UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ams AG, AMS-TAOS USA INC.,
SAMSUNG ELECTRONICS AMERICA, INC., and
SAMSUNG ELECTRONICS CO. LTD.,
Petitioners

v.

JJL TECHNOLOGIES LLC and 511 INNOVATIONS, INC.,
Patent Owner

Case IPR2016-01804
U.S. Patent No. 6,490,038

PETITION FOR *INTER PARTES* REVIEW

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I. MANDATORY NOTICES

A. Real Parties-in-Interest

ams AG, AMS-TAOS USA Inc., Samsung Electronics America, Inc., and Samsung Electronics Co., Ltd. (collectively "Petitioners") are the real parties-in-interest to this proceeding.

U.S. Patent No. 6,490,038 (the "'038 Patent") was assigned to JJL Technologies LLC by an assignment dated July 26, 2007 and recorded on the same date at reel/frame 019597/0461. However, in the various court proceedings identified below, 511 Innovations, Inc. claims to be "the current owner by assignment of all rights, title, and interest in and under the '038 Patent."

B. Related Matters

The '038 Patent and other patents in the same patent family are currently asserted against Petitioners in *511 Innovations, Inc. v. Samsung Telecommunications America, LLC*, No. 2:15-cv-01526 (E.D. Tex.). Other patents in the same patent family are also currently asserted in: *511 Innovations, Inc. v. HTC America, Inc.*, No. 2:15-cv-01524 (E.D. Tex.); *511 Innovations, Inc. v. Microsoft Mobility Inc.*, No. 2:15-cv-01525 (E.D. Tex.); and *511 Innovations, Inc. v. Apple, Inc.*, No. 2:16-cv-00868 (E.D. Tex.).

In addition to this Petition, Petitioners are seeking *inter partes* review of related U.S. Patents Nos. 6,307,629, 7,113,283, 6,915,955, 7,110,096, 7,397,541, 8,472,012, and 8,786,844.

C. Counsel

Lead Counsel: Daniel E. Venglarik (Registration No. 39,409);

Backup Counsel: Jamil N. Alibhai (*pro hac vice* to be filed), Kelly P. Chen (*pro hac vice* to be filed), and Jacob L. LaCombe (Registration No. 63,036).

D. Service Information

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E. Certification of Standing

Petitioners certify that the ’038 Patent is available for *inter partes* review and that Petitioners are not barred or estopped from requesting *inter partes* review on the grounds identified herein.

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Petitioners challenge Claims 126-127, 132, 135-137, and 140-141 of the ’038 Patent as indicated below:

Ground 1: Claims 126-127, 132, 135-137, and 140-141 are obvious over JP ’028.

Ground 2: Claims 126-127, 132, 135-137, and 140-141 are obvious over Mills.

Ground 3: Claims 126-127, 132, 135-137, and 141 are obvious over Eguchi.

The above grounds create a reasonable likelihood that Petitioners will prevail with respect to at least one of the challenged claims. The arguments, charts, and evidence demonstrate that the challenged claims are unpatentable as obvious under 35 U.S.C. § 103. Petitioners request cancellation of the challenged claims.

III. THE ’038 PATENT

A. Overview of the ’038 Patent

The challenged claims are directed to the well-known idea of using optical sensors to measure the intensity of light reflected from the object, and then using the intensity measurements to determine information about the object. The patent generally discusses measuring the intensity of reflected light and using the measured intensity in an algorithm (run on the microprocessor) to determine the optical characteristics of the object. Ex. 1001, 3:23-4:23. The ’038 Patent describes a probe that measures the intensity of reflected light to determine optical characteristics (e.g., color, "reflectivity," or luminance) of teeth. Ex. 1001, 4:18-22. As shown in Figure 1, light emitted by a light source 11 is carried by fiber optic 5 to probe body 2 and probe tip 1 to illuminate a patient's teeth 20:

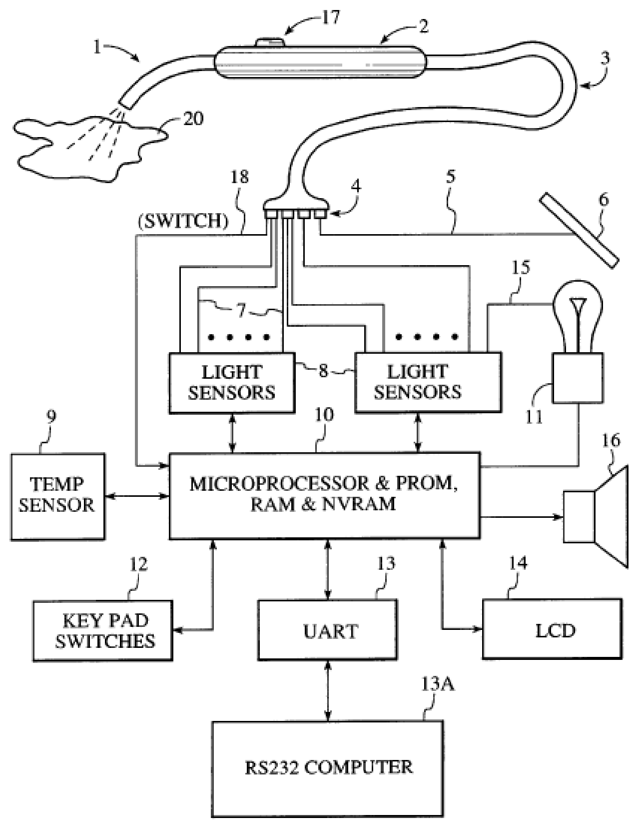


FIG. 1

Ex. 1001, Figure 1, 5:12-6:5, 6:12-19. "Light reflected from the object 20 passes through the receiver fiber optics in probe tip 1 to light sensors 8 (through probe body 2, fiber optic cable 3 and fibers 7)." Ex. 1001, 7:39-41. "Based on the information produced by light sensors [8], microprocessor 10 produces a color measurement result or other information to the operator." Ex. 1001, 7:41-49.

B. Admitted Prior Art

The ’038 Patent admits prior art knowledge that color is dependent on the wavelength(s) of reflected light and that light incident on an object will, when reflected, “vary in intensity and wavelength dependent upon the color of the surface of the object.” Ex. 1001, 1:25-32. Admitted prior art color measurement devices (“colorimeters”) shine “white” light on the object and measure the intensity of reflected light received through filters passing only bands of wavelengths, such as red, green, and blue color filters. Ex. 1001, 1:22-27, 1:58-64. The intensity measurements from the three (red/green/blue) “color sensors” represent the color. Ex. 1001, 2:1-9. Admitted prior art light sensors such as the commercially available TSL230 or TSL213 and admitted prior art filter materials such as Kodak filters are disclosed for such system components. Ex. 1001, Figures 1, 3, & 11, 8:60-9:7, 10:3-20, 19:9-33.

IV. ORDINARY SKILL IN THE ART

A person of ordinary skill in the art at the time of the claimed inventions would have had a bachelor’s degree in electrical engineering, physics, or a closely related field, along with at least 2-3 years of experience in the design and development of optoelectronic measurement systems. An individual with an advanced degree in a relevant field, such as physics or electrical engineering, would require less experience in the design and development of optoelectronic measurement systems.

V. CLAIM CONSTRUCTION

The ’038 Patent expired on January 2, 2016. In reviewing a patent that has expired or will expire before the final decision, the Board applies the “district court” or *Phillips* claim construction standard. 37 C.F.R. § 42.100(b). Under that standard, the “correct” construction—that most accurately delineating the scope of the invention—is identified. *PPC Broadband, Inc. v. Corning Optical Communications RF, LLC*, 815 F.3d 734, 740 (Fed. Cir. 2016).

As shown below, the prior art renders obvious claims 126-127, 132, 135-137 and 140-141 of the ’038 Patent; accordingly, the Board need not consider any claim terms for purposes of invalidity.

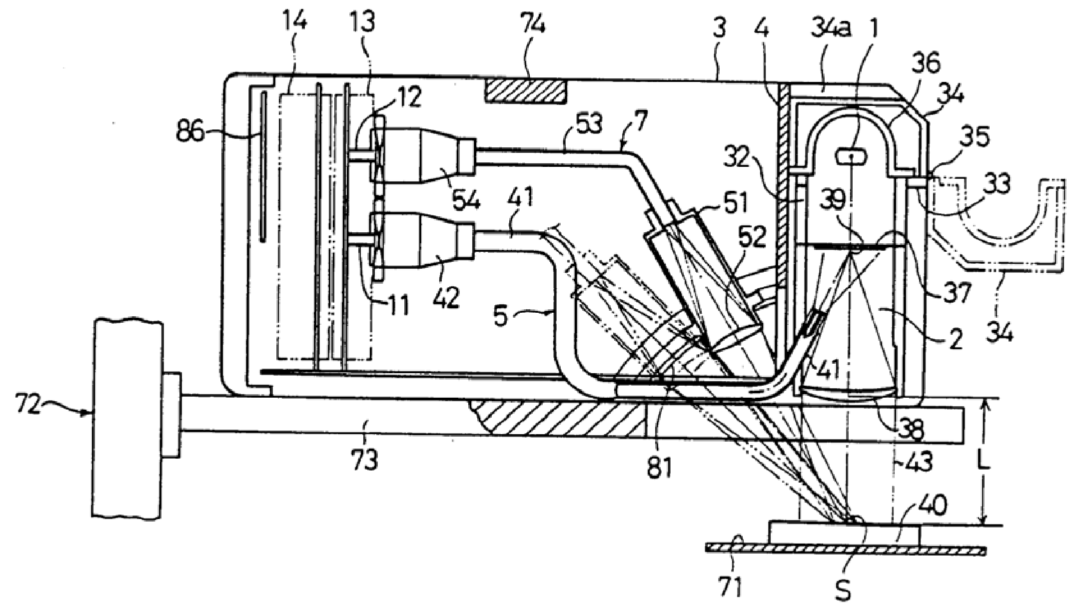
VI. GROUND 1: Claims 126-127, 132, 135-137 and 140-141 are obvious over JP ’028.

A. Overview of JP ’028

JP ’028 describes a non-contact colorimeter B to measure an object’s color and set a distance between the colorimeter and the object to be measured to a prescribed distance (to avoid inaccurate color measurement). Ex. 1004, Figure 6, 214-l[1], 220-l.

A xenon light source 1 emits light projected by lens 38 onto an object 40:

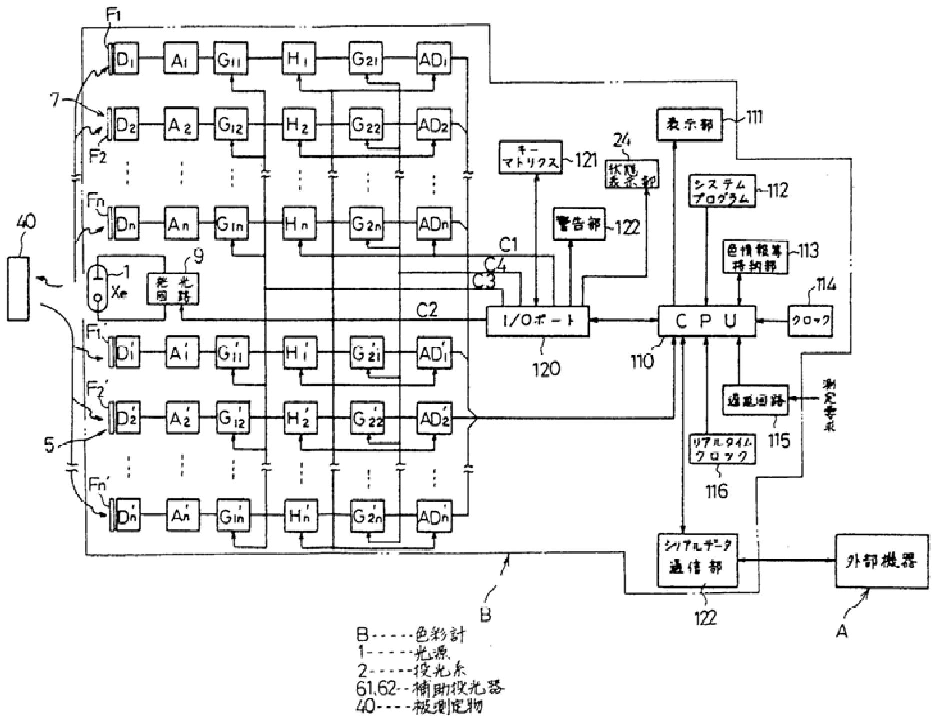
第 2 図



Ex. 1004, Figures 2-4, 215-r. A sample monitor 7 receives light (through a light receiving lens tube 51 and light receiving lens 52) reflected light from the object 40 which is coupled via optical fiber 53 and diffusion chamber 54 to a sensor 12. Ex. 1004, Figure 2, 216-l. Sensor 12 includes color component filters F_1'-F_n' for filtering light reflected from the object 40 and light color component detectors D_1'-D_n' for measuring the intensity of the color components of the received filtered light:

[1] For convenience, "l" and "r" are used to designate the left and right columns, respectively, on the indicated page.

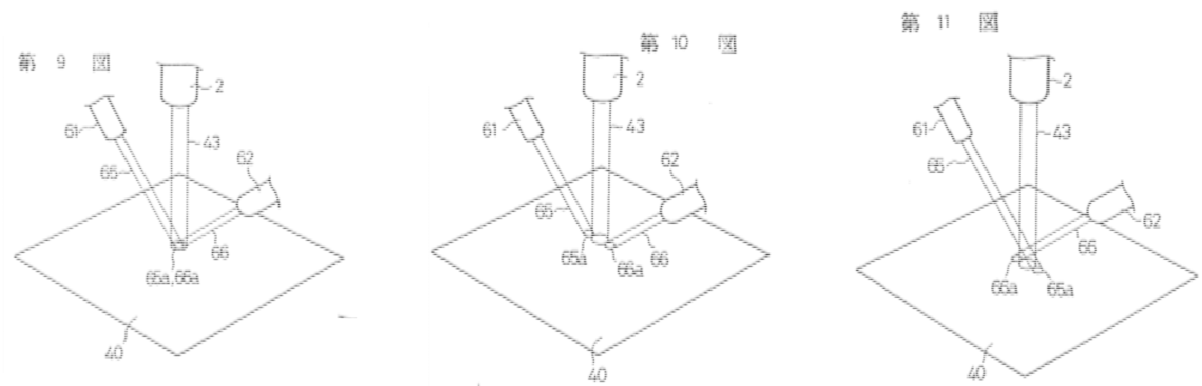
第 1 図



Ex. 1004, Figure 1, 217-r.

The color component detectors D_1'-D_n' generate and output an electric signals corresponding to the intensity of the basic color components. The electric signals are amplified by amplification circuits A_1'-A_n', connected by gate circuits G_{11}'-G_{1n}' to sample and hold circuits H_1'-H_n', and are connected by gate circuits G_{21}'-G_{2n}' to A/D conversion circuits AD_1'-AD_n'. Ex. 1004, Figure 1, 218-l. These AD conversion circuits convert the electric signals corresponding to light intensity measurements into digital values. The CPU 110 receives the digital values for the measured color components of the reflected light (from the object). Ex. 1004, 218-r ("The photometric value of the respective basic color components converted into digital signals by the A/D conversion circuits AD_1-AD_n, AD_1'-AD_n' are input into the CPU 110.”).

To ensure object 40 is at measurement position S that is a prescribed distance L from input lens tube 51, two auxiliary light projectors 61, 62 emit light and are positioned so that the resulting optical paths 65, 66 intersect each other and the main optical path 43 at measurement position S:



Ex. 1004, Figures 9-11, 216-l to 216-r. Auxiliary projectors 61, 62 flash light along the optical paths 65, 66 of two colors different from each other and from the color of light from the main optical path 43 to enable determination of when the object is at the correct measurement position s. Ex. 1004, 214-r to 215-l, 216-r, 216-r to 217-l. Light color component intensity measurements by sensor 12 allow determination of when the object 40 is at the prescribed distance L for accurate color measurement, when the spots 65a and 66a coincide with each other and the sport for beam 43. Ex. 1004, Figure 9, 216-r to 217-l. By analyzing the intensity for each reflected light color based upon one or both of the alternate flashing or different colors from auxiliary projectors 61, 62, the separation or overlap of the projected images 65a, 66a of light 65, 66 from projectors 61, 62 allow determination of an offset direction from the prescribed distance L. Ex. 1004, Figures 10-13, 216-r to 217-l. Light intensity measurements by the sensor 12 (and the sensor 11) allow color determination from light reflected from the object 40. Ex. 1004, 220-l to 220-r.

B. JP ’028 Renders Claims 126-127, 132, 135-137 and 140-141 Obvious

1. *Claim 126*

[126a] “*An apparatus comprising*”

JP ’028 describes a non-contact colorimeter B for use in automated color measurement. Ex. 1004, Figure 6, 220-l.

[126b] “*one or more light receivers receiving light to be spectrally analyzed*”

Object 40 is illuminated by a light source 1 and the light reflected from the object 40 is received by light receiving lens 52 [light receiver] for spectral measurement. Ex. 1004, Figs. 1-2, 216-l; Ex. 1009, ¶ 25.

JP ’028 describes that a monitor 5 receives light from the light source 1 via optical fiber 41, and monitor 7 receives light reflected off the surface of object 40 via receiving lens 52 and optical fiber 52. Each monitor includes a respective sensor 11, 12 for spectrally analyzing the light received by the corresponding monitor. Ex. 1004, Figure 2, 216-l.

[126c] "*a color filter having a plurality of portions*"

JP '028 describes using color component filters F_1'-F_n' [color filter] configured as n portions F_1' thru F_n' "that analyze the light . . . for basic color components." Ex. 1004, Figure 1, 217-r; Ex. 1009, ¶ 26.

[126d] "*wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band, of wavelengths*"

Each color component filter portion F_1'-F_n' "that analyze[s] the light . . . for basic color components" has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. In the embodiment, n=3 is established and the three stimulus values, X,Y,Z, which are in the XYZ color specification. Ex. 1004, 218-l. Three basic color components correspond to wavelengths within the XYZ color specification. Ex. 1009, ¶ 27.

[126e] "*wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed*"

Each of sensors 11, 12 receives light through filters F_1'-F_n' allowing the light to be analyzed for basic color components of the visible light range to determine object color. Ex. 1004, Figure 1, 217-l to 217-r.

[126f] "*wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter*"

Light reflected off the surface of object 40 and received via receiving lens 52 and optical fiber 53 [light receiver] passes through each of color filters F_1'-F_n' "that analyze the light . . . for basic color components" to determine object color. Ex. 1004, Figure 1, 217-l to 217-r.

[126g] "*an optical sensor having a plurality of sensing elements*"

Light sample monitor 7, which includes light sensor 12 having color component detectors D1′-Dn′ [collectively, an optical sensor], receives light (through a light receiving lens tube 51 and light receiving lens 52) reflected from the object 40 via optical fiber 53 and diffusion chamber 54. Ex. 1004, Figs. 1-2, 216-l, 217-r; Ex. 1009, ¶ 27.

[126h] "*wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter*"

The received light is coupled to the light color component detectors D_1'-D_n' [optical sensor] through the color component filters F_1'-F_n' [collectively, a color filter]. Ex. 1004, Figure 1, 217-r.

[126i] "*wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating*"

JP '028 does not describe or disclose any diffraction grating. JP '028 employs filters that filter some received light while transmitting other wavelengths. JP '028 analyzes the filtered (not diffracted) components of the received light to determine spectral qualities (color). Ex. 1004, 217-l to 217-r. Those having ordinary skill in the art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.

[126j] "*wherein the optical sensor integrates the received light*"

The received light is coupled to the light color component detectors D_1'-D_n' [optical sensor]. Ex. 1004, Figure 1, 217-r. Each of sensors 11, 12 includes sample hold circuits H_1-H_n, H_1'-H_n' accumulating [integrating] a signal based on the light intensity received by the detectors D_1-D_n, D_1'-D_n. Ex. 1004, Figure 1, 218-r to 219-l.

2. *Claim 127*

[127a]-[127i] "*An apparatus comprising:*

one or more light receivers receiving light to be spectrally analyzed;

a color filter having a plurality of portions,

wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,

wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,

wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and

an optical sensor having a plurality of sensing elements,

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;"

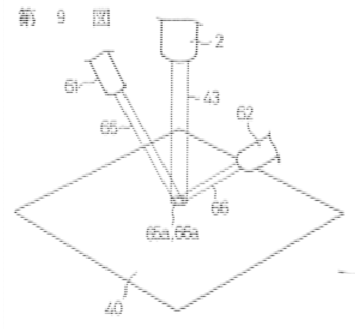
See [126a]-[126i] above.

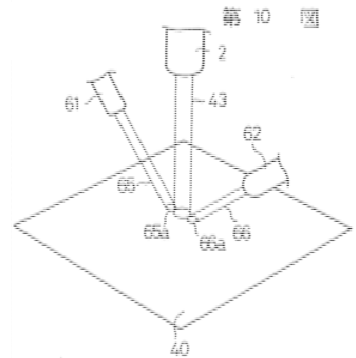
[127j] "*wherein the light is received by a probe*"

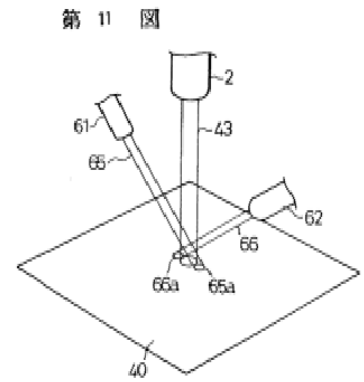
JP '028 describes that colorimeter B [probe] is positioned to receive light from light source 1 that is reflected off object 40. A light source monitor 5 includes a sensor 11 measuring light from a light source 1 using detectors D_1-D_n and a sample monitor 7 including a sensor 12 measuring light reflected from object 40 using detectors D_1'-D_n'. Ex. 1004, Figure 2, 215-l, 216-l.

[127k] "*wherein one or more optical sensors determine a distance of the probe with respect to an object or material*"

JP '028 describes that a lens 52 in light receiving lens tube 51 (which is optically coupled to sensor 12 in sample monitor 7 by optical fiber 53) is focused to receive light reflected from an object surface at position S that is a prescribed distance L from the projection lens 38 within the main optical path 43 from light source 1. To ensure object 40 is at measurement position S that is a prescribed distance L from input lens tube 51, two auxiliary light projectors 61, 62 emit light and are positioned so that the resulting optical paths 65, 66 intersect each other and the main optical path 43 at measurement position S:







Ex. 1004, Figures 9-11, 216-l to 216-r. Auxiliary projectors 61, 62 flash light along the optical paths 65, 66 of two colors different from each other and from the color of light from the main optical path 43 to enable determination of when the object is at the correct measurement position. Ex. 1004, 214-r to 215-l, 216-r, 216-r to 217-l. Light color component intensity measurements by sensor 12 allow determination of when the object 40 is at the prescribed distance L for accurate color measurement, when the spots 65a and 66a coincide with each other and the spot for beam 43. Ex. 1004, Figure 9, 216-r to 217-l. By analyzing the intensity for each reflected light color based upon one or both of the alternate flashing or different colors from auxiliary projectors 61, 62, the separation or overlap of the projected images 65a, 66a of light 65, 66 from projectors 61, 62 allow determination of an offset direction from the prescribed distance. Ex. 1004, Figures 10-13, 216-r to 217-l. When the surface of object 40 is at a distance less than L, the projected light intensity varies, even if the illuminated area remains the same. Ex. 1004, 216-l ("[I]f the prescribed distance is not set within a certain range, measurement cannot be carried out accurately due to the effect of changes in illumination intensity.”).

3. *Claim 132:*

[132a] “*The apparatus of claim 127*”

See [127a]-[127k] above.

[132b] “*wherein the plurality of sensing elements comprise an array of sensing elements*”

Detectors D_1-D_n, D_1'-D_n' in sensors 11, 12 are arranged in 1×3 matrices [array]. Ex. 1004, Figure 1.

4. *Claim 135:*

[135a]-[135i] “*An apparatus comprising:*

one or more light receivers receiving light to be spectrally analyzed;

a color filter having a plurality of portions,

wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,

wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,

wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and

an optical sensor having a plurality of sensing elements,

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;"

See [126a]-[126i] above.

[135j] "*wherein the plurality of sensing elements comprise a matrix of sensing elements*"

Detectors D_1-D_n, D_1'-D_n' in sensors 11, 12 are arranged in 1×3 matrices. Ex. 1004, Figure 1.

5. *Claim 136:*

[136a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[136b] "*wherein the sensing elements comprise a photo detector,*"

Sensors 11, 12 include detectors D_1-D_n, D_1'-D_n', which are photodiodes. Ex. 1004, 217-r. A photodiode is a photo detector. *See also* [137b] below.

6. *Claim 137:*

[137a] "*The apparatus of claim 136*"

See [136a] above.

[137b] "*wherein the photo detector comprises a photo diode,*"

Each of sensors 11, 12 include detectors D_1-D_n, D_1'-D_n', which are photodiodes. Ex. 1004, 217-r.

7. *Claim 140:*

[140a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[140b] "*further comprising a probe having one or more light sources that provides light to an object or material,*"

The non-contact colorimeter B [probe] includes a light source 1 illuminating the object. Ex. 1004, Figure 2, 216-l. Auxiliary projectors 61, 62 also illuminate the object. Ex. 1004, Figure 4, 216-l.

[140c] "*wherein the light from the one or more light sources is received by the one or more light receivers from the object or material,*"

The light-receiving lens 52 and optical fiber 53 receive light from the light source 1 and the auxiliary projectors 61, 62 reflected off the object. Ex. 1004, Figures 2 & 4, 216-l, 216-r.

8. *Claim 141:*

[141a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[141b] "*wherein the predetermined band of wavelengths to be spectrally analyzed comprises substantially the visible band,*"

The non-contact colorimeter B is used in automated color measurement of items 40 on a conveyor 71 using filters F_1-F_n and F_1'-F_n' as corresponding to basic color components to determine an object's color. Ex. 1004, Figure 6, 215-l, 217-l to 217-r, 220-l. Sensors 11, 12 have filters F1, F2, ... Fn and F1′, F2′, ... Fn′ that analyze the light guided to the light source monitors 5, 7 for basic color components. Each color component portion F_1'-F_n' has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. In the embodiment, n=3 is established and the three stimulus values, X,Y,Z, which are in the XYZ color specification.. Ex. 1004, 218-l. Three basic color components correspond to the XYZ color specification. The color components measured by JP ’028 necessarily comprise substantially the visible band in order to determine object color. Ex. 1009, ¶¶ 27 & 57.

C. Charts

Limitation		JP ’028
126a	An apparatus comprising:	JP ’028 describes a non-contact colorimeter B for use in automated color measurement of items 40 on a conveyor 71. Ex. 1004, Figure 6, 220-l.
126b	one or more light receivers receiving light to be spectrally analyzed;	Object 40 is illuminated by a light source 1 and the light reflected from the object 40 is received by light receiving lens 52 [light receiver] for spectral measurement. Ex. 1004, Figs. 1-2, 216-l. Monitor 5 receives light from the light source 1 via optical fiber 41, and monitor 7 receives light reflected off the surface of object 40 via receiving lens 52 and optical fiber 52. Each monitor includes a respective sensor 11, 12 for spectrally analyzing the light received by the corresponding monitor. Ex. 1004, Figure 2, 216-l; Ex. 1009, ¶ 25.
126c	a color filter having a plurality of portions,	The color component filters F_1'-F_n' [color filter] are configured as n portions F_1' thru F_n'. Ex. 1004, Figure 1, 217-r; Ex. 1009, ¶26.
126d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band, of wavelengths,	Each color component portion F_1'-F_n' has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. In the embodiment, n=3 is established and the three stimulus values, X,Y,Z, which are in the XYZ color specification.. Ex. 1004, 218-l. Three basic color components correspond to red, green and blue color wavelengths, with the red, green and blue color components employed to determine the colors within the XYZ color

Limitation		JP ’028
		specification. Ex. 1009, ¶¶ 27 & 50.
126e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	Each color component filter F_1'-F_n' has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. Ex. 1004, 218-l. Each of sensors 11, 12 receives light through filters allowing the light to be analyzed for basic color components of the visible light range. Ex. 1004, Figure 1, 217-l to 217-r; Ex. 1009, ¶ 27.
126f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	Light reflected off the surface of object 40 and received via receiving lens 52 and optical fiber 53 [light receivers] passes through each of color filters F_1, F_2, . . . F_n. Ex. 1004, Figure 1, 217-l to 217-r.
126g	an optical sensor having a plurality of sensing elements,	Light sample monitor 7, which includes light sensor 12 having color component detectors D1′-Dn′ [collectively, an optical sensor], receives light (through a light receiving lens tube 51 and light receiving lens 52) reflected light from the object 40 which is coupled via optical fiber 53 and diffusion chamber 54. Ex. 1004, Figs. 1-2, 216-l, 217-r; Ex. 1009, ¶ 27.
126h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	The received light is coupled to the light color component detectors D_1'-D_n' [optical sensor] through the color component filters F_1'-F_n' [collectively, a color filter]. Ex. 1004, Figure 1, 217-r.
126i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	JP ’028 does not describe or disclose any diffraction grating. JP ’028 employs filters that filter some received light while transmitting other wavelengths. JP ’028 analyzes the filtered (not diffracted) components of the received light to determine spectral qualities. Ex. 1004, 217-l to 217-r. Those having ordinary skill in the

Limitation		JP ’028
		art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.
126j	wherein the optical sensor integrates the received light.	The received light is coupled to the light color component detectors D_1'-D_n' [optical sensor]. Ex. 1004, Figure 1, 217-r. Each of sensors 11, 12 includes sample hold circuits H_1-H_n, H_1'-H_n' accumulating (“integrating”) a signal based on the light intensity received by the detectors D_1-D_n, D_1'-D_n. Ex. 1004, Figure 1, 218-r to 219-l.
127a	An apparatus comprising:	See [126a]
127b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
127c	a color filter having a plurality of portions,	See [126c]
127d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,	See [126d]
127e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	See [126e]
127f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter;	See [126f]

Limitation		JP '028
	and	
127g	an optical sensor having a plurality of sensing elements,	See [126g]
127h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,	See [126h]
127i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	See [126i]
127j	wherein the light is received by a probe,	Colorimeter B [probe] is positioned to receive light from light source 1 that is reflected off object 40. A light source monitor 5 includes a sensor 11 measuring light from a light source 1 using detectors D_1-D_n and a sample monitor 7 including a sensor 12 measuring light reflected from object 40 using detectors D_1'-D_n'. Ex. 1004, Figure 2, 215-l, 216-l. Colorimeter B is therefore a fiber optic instrument that carries light to measure an object's optical characteristics [probe].
127k	wherein one or more optical sensors determine a distance of the probe with respect to an object or material.	A lens 52 in light receiving lens tube 51 (which is optically coupled to sensor 12 in sample monitor 7 by optical fiber 53) is focused to receive light reflected from an object surface at position S that is a prescribed distance L from the projection lens 38 within the main optical path 43 from light source 1. When the surface of object 40 is at a distance less than L, at least some light emitted by from light source 1 along optical path 43 and reflected off object 40 is not

Limitation		JP ’028
		received by the sensor 12 in sample monitor 7 via optical fiber 53 because the intensity varies, even if the illuminated area remains the same. Ex. 1004, 216-l (“[I]f the prescribed distance is not set within a certain range, measurement cannot be carried out accurately due to the effect of changes in illumination intensity.”),
132a	The apparatus of claim 127,	See [127a]-[127k].
132b	wherein the plurality of sensing elements comprise an array of sensing elements.	Detectors D_1-D_n, $D_1{'}$-$D_n{'}$ in sensors 11, 12 are arranged in 1×3 matrices [array]. Ex. 1004, Figure 1.
135a	An apparatus comprising:	See [126a]
135b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
135c	a color filter having a plurality of portions,	See [126c]
135d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,	See [126d]
135e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	See [126e]
135f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	See [126f]
135g	an optical sensor having a plurality of sensing	See [126g]

Limitation		JP ’028
	elements,	
135h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	See [126h]
135i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	See [126i]
135j	wherein the plurality of sensing elements comprise a matrix of sensing elements.	Detectors D_1-D_n, D_1'-D_n' in sensors 11, 12 are arranged in 1×3 matrices. Ex. 1004, Figure 1.
136a	The apparatus of claim 135,	See [135a]-[135j].
136b	wherein the sensing elements comprise a photo detector.	Sensors 11, 12 include detectors D_1-D_n, D_1'-D_n', which are photodiodes. Ex. 1004, 217-r.
137a	The apparatus of claim 136,	See [136a]-[136b].
137b	wherein the photo detector comprises a photo diode.	Each of sensors 11, 12 include detectors D_1-D_n, D_1'-D_n', which are photodiodes. Ex. 1004, 217-r.
140a	The apparatus of claim 135,	See [135a]-[135j].
140b	further comprising a probe having one or more light sources that provides light to an object or material,.	The non-contact colorimeter B [probe] includes a light source 1 illuminating the object. Ex. 1004, Figure 2, 216-l. Auxiliary projectors 61, 62 also illuminate the object. Ex. 1004, Figure 4, 216-l.
140c	wherein the light from the one or more light sources is received by the one or more light receivers from the object or material	The light receiving lens 52 receives light from the light source 1 and the auxiliary projectors 61, 62 reflected off the object. Ex. 1004, Figures 2 & 4, 216-l, 216-r.
141a	The apparatus of claim 135,	See [135a]-[135j].
141b	wherein the predetermined band of wavelengths to be spectrally analyzed	The non-contact colorimeter B is used in automated color measurement of items 40 on a conveyor 71 using filters F_1-F_n and F_1’-F_n’

Limitation		JP ’028
	comprises substantially the visible band.	as corresponding to basic color components. Ex. 1004, Figure 6, 215-l, 217-l to 217-r, 220-l. Sensors 11, 12 have filters F1, F2, ... Fn and F1´, F2´, ... Fn´ that analyze the light guided to the light source monitors 5, 7 for basic color components. Each color component portion F_1'-F_n' has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. In the embodiment, n=3 is established and the three stimulus values, X,Y,Z, which are in the XYZ color specification.. Ex. 1004, 218-l. Three basic color components correspond to red, green and blue color wavelengths, with the red, green and blue color components are employed to determine the colors within the XYZ color specification. Ex. 1009, ¶¶ 27 & 57.

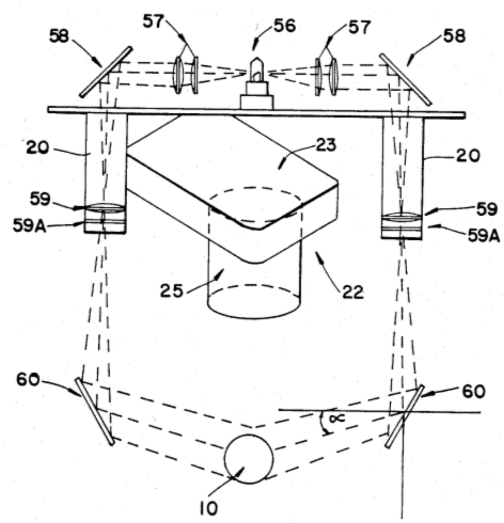
VII. GROUND 2: Claims 126-127, 132, 135-137 and 140-141 are obvious over Mills.

This ground is not redundant with Grounds 1 because Mills describes (a) separate color filter portions over a single 16 diode linear sensor array integrated circuit, rather than separate color filters F_1-F_n and F_1'-F_n' over distinct detectors F_1-F_n and F_1'-F_n' as taught by JP ’028, and (b) determining a distance with respect to all portions of an object’s surface rather than to only a single area of projected light.

A. Overview of Mills

Mills describes an optical scanning system for sorting objects (e.g., fruit) based on a characteristic of the object. Ex. 1005, Abstract, 1:5-9, 4:12-18. Mills describes a detector subsystem 22 to measure an object's color, volume, or shape. Ex. 1005, Figures 2A, 2B, & 3, 4:10-18. An illuminator subsystem comprising a lamp 56 is used in common with a plurality of mirrors 58, to provide effectively four illuminators 20 or sources of light that are incident upon the object. Ex. 1005, Figure 2B.

Fig. 2B



Light from lamp 56 passes through a condenser 57 and is reflected at substantially a right angle from first mirrors 58. A detector subsystem 22 views the surface areas of the object that are illuminated. The object is rotated as it passes the detector subsystem 22, such that substantially all portions of the surface are illuminated uniformly. Ex. 1005, Figure 2B, 4:50-67.

The detector subsystem 22 includes a linear diode array 61 to determine an object's shape or volume, and a color detector 62 to generate color signals of the object. Ex. 1005, Figure 3, 5:57-65.

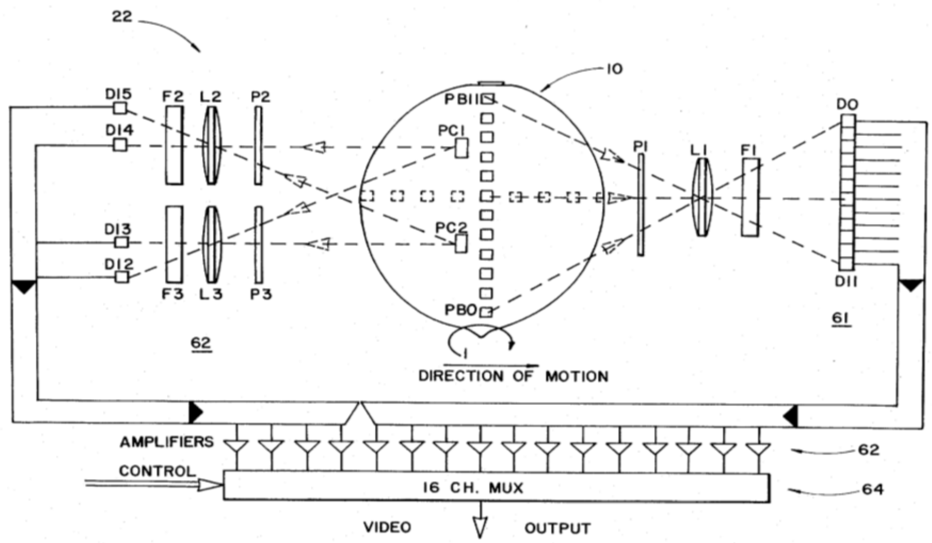


Fig. 3

The linear array 61 is utilized for obtaining a linear view of the object for purposes of looking for blemishes in the object. The light from illuminators 20 is reflected from the portions PB0-PB11 of the surface of the item 10 through linear polarizer P1, lens L1 and filter F1 to the twelve diodes of array 61. The diodes D0-D11 of the linear array 61 are arranged in a line, and thus respective diodes detect reflected light from portions PB0 through PB11 of the object. Such a diode array can be obtained commercially, such as the Hamamatsu S994-18 diode array. Ex. 1005, Figure 3, 5:15-32.

Color detector 62 comprises diodes D12, D13, D14, and D15 utilized for generating color signals of the object being examined. The filters F2 and F3 are bandpass filters at different wavelengths corresponding to different colors, for example red and green. The diodes generate signals representative of the amount of green color and red color at different portions of the object. Ex. 1005, Figure 3, 5:26-6:19.

The signals generated at diodes D0-D11 are periodically scanned and transmitted through separate amplifiers 62 to a multiplexer 64. The output of multiplexer 64 is a chopped video signal, in analog form, which is subsequently converted to digital signals at A/D converter 36. The signals from diodes D12-D15 are also amplified at 62 and multiplexed at 64. Thus, the output of multiplexer 64 is a 16 channel multiplex video signal, representing a series of 16 video levels corresponding to the outputs of the 16 diodes, D0-D15 for each scan of the detector subsystem 22. Ex. 1005, Figures 2B and 3, 5:26-32, 6:8-19.

The digital data retrieved from the detector subsystem 22 corresponding to examination of an object that has been passed by the detector subsystem 22 while being rotated can be shown in a representation of data. Ex. 1005, Figure 4, 6:20-25.

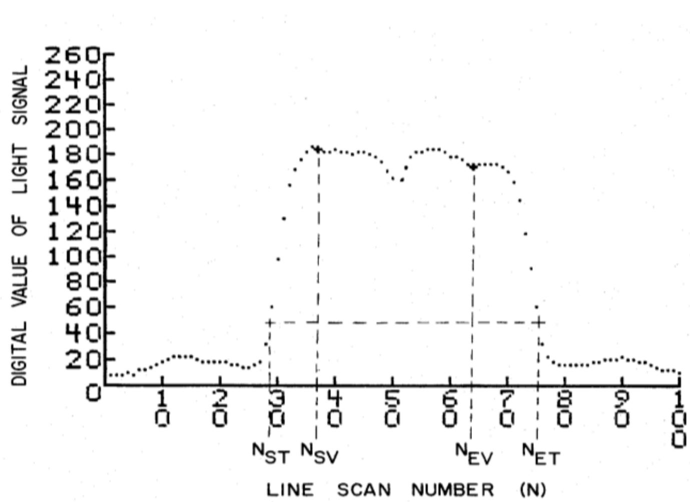


Fig. 4

The Y-axis of FIG. 4 charts the level intensity of the video signal, 255 corresponding to the highest level of an 8-bit byte. The X-axis of FIG. 4 carries the scan number N, corresponding to the number of times the detector subsystem 22 is scanned. Ex. 1005, Figure 4, 6:25-30. If a perfect blemish-free object is assumed, the data signals would be substantially zero until the leading edge of the fruit intercepted the diode, and would again return to substantially zero after the trailing edge of the fruit had passed the particular diode. As illustrated in FIG. 4, there is a blemish centered approximately near scan line 50. Ex. 1005, Figure 4, 6:32-42.

The light intensity measurements by the twelve diodes D0-D11 indicate a position (of the diodes D0-D11) relative to the upper fruit surface regions PB0-PB11, such that the leading and trailing edges of the fruit and indentations on the fruit surface are determined. Ex. 1005, Figures 3-4, 5:15-18, 6:32-53; Ex. 1009, ¶ 31. These intensity measurements permit the apparatus determine fruit length and width as well as the existence of blemishes by comparing signal values with the unblemished surface of the particular object being examined. Ex. 1005, Figure 4, 6:62-68; Ex. 1009, ¶ 32.

B. Mills Renders Claims 126-127, 132, 135-137 and 140-141 Obvious

1. *Claim 126:*

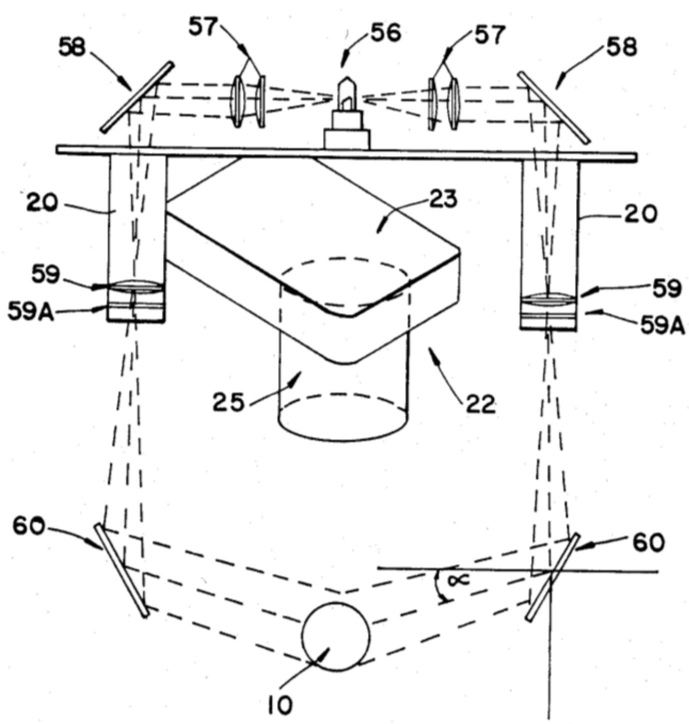
[126a] "*An apparatus comprising*"

Mills discloses at least one optical scanning unit 18 with a detector subsystem 22 for determining characteristics of fruit, including color, surface blemishes, size, and shape. The optical scanning unit 18 is an apparatus. Ex. 1005, Figures 1 & 3, 1:5-9, 2:17-22; 2:45-64, 4:10-18.

[126b] "*one or more light receivers receiving light to be spectrally analyzed*"

The detector 22 in each scanning unit 18 receives light reflected from a fruit surface via a cylindrical housing of lens portion 25:

Fig. 2B



Ex. 1005, Figure 2B & 3, 4:67-68, 5:5-18, 5:68-6:8. The cylindrical housing [light receiver] restricts the angle of acceptance for diodes D0-D15 in the sensor portion 23, and is functionally equivalent to fiber optics in that regard. Ex. Ex. 1009, ¶¶ 29, 30 & 59. A color detector 62 receives reflected light from the fruit 10 via the polarizer P2, P3, the lens L2, L3, and the filters F2, F3. Ex. 1005, Figure 3, 5:61-68.

[126c] "*a color filter having a plurality of portions*"

Mills discloses color filters F2, F3 that are configured as filter portions F2 and F3. Ex. 1005, Figure 3, 5:61-68.

[126d] "*wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths*"

The filter portions F2 and F3 are bandpass filters at different wavelengths that correspond to different colors (e.g., red, green). Ex. 1005, Figure 3, 5:68-6:2. Each filter F2 and F3 has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths.

[126e] "*wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed*"

Each filter F2 and F3 has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. Filters F2-F3 enable determination of green and red colors of the fruit, and color ratios of those two colors. Ex. 1005, 5:61-6:19, 10:9-39. The light passes from filter F2 to diodes D14-D15 and F3 to diodes D12-D13. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.

[126f] "*wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter*"

The light reflected off the surface of the fruit passes through the cylindrical housing ("light receiver"), polarizers P2-P3, and lens portions L2-L3 to filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19.

[126g] "*an optical sensor having a plurality of sensing elements*"

The detector 22 in each scanning unit 18 includes detector diodes D0-D15, as implemented by a commercial integrated circuit diode array, that detect reflected light from the fruit. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.

[126h] "*wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter*"

The light reflected off the surface of the fruit as passing through the cylindrical housing ("light receiver"), polarizers P2-P3, and lens portions L2-L3 to filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19.

[126i] "*wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating*"

Mills does not describe or disclose diffraction grating. The light reflected off fruit 10 is spectrally analyzed for light within the wavelength transmission bands of filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19. Those having ordinary skill in the art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.

[126j] "*wherein the optical sensor integrates the received light*"

Collectively, the diodes D0-D15 are an optical sensor. Diodes D0-D15 accumulate [integrate] the output of each individual diode for each of a series of 100 scans in determining the light intensity reflected off portions of the fruit 10 and received through one of filters F1-F3 by the respective diode. Ex. 1005, Figure 4, 6:9-32. Accumulating the output of each individual diode is functionally equivalent to integrating the received light. Ex. 1009, ¶¶ 31, 32, & 59.

2. *Claim 127:*

[127a]-[127i] "*An apparatus comprising:*

one or more light receivers receiving light to be spectrally analyzed;

a color filter having a plurality of portions,

wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,

wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,

wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and

an optical sensor having a plurality of sensing elements,

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;"

See [126a]-[126i] above.

[127j] "*wherein the light is received by a probe*"

Each scanning unit 18 is positioned over the fruit. Ex. 1005, Figures 1 & 2A-2B, 3:29-46. The scanning unit is positioned in sufficient proximity to the fruit for diodes D0-D11 therein to receive light reflected off the fruit surface portions PB0-PB11, and diodes D12-D15 receive light reflected off the fruit surface portions PC1-PC2. Ex. 1005, 5:15-18, 5:61-6:8.

[127k] "*wherein one or more optical sensors determine a distance of the probe with respect to an object or material*"

Diodes D0-D15 are in a fixed position relative to the fruit moving below those diodes, and are operable to take light intensity measurements varying with distance of the fruit surface portions PB0-PB11 from the diodes. Ex. 1005, 6:22-47. The diodes D0-D15 scan 100 times during passage of the fruit below the diodes to detect the leading and trailing edges of the fruit as well as surface irregularities (indentations or blemishes) where dips in light intensity indicate that the surface of the fruit is further from the diodes D0-D15 than surrounding areas. Ex. 1005, Figures 3 & 4, 5:9-26, 5:33-60, 6:20 to 7:3, 8:38-68. Ex. 1009, ¶ 32.

3. *Claim 132:*

[132a] "*The apparatus of claim 127*"

See [127a]-[127k] above.

[132b] "*wherein the plurality of sensing elements comprise an array of sensing elements,*"

Detector diodes D0-D15 are implemented by a commercial integrated circuit diode array. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.

4. *Claim 135:*

[135a]-[135i] "*An apparatus comprising:*

one or more light receivers receiving light to be spectrally analyzed;

a color filter having a plurality of portions,

wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,

wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,

wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and

an optical sensor having a plurality of sensing elements,

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating"

See [126a]-[126i] above.

[135j] "*wherein the plurality of sensing elements comprise a matrix of sensing elements*"

Detector diodes D0-D15 are implemented by a commercial integrated circuit linear diode array (a 1×16 matrix of sensing elements). Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.

5. *Claim 136:*

[136a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[136b] "*wherein the sensing elements comprise a photo detector,*"

Detector diodes D0-D15 that sense light reflected off the object are implemented using a commercially available photodiode array. Ex. 1005, 5:6-20. A photodiode is a photo detector. *See also* claim [137b] below.

6. *Claim 137:*

[137a] "*The apparatus of claim 136*"

See [136a] above.

[137b] "*wherein the photo detector comprises a photo diode,*"

Detector diodes D0-D15 that sense light reflected off the object are implemented using a commercially available photodiode array. Ex. 1005, 5:6-20.

7. *Claim 140:*

[140a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[140b] "*further comprising a probe having one or more light sources that provides light to an object or material,*"

Scanning unit 18 includes a plurality of illuminators 20 for uniformly illuminating the surface areas of the fruit being tested, processed or evaluated with suitable radiation such as visible, ultraviolet or infrared, depending upon the specific application. Ex. 1005, Figures 2A-2B, 3:51-57, 4:27-41.

[140c] "*wherein the light from the one or more light sources is received by the one or more light receivers from the object or material,*"

Detector diodes D0-D15 sense light from illuminators 20 reflected off the fruit. Ex. 1005, 5:6-20.

8. *Claim 141:*

[141a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[141b] "*wherein the predetermined band of wavelengths to be spectrally analyzed comprises substantially the visible band,*"

Diodes D0-D15 receive light generated by a lamp 56 and reflected off of the surface portions PB0-PB11 of the object through polarizers P1-P3, lenses L1-L3 and filters F1-F3, with filters F2-F3 filtering for red or green colors. Ex. 1005, Figures 2A-2B & 3, 3:51-57, 4:27-41, 5:11-32, 5:61 to 6:19. Red and green wavelengths encompass a substantial portion of the visible band. Ex. 1009, page Ex. 1009, ¶¶ 30 & 66.

C. Charts

Limitation		Mills
126a	An apparatus comprising:	Optical scanning unit 18 includes a detector

Limitation		Mills
		subsystem 22 for determining characteristics of fruit 10 (i.e., an object), including color, surface blemishes, size, and shape. Ex. 1005, Figure 3, 1:5-9, 2:17-22; 2:45-64, 3:47 to 4:26, 7:4-39.
126b	one or more light receivers receiving light to be spectrally analyzed;	The detector 22 in each scanning unit 18 receives light reflected from an object via a cylindrical housing of lens portion 25. Ex. 1005, Figure 2B & 3, 4:67-68, 5:5-18, 5:68-6:8. The cylindrical housing [light receiver] restricts the angle of acceptance for diodes D0-D15 in the sensor portion 23, and is functionally equivalent to fiber optics in that regard. Ex. 1009, ¶¶ 29, 30 & 59. A color detector 62 receives reflected from the object 10 via the polarizer P2, P3, the lens L2, L3, and the filters F2, F3. Ex. 1005, Figure 3, 5:61-68.
126c	a color filter having a plurality of portions,	The color filters F2, F3 [color filter] are configured as portions F2 and F3. Ex. 1005, Figure 3, 5:61-68.
126d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band, of wavelengths,	The filter portions F2 and F3 are bandpass filters at different wavelengths that correspond to different colors (e.g., red, green). Ex. 1005, Figure 3, 5:68-6:2. Each filter F2 and F3 has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths.
126e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	Each filter F2 and F3 has a wavelength dependent light transmission property that covers a predetermined band or bands of wavelengths. Filters F2-F3 enable determination of green and red colors of an object, and color ratios of those two colors. Ex. 1005, 5:61-6:19, 10:9-39. The light passes from filter F2 to diodes D14-D15 and F3 to diodes D12-D13. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.

Limitation		Mills
126f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	The light reflected off the surface of the object as passing through the cylindrical housing ("light receiver"), polarizers P2-P3, and lens portions L2-L3 to filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19.
126g	an optical sensor having a plurality of sensing elements,	The detector 22 in each scanning unit 18 includes detector diodes D0-D15, as implemented by a commercial integrated circuit diode array, that detect reflected light from the object. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.
126h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	The light reflected off the surface of the object as passing through the cylindrical housing ("light receiver"), polarizers P2-P3, and lens portions L2-L3 to filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19.
126i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	Mills does not describe or disclose diffraction grating. The light reflected off fruit 10 is spectrally analyzed for light within the wavelength transmission bands of filters F2-F3. Ex. 1005, Figure 3, 5:11-32, 5:61 to 6:19. Those having ordinary skill in the art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.
126j	wherein the optical sensor integrates the received light.	Collectively, the diodes D0-D15 are an optical sensor. Diodes D0-D15 accumulate the output of each individual diode for each of a series of 100 scans in determining the light intensity reflected off portions of the fruit 10 and received through one of filters F1-F3 by the respective diode. Ex. 1005,

Limitation		Mills
		Figure 4, 6:9-32. Accumulating the output of each individual diode is functionally equivalent to integrating the received light. Ex. 1009, ¶¶ 31, 32, & 59.
127a	An apparatus comprising:	See [126a]
127b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
127c	a color filter having a plurality of portions,	See [126c]
127d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,	See [126d]
127e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	See [126e]
127f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	See [126f]
127g	an optical sensor having a plurality of sensing elements,	See [126g]
127h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,	See [126h]
127i	wherein light received by the one or more light	See [126i]

Limitation		Mills
	receivers is spectrally analyzed without using a diffraction grating;	
127j	wherein the light is received by a probe,	Each scanning unit 18 is positioned over the object. Ex. 1005, Figures 1 & 2A-2B, 3:29-46. The scanning unit is positioned in sufficient proximity to the object for diodes D0-D11 therein to receive light reflected off the object surface portions PB0-PB11, and diodes D12-D15 therein to receive light reflected off the object surface portions PC1-PC2. Ex. 1005, 5:15-18, 5:61-6:8.
127k	wherein one or more optical sensors determine a distance of the probe with respect to an object or material.	Diodes D0-D15 are in a fixed position relative to the object moving in front of those diodes operable to take light intensity measurements. The diodes D0-D15 scan 100 times during passage of the object in front of the diodes to detect the leading and trailing edges of the object as well as surface irregularities (blemishes) where the surface of the object is further from the diodes D0-D15 than surrounding areas. Ex. 1005, Figures 3 & 4, 5:9-26, 5:33-60, 6:20 to 7:3, 8:38-68; Ex. 1009, ¶ 32.
132a	The apparatus of claim 127,	See [127a]-[127k].
132b	wherein the plurality of sensing elements comprise an array of sensing elements.	Detector diodes D0-D15 are implemented by a commercial integrated circuit diode array. Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.
135a	An apparatus comprising:	See [126a]
135b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
135c	a color filter having a plurality of portions,	See [126c]
135d	wherein each of the plurality of portions has a wavelength dependent light transmission	See [126d]

Limitation		Mills
	property covering a predetermined band of wavelengths,	
135e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	See [126e]
135f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	See [126f]
135g	an optical sensor having a plurality of sensing elements,	See [126g]
135h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	See [126h]
135i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	See [126i]
135j	wherein the plurality of sensing elements comprise a matrix of sensing elements.	Detector diodes D0-D15 are implemented by a commercial integrated circuit linear diode array (a 1×16 matrix of sensing elements). Ex. 1005, Figure 3, 4:67 to 5:32, 5:61 to 6:19.
136a	The apparatus of claim 135,	See [135a]-[135j].
136b	wherein the sensing elements comprise a photo detector.	Detector diodes D0-D15 sense light reflected off the object, citing a commercially available photodiode array as suitable for diodes D0-D15. Ex. 1005, 5:6-20.

Limitation		Mills
137a	The apparatus of claim 136,	See [136a]-[136b].
137b	wherein the photo detector comprises a photo diode.	Detector diodes D0-D15 sense light reflected off the object, citing a commercially available photodiode array as suitable for diodes D0-D15. Ex. 1005, 5:6-20.
140a	The apparatus of claim 135,	See [135a]-[135j].
140b	further comprising a probe having one or more light sources that provides light to an object or material, wherein the light from the one or more light sources is received by the one or more light receivers from the object or material.	Scanning unit 18 includes an illuminator subsystem. The illuminator subsystem comprises a plurality of illuminators 20 for uniformly illuminating the surface areas of the object being tested, processed or evaluated with suitable radiation such as visible, ultraviolet or infrared, depending upon the specific application. Ex. 1005, Figures 2A-2B, 3:51-57, 4:27-41.
140c	wherein the light from the one or more light sources is received by the one or more light receivers from the object or material	Detector diodes D0-D15 sense light reflected off the object, and can be implemented as a commercially available photodiode array. Ex. 1005, 5:6-20.
141a	The apparatus of claim 135,	See [135a]-[135j].
141b	wherein the predetermined band of wavelengths to be spectrally analyzed comprises substantially the visible band.	Diodes D0-D15 receive light generated by a lamp 56 and reflected off of the surface portions PB0-PB11 of the object through polarizers P1-P3, lenses L1-L3 and filters F1-F3, with filters F2-F3 filtering for red or green colors. Ex. 1005, Figures 2A-2B & 3, 3:51-57, 4:27-41, 5:11-32, 5:61 to 6:19. Red and green wavelengths encompass a substantial portion of the visible band. Ex. Ex. 1009, ¶¶ 30 & 66.

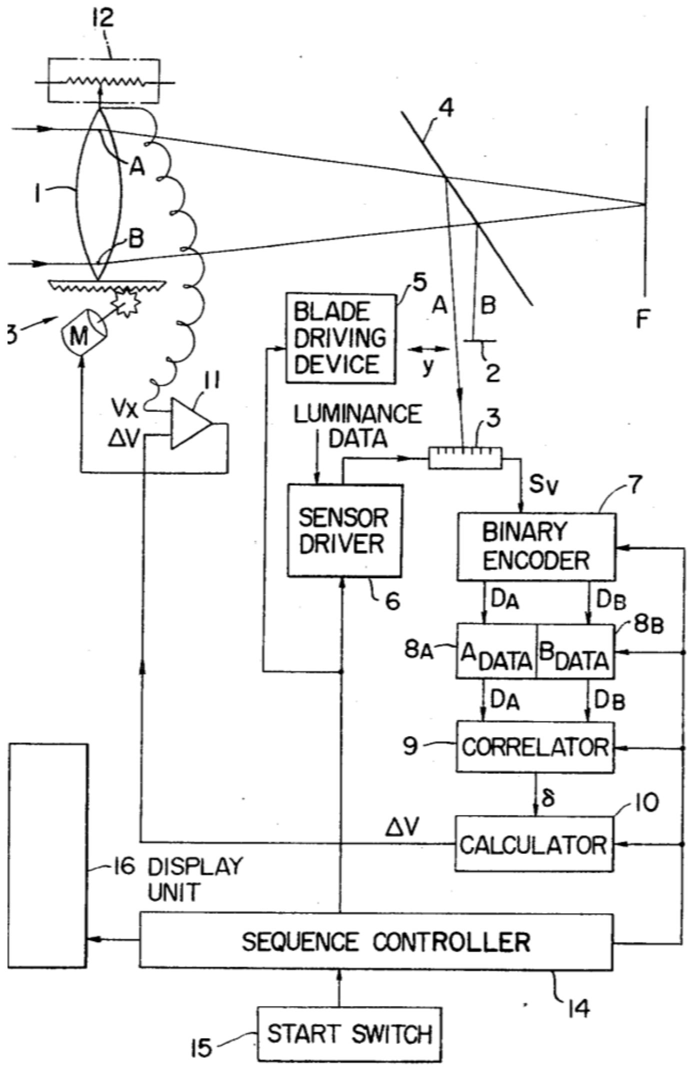
VIII. GROUND 3: Claims 126-127, 132, 135-137 and 141 are obvious over Eguchi.

This ground is not redundant with Grounds 1-2 because Eguchi explicitly discloses determining a distance based on simultaneously acquired reflected light intensity measurements (rather than a sequence of light intensity measurements), a feature not disclosed by the references in Grounds 1-2.

A. Overview of Eguchi

Eguchi describes a camera with an autofocus feature for a camera that determines a distance (in the form of a focusing position or focal length of the camera lens) to an object Σ based in part on the intensity of light reflected from the object. Ex. 1006, 5:40-62. The camera receives light from an object of focus via a lens 1 and half-mirror 4. The light is moved through a color strip 2 to affect light beams A and B at sensor array 3:

FIG. 9



Ex. 1006, Figures 1 & 9, 5:42-60. The autofocus relies on shifting image when the image is not in focus to detect an out-of-focus condition and determine a necessary focus adjustment. Ex. 1006, 6:14-35. When the focusing position of the camera lens relative to an image plane corresponds to the distance to the object, light reflected off points at the extremities of the object Σ and passing through both lens edges A, B focus at corresponding points of the object image Σ1 at the focal plane.

When only light reflected off the extremities of the object Σ and passing through only one of the lens edges A or B is allowed to reach the focal plane, the position of an image $\Sigma^1\alpha$ at a defocus position α in front of the focal plane and the position of an image $\Sigma^1\beta$ at a defocus position β behind the focal plane are shifted up or down relative to the image Σ^1 at the focal plane:

FIG. 2

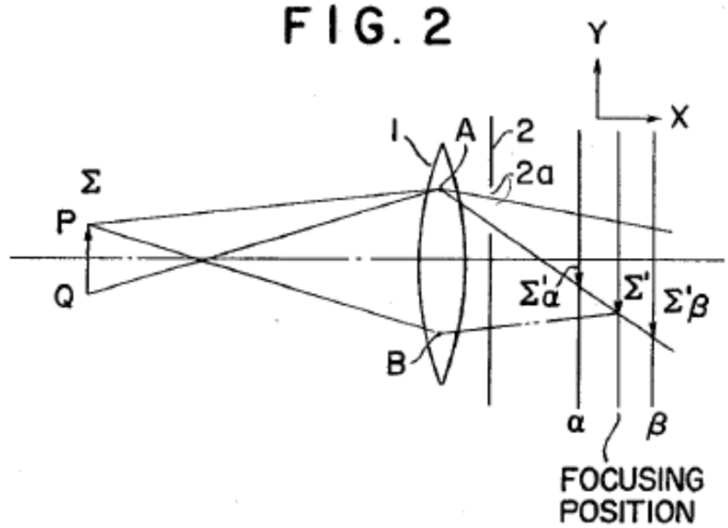
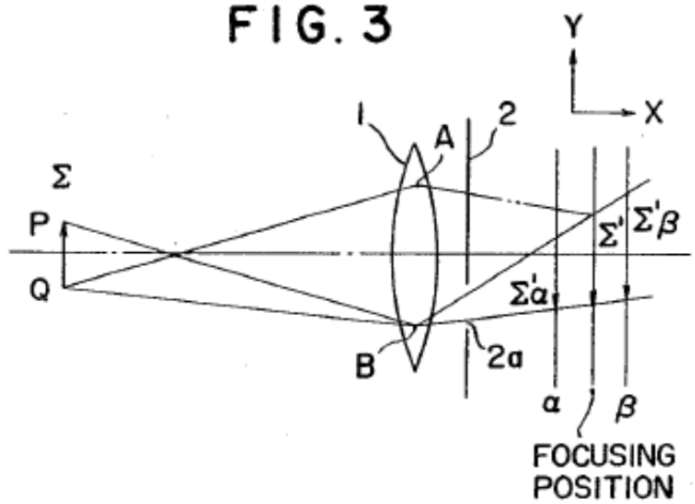
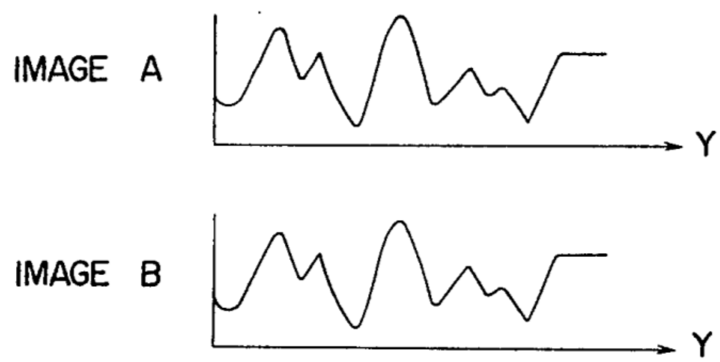


FIG. 3



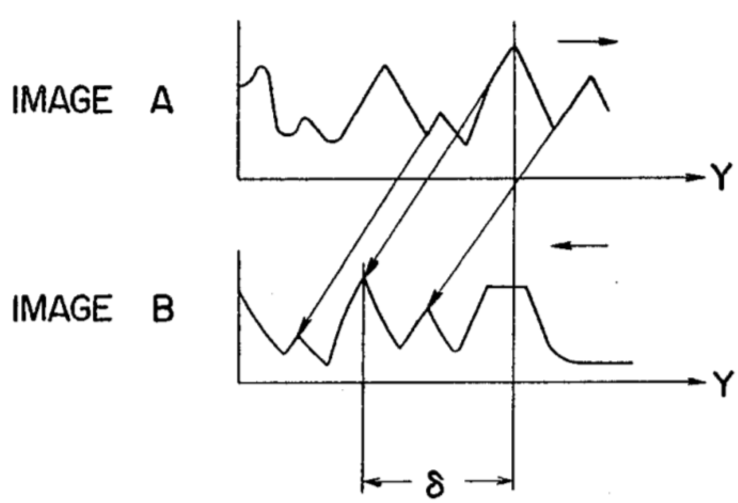
Ex. 1006, Figures 2-3, 4:8-35. A sensor array 3 positioned along the focal plane determines distributions of light intensity (corresponding to light and dark regions of the object). When the lens is in the focus position, images passing through the edges A and B of the lens are aligned:

FIG. 6



Ex. 1006, Figure 6, 4:42-52. When the lens is not in the focus position, the images passing through the edges A and B of the lens are offset, which offset can be used to determine the amount and direction of lens adjustment necessary to move the lens into the focus position:

FIG. 7



Ex. 1006, Figure 7, 4:53 to 5:41. The amount of movement of the lens is related directly to the amount of composite shift δ of the images A and B. Thus, the lens driving direction and distance to which the lens is moved for focusing can be detected.

B. Eguchi Renders Claims 126-127, 132, 135-137 and 141 Obvious

1. *Claim 126:*

[126a] "*An apparatus comprising*"

Eguchi describes an autofocus feature for a camera [apparatus] that determines a distance to an object Σ based in part on the intensity of light reflected from the object. Ex. 1006, 5:46-62.

[126b] "*one or more light receivers receiving light to be spectrally analyzed*"

The camera includes an autofocus feature receiving light from an object of focus via a lens 1 and half-mirror 4 and around edges of a blade alternately shielding the sensor array 3 from light beams A and B. Ex. 1006, Figure 9, 5:42-60. In one embodiment, a color stripe filter or color division filter is used in place of the blade 2. Ex. 1006, 5:60-62.

[126c] "*a color filter having a plurality of portions*"

Eguchi describes bundles of rays passing through points A and B in a lens 1 are separated without affecting a photographing image to measure the intensity distributions of the images which are formed by the bundles of rays. The bundles of rays passing through the points A and B (hereinafter referred to as "light beams A and B" when applicable) are separated from each other by moving a blade 2 in the direction of the arrow y with a blade driving device 5, in such a manner that the light beams A and B are allowed to pass alternately. Ex. 1006, Figure 9, 5:42-60. In one embodiment, Eguchi uses a color stripe filter or color division filter in place of the blade 2. Eguchi at 5:60-62.

Suzuki describes using "a stripe filter having red, green and blue color stripes sequentially arranged thereon." Ex. 1007, 1:29-44. Bayer describes a color division filter formed as "a filter mosaic . . . of selectively transmitting type . . . arranged in patterns" of "green, red and blue light transmission characteristics." Ex. 1008, Figures 3A-3B, 4:58-64. Those having ordinary skill in the art would be motivated to implement the color stripe or color division filter in the respective known manners for such filters. No more than ordinary skill would be required, and would produce the predictable result of color stripe and color division filters being implemented using known structures for those filters. Ex. 1009, ¶¶ 39, 68.

[126d] "*wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band, of wavelengths*"

The color stripe filter or color division filter includes one or more portions covering a first (e.g., red) band of wavelengths, one or more portions covering a second (e.g., green) band of wavelengths, or one or more portions covering a third (e.g., blue) band of wavelengths. Ex. 1006, Figure 9, 5:42-60; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1009, ¶¶ 39, 68.

[126e] "*wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed*"

The color stripe filter or color division filter includes (e.g., red, green and blue) color portions covering the overall band of wavelengths (the visible band) to be spectrally analyzed. Ex. 1006, Figure 9, 5:42-60; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1009, ¶¶ 39, 68.

[126f] "*wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter*"

Light received via the lens 1 and half-mirror 4 is coupled to the sensor array 3 through the color stripe filter or color division filter. Ex. 1006, Figure 9, 5:42-60.

[126g] "*an optical sensor having a plurality of sensing elements*"

A sensor array 3 is set at a position in conjugation with the position of the film surface F and in a direction corresponding to the Y-axis, to alternately receive the light beams A and B. Ex. 1006, Figure 9, 5:63-6:2. The sensor array 3 includes a linear array of sensors from which a series of 128 intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.

[126h] "*wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter*"

Light received via the lens 1 and half-mirror 4 is coupled to the sensor array 3 through the color stripe filter or color division filter. Ex. 1006, Figure 9, 5:42-60.

[126i] "*wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating*"

Eguchi does not describe or disclose diffraction grating. Eguchi uses a color stripe filter or color division filter in place of the blade 2. Eguchi at 5:60-62. Those having ordinary skill in the art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.

[126j] "*wherein the optical sensor integrates the received light*"

An accumulation mode CCD sensor array 3 accumulates [integrates] a charge produced by the sensors within the sensor array 3 over an accumulation time that is determined based on the intensity of received light. Ex. 1006, 6:3-13.

2. *Claim 127:*

[127a]-[127i] "*An apparatus comprising:*

> *one or more light receivers receiving light to be spectrally analyzed;*
>
> *a color filter having a plurality of portions,*
>
> *wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,*
>
> *wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,*
>
> *wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and*
>
> *an optical sensor having a plurality of sensing elements,*

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;"

See [126a]-[126i] above.

[127j] "*wherein the light is received by a probe*"

A camera [probe] receives light via the lens 1 and half-mirror 4. Ex. 1006, 5:46-60.

[127k] "*wherein one or more optical sensors determine a distance of the probe with respect to an object or material*"

The sensor array 3 of the camera outputs an intensity distribution Sv of light reflected from the object in order to derive a focus adjustment ΔV for the lens 1 corresponding to a distance of the object from the lens 1. Ex. 1006, 9, 5:63 to 6:44.

3. *Claim 132:*

[132a] "*The apparatus of claim 127*"

See [127a]-[127k] above.

[132b] "*wherein the plurality of sensing elements comprise an array of sensing elements,*"

The sensor array 3 includes a linear array of sensors from which a series of 128 intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.

4. *Claim 135:*

[135a]-[135i] "*An apparatus comprising:*

one or more light receivers receiving light to be spectrally analyzed;

a color filter having a plurality of portions,

wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,

wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,

wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and

an optical sensor having a plurality of sensing elements,

wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter,

wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating"

See [126a]-[126i] above.

[135j] "*wherein the plurality of sensing elements comprise a matrix of sensing elements*"

The sensor array 3 includes a linear array [1x128 matrix] of sensors from which a series of intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.

5. *Claim 136:*

[136a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[136b] "*wherein the sensing elements comprise a photo detector,*"

Sensor array 3 is set to alternately receive the light beams A and B, which are separated, to convert the intensity distributions of the images formed by the light beams A and B into electrical video signals for detection. It is preferable to employ an accumulation mode charged coupled device (CCD) image sensor array in order to obtain signals in response to the variations in luminance of the object. Accordingly, a CCD image sensor array is employed as the sensor array 3. Ex. 1006, 5:63-6:14. A CCD is one type of a photo detector. Ex. 1009, ¶¶ 35 & 72.

6. *Claim 137:*

[137a] "*The apparatus of claim 136*"

See [136a] above.

[137b] "*wherein the photo detector comprises a photo diode,*"

Sensor array 3 can be a CCD. Ex. 1006, 5:63-6:14. A CCD includes alternating doped regions of a substrate, with each alternating doped pair forming a photodiode. Ex. 1009, ¶¶ 35 & 73.

7. *Claim 141:*

[141a] "*The apparatus of claim 135*"

See [135a]-[135j] above.

[141b] "*wherein the predetermined band of wavelengths to be spectrally analyzed comprises substantially the visible band,*"

The color stripe filter or color division filter includes (e.g., red, green and blue) color portions covering the overall band of wavelengths to be spectrally analyzed (e.g., red, blue, and green wavelengths). Ex. 1006, Figure 9, 5:42-60; Ex. 1007, 1:29-55. The red, green and blue bands of wavelengths comprise substantially the visible light band of wavelengths. Ex. 1009, ¶¶ 33 & 74.

C. Charts

Limitation		**Eguchi**
126a	An apparatus comprising:	Eguchi describes an autofocus feature for a camera [apparatus] that determines a distance to an object Σ based in part on the intensity of light reflected from the object. Ex. 1006, 5:46-62.
126b	one or more light receivers receiving light to be spectrally analyzed;	The camera includes an autofocus feature receiving light from an object of focus via a lens 1 and half-mirror 4 and around edges of a blade alternately shielding the sensor array 3 from light beams A and B. Ex. 1006, Figure 9, 5:42-60.
126c	a color filter having a plurality of portions,	Eguchi describes bundles of rays passing through points A and B in a lens 1 are separated without affecting a photographing image to measure the intensity distributions of the images which are formed by the bundles of rays. The bundles of rays passing

Limitation		Eguchi
		through the points A and B (hereinafter referred to as "light beams A and B" when applicable) are separated from each other by moving a blade 2 in the direction of the arrow y with a blade driving device 5, in such a manner that the light beams A and B are allowed to pass alternately. Ex. 1006, Figure 9, 5:42-60. In one embodiment, Eguchi uses a color stripe filter or color division filter in place of the blade 2. Eguchi at 5:60-62. Suzuki describes using "a stripe filter having red, green and blue color stripes sequentially arranged thereon." Ex. 1007, 1:29-44. Bayer describes a color division filter formed as "a filter mosaic . . . of selectively transmitting type . . . arranged in patterns" of "green, red and blue light transmission characteristics." Ex. 1008, Figures 3A-3B, 4:58-64. Those having ordinary skill in the art would be motivated to implement the color stripe or color division filter in the respective known manners for such filters. No more than ordinary skill would be required, and would produce the predictable result of color stripe and color division filters being implemented using known structures for those filters. Ex. 1009, ¶¶ 39, 68.
126d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band, of wavelengths,	The color stripe filter or color division filter includes one or more portions covering a red band of wavelengths, one or more portions covering a green band of wavelengths, or one or more portions covering a blue band of wavelengths. Ex. 1006, Figure 9, 5:42-60; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1009, ¶¶ 39, 68.

Limitation		Eguchi
126e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	The color stripe filter or color division filter includes red, green and blue color portions covering the overall band of wavelengths to be spectrally analyzed. Ex. 1006, Figure 9, 5:42-60. Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1008, Figures 3A-3B, 4:58-64; Ex. 1009, ¶¶ 39, 68.
126f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	Light received via the lens 1 and half-mirror 4 is coupled to the sensor array 3 through the color stripe filter or color division filter. Ex. 1006, Figure 9, 5:42-60.
126g	an optical sensor having a plurality of sensing elements,	A sensor array 3 [optical sensor] is set at a position in conjugation with the position of the film surface F and in a direction corresponding to the Y-axis, to alternately receive the light beams A and B. Ex. 1006, Figure 9, 5:63-6:2. The sensor array 3 includes a linear array of sensors [plurality of sensing elements] from which a series of 128 intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.
126h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	Light received via the lens 1 and half-mirror 4 is coupled to the sensor array 3 through the color stripe filter or color division filter. Ex. 1006, Figure 9, 5:42-60.
126i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	Eguchi does not describe or disclose diffraction grating. Eguchi uses a color stripe filter or color division filter in place of the blade 2. Eguchi at 5:60-62. Those having ordinary skill in the art would be motivated to not use a diffraction grating when color filters are already being utilized as unnecessary and redundant. No more than

Limitation		Eguchi
		ordinary skill would be required for this modification, which would produce the predictable result of spectrally analyzing light without using a diffraction grating. Ex. 1009, ¶ 38.
126j	wherein the optical sensor integrates the received light.	A camera [probe] receives light via the lens 1 and half-mirror 4. Ex. 1006, 5:46-60.
127a	An apparatus comprising:	See [126a]
127b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
127c	a color filter having a plurality of portions,	See [126c]
127d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,	See [126d]
127e	wherein the predetermined bands of the plurality of portions cover a predetermined band or bands of wavelengths to be spectrally analyzed,	See [126e]
127f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	See [126f]
127g	an optical sensor having a plurality of sensing elements,	See [126g]
127h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of	See [126h]

Limitation		Eguchi
	the color filter,	
127i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	See [126i]
127j	wherein the light is received by a probe,	A camera [probe] receives light via the lens 1 and half-mirror 4. Ex. 1006, 5:46-60.
127k	wherein one or more optical sensors determine a distance of the probe with respect to an object or material.	The sensor array 3 of the camera outputs an intensity distribution Sv of light reflected from the object in order to derive a focus adjustment ΔV for the lens 1 corresponding to a distance of the object from the lens 1. Ex. 1006, 9, 5:63 to 6:44.
132a	The apparatus of claim 127,	See [127a]-[127k].
132b	wherein the plurality of sensing elements comprise an array of sensing elements.	The sensor array 3 includes a linear array of sensors [plurality of sensing elements] from which a series of 128 intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.
135a	An apparatus comprising:	See [126a]
135b	one or more light receivers receiving light to be spectrally analyzed;	See [126b]
135c	a color filter having a plurality of portions,	See [126c]
135d	wherein each of the plurality of portions has a wavelength dependent light transmission property covering a predetermined band of wavelengths,	See [126d]
135e	wherein the predetermined bands of the plurality of portions cover a predetermined band or	See [126e]

Limitation		Eguchi
	bands of wavelengths to be spectrally analyzed,	
135f	wherein light from the one or more light receivers is coupled to the plurality of portions of the color filter; and	See [126f]
135g	an optical sensor having a plurality of sensing elements,	See [126g]
135h	wherein light received by the one or more light receivers is coupled to the sensing elements through the plurality of portions of the color filter;	See [126h]
135i	wherein light received by the one or more light receivers is spectrally analyzed without using a diffraction grating;	See [126i]
135j	wherein the plurality of sensing elements comprise a matrix of sensing elements.	The sensor array 3 includes a linear array [1x128 matrix] of sensors [plurality of sensing elements] from which a series of intensity measurements for each of light beam A and light beam B are shifted out under the control of transfer pulses ϕ_1 and ϕ_2. Ex. 1006, Figures 12 & 17, 6:6-13, 7:21-27.
136a	The apparatus of claim 135,	See [135a]-[135j].
136b	wherein the sensing elements comprise a photo detector.	Sensor array 3 is set to alternately receive the light beams A and B which are separated, to convert the intensity distributions of the images formed by the light beams A and B into electrical video signals for detection. It is preferable to employ an accumulation mode charged coupled device (CCD) image sensor array in order to obtain signals in response to the variations in luminance of the

Limitation		Eguchi
		object. Accordingly, a CCD image sensor array is employed as the sensor array 3. Ex. 1006, 5:63-6:14. A CCD is one type of a photo detector. Ex. 1009, ¶¶ 35 & 72.
137a	The apparatus of claim 136,	See [136a]-[136b].
137b	wherein the photo detector comprises a photo diode.	Sensor array 3 can be a CCD. Ex. 1006, 5:63-6:14. A CCD includes alternating doped regions of a substrate. Each alternating doped pair forms a diode. Ex. 1009, ¶¶ 35 & 73.
141a	The apparatus of claim 135,	See [135a]-[135j].
141b	wherein the predetermined band of wavelengths to be spectrally analyzed comprises substantially the visible band.	The color stripe filter or color division filter includes red, green and blue color portions covering the overall band of wavelengths to be spectrally analyzed, red, blue, and green components. Ex. 1006, Figure 9, 5:42-60; Ex. 1007, 1:29-55. The red, green and blue bands of wavelengths comprise substantially the visible light band of wavelengths. Ex. 1009, ¶¶ 33 & 74.

IX. CONCLUSION

Claims 126-127, 132, 135-137 and 140-141 of the '038 Patent are unpatentable as obvious. Petitioner therefore requests *inter partes* review on Grounds 1-3 as well as cancellation of Claims 126-127, 132, 135-137 and 140-141.

Dated: September 14, 2016 Respectfully submitted,

By: /Daniel E. Venglarik/

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CERTIFICATE OF SERVICE UNDER 37 C.F.R. §§ 42.6(e)(4) and 42.105

The undersigned certifies that a copy of the foregoing PETITION FOR INTER PARTES REVIEW and all exhibits identified herein are being served via Priority Mail Express on September 14, 2016 on:

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CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. §§ 42.24(d)

The undersigned certifies that the word count of the foregoing PETITION FOR INTER PARTES REVIEW, starting with the "OVERVIEW OF CHALLENGE AND RELIEF REQUESTED" up to and including the last word of the "CONCLUSION," is 12,553.

Dated: September 14, 2016

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