-level" limitation—which is not inconsistent with the Examiner's reliance on related '323 for an INU. EX1002, 119-22, 264-67.

⁴⁰ Discretionary denial under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Pap.11 (Mar. 20, 2020) (precedential) is inapplicable. No trial date is set and the Utah

VIII. CONCLUSION

Petitioner requests this Petition be instituted and the Claims found unpatentable/canceled. Per §§1.33(c), 42.105(c), and 42.100, pursuant to agreement with PO's counsel this Request is being served via electronic mail on PO's counsel. The Director is authorized to charge any fee deficiency in this proceeding to Deposit Account DA604974.

Respectfully submitted:

/J. Steven Baughman/
J. Steven Baughman

March 28, 2024

litigation district's median time-to-trial yields a May 2026 trial, long after the October 2025 FWD deadline here. *See* EX1013, 85; USPTO, *Interim Procedure for Discretionary Denials*, at 3, 8-9 (June 21, 2022).

CLAIM APPENDIX

The claim listing below assigns element labels to the independent claim(s) corresponding to the mappings provided in the Petition.

Limitation	Text
1[pre]	A system for capturing images and geo-location data corresponding thereto, comprising:
1[a]	a first image-capturing device, said first image-capturing device capturing oblique aerial images at image-capturing events, said first image-capturing device issuing first image-data signals corresponding to captured images;
1[b]	a second image-capturing device, said second image-capturing device capturing images at image-capturing events, said second image capturing device issuing second image-data signals corresponding to captured images;
1[c]	at least one geo-locating device, each said at least one geo-locating device issuing a corresponding at least one geo-locating signal, each said at least one geo-locating signal being indicative at least in part of a geo-location of said first image-capturing device during each first image capturing event;
1[d]	a computer system receiving and storing said first and second image-data signals and said at least one geo-locating signal;
1[e]	the computer system executing image and data acquiring software reading said first and second image-data signals and said at least one geo-locating signal, said image and data acquiring software associating each said first or second image-data signal with a corresponding said at least one geo-locating signal for each image-capturing event; and
1[f]	wherein the computer system transmits image-capture signals to the first image-capturing device and the second image-capturing device to cause the first and second image-capturing devices to capture images, and wherein the computer system controls the first and second image-capturing devices separately.

Limitation	Text
2[pre]	The system of claim 1, wherein said at least one geo-locating device and said at least one geo-locating signal respectively comprise at least one of:
2[a]	a clock issuing to said image-capturing computer system time data signals indicative of a time of each said image-capturing event;
2[b]	a global-positioning system (GPS) receiver receiving GPS signals and issuing to said image-capturing computer system location data signals indicative of a longitude and latitude of said first or second image-capturing devices at each said image-capturing event;
2[c]	an inertial navigation unit (INU) issuing to said image-capturing computer system velocity data signals indicative of a velocity of said first or second image-capturing device at each said image-capturing event;
2[d]	a gyroscope issuing to said image-capturing computer system a pitch signal, a roll signal, and a yaw signal respectively indicative of a pitch, roll and yaw of said first or second image-capturing device at each said image-capturing event;
2[e]	a compass issuing to said image-capturing computer system heading data signals indicative of a heading of said first or second image-capturing device at each said image-capturing event; and
2[f]	an altimeter issuing to said image-capturing computer system altitude data signals indicative of an altitude of said first or second image-capturing device at each said image-capturing event.
3[pre]	The system of claim 1, wherein said at least one geo-locating device and said at least one geo-locating signal respectively comprise:
3[a]	a clock issuing to said image-capturing computer system time data signals indicative of a time of each said image-capturing event;
3[b]	a global-positioning system (GPS) receiver receiving GPS signals and issuing to said image-capturing computer system location data signals indicative of a longitude and latitude of said first or second image-capturing devices at each said image-capturing event;
3[c]	an inertial navigation unit (INU) issuing to said image-capturing computer system velocity data signals indicative of a velocity of said first or second image-capturing device at each said image-capturing event;

Limitation	Text
3[d]	a gyroscope issuing to said image-capturing computer system a pitch signal, a roll signal, and a yaw signal respectively indicative of a pitch, roll and yaw of said first or second image-capturing device at each said image-capturing event;
3[e]	a compass issuing to said image-capturing computer system heading data signals indicative of a heading of said first or second image-capturing device at each said image-capturing event; and
3[f]	an altimeter issuing to said image-capturing computer system altitude data signals indicative of an altitude of said first or second image-capturing device at each said image-capturing event.
4	The system for capturing images and geo-location data corresponding thereto of claim 1, wherein the first or second image-capturing device captures community level oblique aerial images.
5	The system for capturing images and geo-location data corresponding thereto of claim 1, wherein the second image-capturing device captures orthogonal images at image-capturing events.
14	The system for capturing images and geo-location data corresponding thereto of claim 1, further comprising a platform carrying the first and second image-capturing devices through a controlled flight.
19	The system for capturing images and geo-location data corresponding thereto of claim 14, wherein the first and second image-capturing devices have different angles of declination.
20	The system for capturing images and geo-location data corresponding thereto of claim 14, further comprising a third image-capturing device, wherein the first and second image-capturing devices are capturing oblique aerial images and the third image-capturing device is capturing orthogonal aerial images.
21	The system for capturing images and geo-location data corresponding thereto of claim 20, wherein the computer system transmits im-

Limitation	Text
	age-capture signals to the first image-capturing device and the second image-capturing device and the third image-capturing device to cause the first, second, and third image-capturing devices to capture images.
26	The system for capturing images and geo-location data corresponding thereto of claim 20, wherein the first and second image-capturing devices capture community level oblique aerial images.
27	The system for capturing images and geo-location data corresponding thereto of claim 20, wherein the first and second image-capturing devices capture neighborhood level oblique aerial images.

CERTIFICATE UNDER 37 C.F.R §42.24(d)

Pursuant to 37 CFR §42.24(d), the undersigned certifies that this Petition complies with the type-volume limitation of 37 C.F.R. §42.24(a). The word count application of the word processing program used to prepare this Petition indicates that the Petition contains 13,987 words, excluding the parts of the brief exempted by 37 C.F.R. §42.24(a).

Respectfully submitted:

/Megan Raymond /
Megan Raymond

March 28, 2023

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the following documents has been served in its entirety on the patent owner as provided in 37 C.F.R. §42.105:

Petition for *Inter Partes* Review of United States Patent No. 10,671,657 and accompanying exhibits:

Exhibit	Description
EX1001	U.S. Patent No. 9,182,657
EX1002	U.S. Patent No. 9,182,657 File History
EX1003	Declaration of David A. Forsyth, Ph.D.
EX1004	U.S. Patent No. 7,184,072 (Loewen)
EX1005	EP0053640 (Fujimoto)
EX1006	U.S. Patent No. 5,878,356 (Garrot)
EX1007	Mostafa, M.M.R. & Schwarz, K.-P., “Digital image georeferencing from a multiple camera system by GPS/INS,” ISPRS Journal of Photogrammetry & Remote Sensing, Vol.56, 1-12 (2001) (Mostafa)
EX1008	WO 97/35166 (Kain 1997)
EX1009	U.S. Patent Pub. No. 2003/0048357 (Kain 2003)
EX1010	U.S. Patent No. 7,893,957 (Peters)
EX1011	Hall, R.J. & Hiscocks, P., “A Microcomputer-Based Camera Control System,” Photogrammetric Engineering and Remote Sensing, Vol.56 No.5, 443-446 (April 1990)
EX1012	Held, K.J. & Robinson, B, “TIER II Plus Airborne EO Sensor LOS Control and Image Geolocation,” 1997 IEEE Aerospace Conference, Vol.2, 377-405 (1997)
EX1013	<i>U.S. District Courts—National Judicial Caseload Profile</i> , available at https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile1231.2023.pdf (Dec. 31, 2023)
EX1014	Fourth Amended Patent Case Scheduling Order, Dkt. 372, <i>Eagle View Technologies Inc., and Pictometry International Corp v. Nearmap US, Inc., Nearmap Australia Pty Ltd, and Nearmap Ltd</i> , C.A. No. 2:21-cv-00283-TS-DAO (D. Utah Dec. 27, 2023)

EX1015	WO 99/18732 (Ciampa)
EX1016	U.S. Patent Pub. No. 2003/0164962 (Nims)
EX1017	“ISPRS Journal of Photogrammetry and Remote Sensing,” https://www.sciencedirect.com/journal/isprs-journal-of-photogrammetry-and-remote-sensing/vol/56/issue/1
EX1018	“Nadir,” “Merriam-Webster.com Dictionary,” <i>available at</i> https://www.merriam-webster.com/dictionary/nadir (Accessed March 26, 2024)
EX1019	Compilation of Annotated Images from Oblique Aerials Browser, “A collection of historical aerial photographs of the City of Tampa,” https://storymaps.arcgis.com/stories/f26b7c047dde45d6ae2224208d46071a (accessed March 27, 2024)
EX1020	Declaration of June Munford
EX1021	Oblique Aerials Browser, “A collection of historical aerial photographs of the City of Tampa,” https://storymaps.arcgis.com/stories/f26b7c047dde45d6ae2224208d46071a (accessed March 27, 2024)
EX1022	Declaration of Sayem Osman

Pursuant to agreement with PO’s counsel, the copy has been served on March 28, 2024, by causing the aforementioned document to be electronically mailed to the following attorneys for PO listed below:

Counsel Authorized to Accept Service:	Gregory P. Webb HAYNES AND BOONE, LLP 6000 Headquarters Dr. Suite 200 Plano, TX 75024 greg.webb@haynesboone.com Patricia Hauglum HAYNES AND BOONE, LLP 6000 Headquarters Dr. Suite 200 Plano, TX 75024 patricia.hauglum@haynesboone.com By Electronic Mail
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Dated: March 28, 2024

**GROOMBRIDGE, WU, BAUGHMAN &
STONE LLP**

/Sayem Osman/
Sayem Osman