

**Google LLC,
Petitioner
v.
138 East LCD Advancements Limited,
Patent Owner**

**U.S. Pat. No. 8,482,638
IPR2024-00958
Oral Hearing October 30, 2025**

Patent Owner's Oral Hearing Demonstrative Exhibit

Agenda

- '638 Patent Background
- Proposed Substitute Claims
 - Superimposing a partial image on a main image by mixing pixel values
- Ground #1: Parulski and Safonov
 - No motivation to combine, hindsight reasoning
- Ground #2: Parulski and Johnson
 - No mixing of pixel values
- Ground #3: Parulski, Johnson, and Safonov
 - Same problems as Grounds #1 and #2
- Ground #4: Parulski and Hoshino
 - Hoshino is not prior art

'638 Patent Background



US008482638B2

(12) **United States Patent**
Shiohara

(10) **Patent No.:** **US 8,482,638 B2**
(45) **Date of Patent:** **Jul. 9, 2013**

(54) **DIGITAL CAMERA GENERATING
COMPOSITE IMAGE FROM MAIN IMAGE
AND SUB-IMAGE, AND METHOD FOR
MANUFACTURING SAME**

(75) Inventor: **Ryuichi Shiohara, Nagano (JP)**

(73) Assignee: **Seiko Epson Corporation, Tokyo (JP)**

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 161 days.

(21) Appl. No.: **12/976,048**

(22) Filed: **Dec. 22, 2010**

(65) **Prior Publication Data**

US 2011/0157404 A1 Jun. 30, 2011

(30) **Foreign Application Priority Data**

Dec. 25, 2009 (JP) 2009-2952

(51) **Int. Cl.**

H04N 5/262 (2006.01)

G03B 17/00 (2006.01)

(52) **U.S. Cl.**

348/240.99; 348/240.3; 396

(58) **Field of Classification Search**

USPC 348/345-356, 42, 47, 48, 51, 333,

348/240.1, 240.99, 240.2, 240.3

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

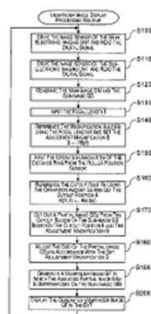
4,231,647 A * 11/1980 Kitai et al. 396/103
5,682,198 A * 10/1997 Katayama et al. 348/47
6,226,459 B1 * 5/2001 Hamada et al. 396/54
6,433,824 B1 * 8/2002 Tanaka et al. 348/345

6,731,339 B2 * 5/2004 Ohkawara 348/347
6,757,013 B2 * 6/2004 Matsuzaka 348/240.1
6,839,086 B1 * 1/2005 Katagiri 348/347
7,289,152 B2 * 10/2007 Watanabe et al. 348/357
7,305,180 B2 * 12/2007 Labaziewicz et al. 396/60
7,509,041 B2 * 3/2009 Hosono 396/60
7,676,146 B2 * 3/2010 Borden et al. 396/380
7,680,411 B2 * 3/2010 Ye 396/334
7,738,016 B2 * 6/2010 Toyofuku 348/240.1
7,856,181 B2 * 12/2010 Maczono 396/324
7,884,862 B2 * 2/2011 Ishii et al. 348/240.3
8,035,725 B2 * 10/2011 Chen et al. 348/349
8,089,527 B2 * 1/2012 Tomita 348/222.1
8,194,168 B2 * 6/2012 Mowry 348/335
8,363,126 B2 * 1/2013 Kurokawa 348/240.3
2003/0020814 A1 * 1/2003 Ono 348/220.1
2003/0160886 A1 * 8/2003 Matsuda et al. 348/347

A main object of the present invention is to provide a digital camera for generating a composite image in which two images are superimposed by a simple mechanism, and to provide a method for manufacturing the camera.

the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.

6 Claims, 11 Drawing Sheets



'638 Patent Background



US008482638B2

(12) United States Patent Shiohara

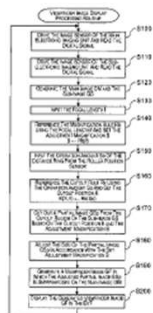
(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2013

- (54) **DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME**
- (75) Inventor: **Ryuichi Shiohara, Nagano (JP)**
- (73) Assignee: **Seiko Epson Corporation, Tokyo (JP)**
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.
- (21) Appl. No.: **12/976,048**
- (22) Filed: **Dec. 22, 2010**
- (65) **Prior Publication Data**
US 2011/0157404 A1 Jun. 30, 2011
- (30) **Foreign Application Priority Data**
Dec. 25, 2009 (JP) 2009-295202
- (51) **Int. Cl.**
H04N 5/262 (2006.01)
G03B 17/00 (2006.01)
- (52) **U.S. CL.**
USPC **348/240.99; 348/240.3; 396/72**
- (58) **Field of Classification Search**
USPC **348/345-356, 42, 47, 48, 51, 333.01, 348/240.1, 240.99, 240.2, 240.3**
See application file for complete search history.
- (56) **References Cited**

U.S. PATENT DOCUMENTS

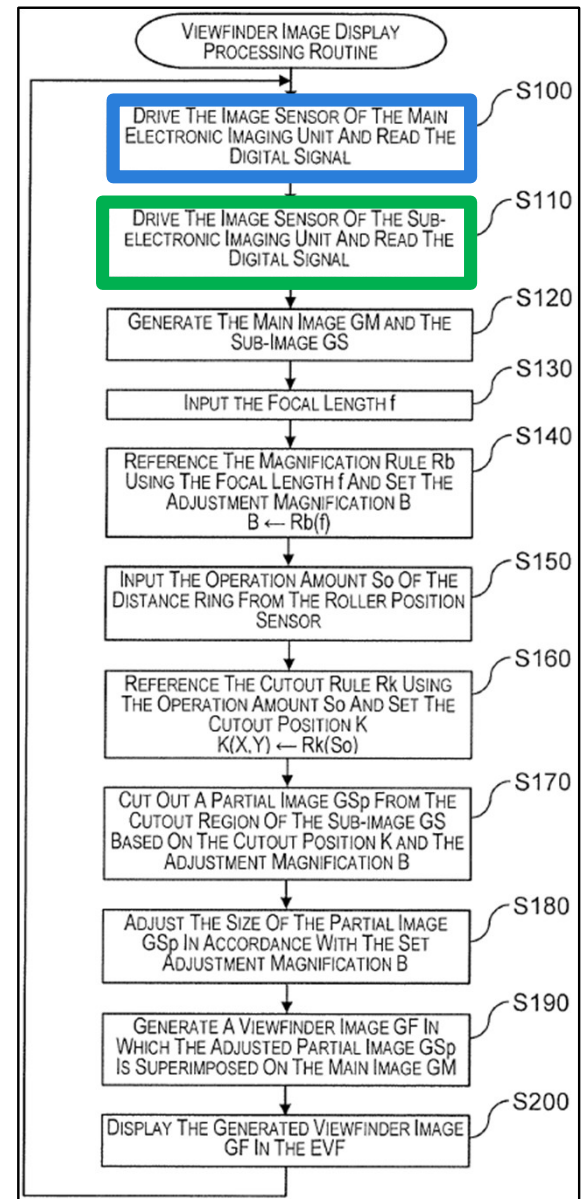
4,231,647 A *	11/1980	Kitai et al.	396/103
5,682,198 A *	10/1997	Katayama et al.	348/47
6,226,459 B1 *	5/2001	Hamada et al.	396/54
6,433,824 B1 *	8/2002	Tanaka et al.	348/345

6 Claims, 11 Drawing Sheets



Page 1 of 20

GOOGLE EXHIBIT 1001



EX1001 at Fig. 7

'638 Patent Background

(12) United States Patent Shiohara

(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2011

(54) DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME

(75) Inventor: Ryuichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data
US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data

Dec. 25, 2009 (JP) 2009-295202

(51) Int. Cl.
H04N 5/262 (2006.01)
G03B 17/00 (2006.01)

(52) U.S. CL.
348/240.99; 348/240.3; 396/72

(58) Field of Classification Search
USPC 348/345-356, 42, 47, 48, 51, 333.01,
348/240.1, 240.99, 240.2, 240.3
See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396/103
5,682,198 A * 10/1997 Katayama et al. 348/47
6,226,459 B1 * 5/2001 Hamada et al. 396/54
6,433,824 B1 * 8/2002 Tanaka et al. 348/345



US008482638B2

(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2011

(6,731,339 B2 * 5/2004 Ohkawara 348/34
6,757,013 B2 * 6/2004 Matsuzaka 348/240
6,839,086 B1 * 1/2005 Katagiri 348/34
7,289,152 B2 * 10/2007 Watanabe et al. 348/35
7,305,180 B2 * 12/2007 Labaziewicz et al. 396/6
7,509,041 B2 * 3/2009 Hosono 396/6
7,676,146 B2 * 3/2010 Borden et al. 396/8
7,680,411 B2 * 3/2010 Ye 396/33
7,738,016 B2 * 6/2010 Toyofuku 348/240
7,856,181 B2 * 12/2010 Maczono 396/32
7,884,862 B2 * 2/2011 Ishii et al. 348/240
8,035,725 B2 * 10/2011 Chen et al. 348/34
8,089,527 B2 * 1/2012 Tomita 348/222
8,194,168 B2 * 6/2012 Mowry 348/33
8,363,126 B2 * 1/2013 Kurokawa 348/240.3
2003/0020814 A1 * 1/2003 Ono 348/220.1
2003/0160886 A1 * 8/2003 Mitsuura et al. 348/347

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2002-122907 A 4/2002

Primary Examiner — Tuan Ho

Assistant Examiner — Selam Gebriel

(74) Attorney, Agent, or Firm — Global IP Counsel

(57) ABSTRACT

A digital camera is provided with a focusing function of focal length varying function of a main lens. The camera includes a main imaging unit configured to get main image by performing a photoelectric conversion subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photo conversion from the subject obtained via a sub-lens, length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a magnification level on the basis of the focal length of the main lens, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.

6 Claims, 11 Drawing Sheets



main areas of processing in the following description. When the viewfinder image display processing routine is executed, the main controller 30 first drives the image sensor 22 of the main electronic imaging unit 20 and reads the digital signal thereof (step S100), and drives the image sensor 42 of the sub-electronic imaging unit 40 and reads the digital signal thereof (step S110). Various types of image processing are then applied to the read digital signals to generate the main image GM and the sub-image GS (step S120). When the main

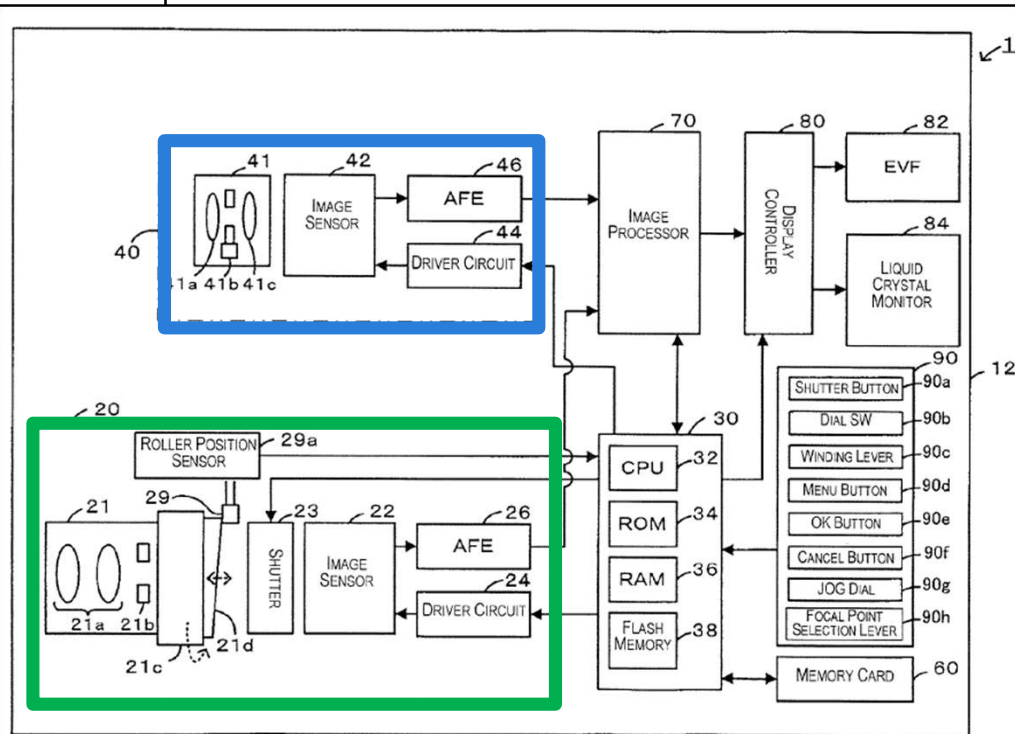


Fig. 1

'638 Patent Background



US008482638B2

(12) United States Patent Shiohara

(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2013

(54) DIGITAL CAMERA GENERATING
COMPOSITE IMAGE FROM MAIN IMAGE
AND SUB-IMAGE, AND METHOD FOR
MANUFACTURING SAME

(75) Inventor: Ryuichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data

US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data

Dec. 25, 2009 (JP) 2009-295202

(51) Int. Cl.

H04N 5/262 (2006.01)

G03B 17/00 (2006.01)

(52) U.S. Cl.

USPC 348/240.99; 348/240.3; 396/72

(58) Field of Classification Search

USPC 348/345-356, 42, 47, 48, 51, 333.01,

348/240.1, 240.99, 240.2, 240.3

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396/103

5,682,198 A * 10/1997 Katayama et al. 348/47

6,226,459 B1 * 5/2001 Hamada et al. 396/54

6,433,824 B1 * 8/2002 Tanaka et al. 348/345

6,731,339 B2 * 5/2004 Ohkawara 348/347
6,757,013 B2 * 6/2004 Matsuzaka 348/240.1
6,839,086 B1 * 1/2005 Katagiri 348/347
7,289,152 B2 * 10/2007 Watanabe et al. 348/357
7,305,180 B2 * 12/2007 Labaziewicz et al. 396/60
7,509,041 B2 * 3/2009 Hosono 396/60
7,676,146 B2 * 3/2010 Border et al. 396/80
7,680,411 B2 * 3/2010 Ye 396/334
7,738,016 B2 * 6/2010 Toyofuku 348/240.1
7,856,181 B2 * 12/2010 Maczono 396/324
7,884,862 B2 * 2/2011 Ishii et al. 348/240.3
8,035,725 B2 * 10/2011 Chen et al. 348/349
8,089,527 B2 * 1/2012 Tomita 348/222.1
8,194,168 B2 * 6/2012 Mowry 348/335
8,363,126 B2 * 1/2013 Kurokawa 348/240.3
2003/0020814 A1 * 1/2003 Ono 348/220.1
2003/0160886 A1 * 8/2003 Mitsuwa et al. 348/347

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2002-122907 A 4/2002

Primary Examiner — Tuan Ho

Assistant Examiner — Selam Gebriel

(74) Attorney, Agent, or Firm — Global IP Counselors, LLP

(57) ABSTRACT

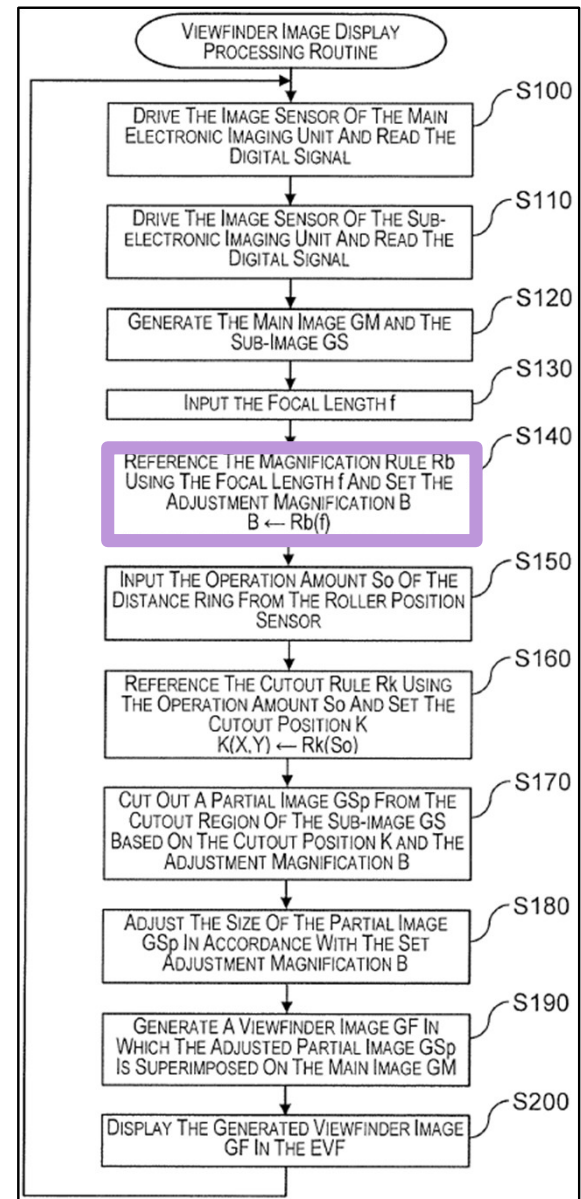
A digital camera is provided with a focusing function and a focal length varying function of a main lens. The digital camera includes a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens, a focal length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.

6 Claims, 11 Drawing Sheets



Page 1 of 20

GOOGLE EXHIBIT 1001



EX1001 at Fig. 7

'638 Patent Background

(12) United States Patent Shiohara

(54) DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME

(75) Inventor: Ryueichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data
US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data
Dec. 25, 2009 (JP) 2009-295

(51) Int. Cl.
H04N 5/262 (2006.01)
G03B 17/00 (2006.01)

(52) U.S. Cl.
USPC 348/240.99; 348/240.3; 39

(58) Field of Classification Search
USPC 348/345-356, 42, 47, 48, 51, 333
348/240.1, 240.99, 240.2, 2

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396
5,682,198 A * 10/1997 Katayama et al. 34
6,226,459 B1 * 5/2001 Hamada et al. 39
6,433,824 B1 * 8/2002 Tanaka et al. 348

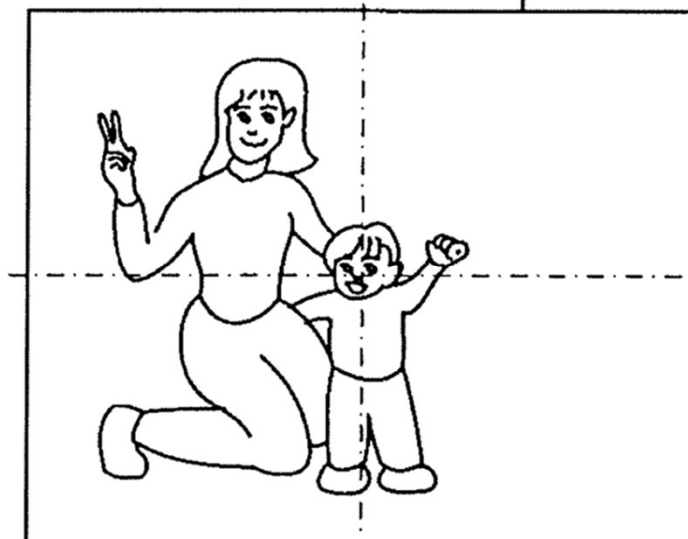
since an image sensor 22 and an image sensor 42 having different numbers of pixels are used in the main electronic imaging unit 20 and the sub-electronic imaging unit 40, respectively, the main image GM and the sub-image GS are of different sizes, as shown in the drawings. Lenses 21 having

(b) MAIN FOCAL LENGTH f_2

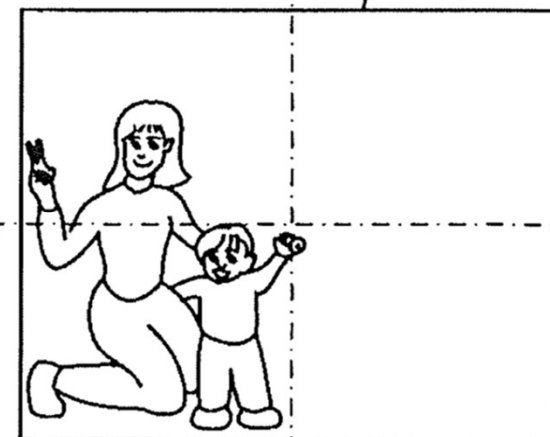
GM

(d) SUB

GS



MAGNIFICATION
B2



'638 Patent Background



US008482638B2

(12) United States Patent Shiohara

(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2013

(54) DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME

(75) Inventor: Ryuichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data

US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data

Dec. 25, 2009 (JP) 2009-295202

(51) Int. Cl.

H04N 5/262 (2006.01)

G03B 17/00 (2006.01)

(52) U.S. Cl.

USPC 348/240.99; 348/240.3; 396/72

(58) Field of Classification Search

USPC 348/345, 356, 42, 47, 48, 51, 333.01,

348/240.1, 240.99, 240.2, 240.3

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396/103

5,682,198 A * 10/1997 Katayama et al. 348/47

6,226,459 B1 * 5/2001 Hamada et al. 396/54

6,433,824 B1 * 8/2002 Tanaka et al. 348/345

6,731,339 B2 * 5/2004 Ohkawara 348/347
6,757,013 B2 * 6/2004 Matsuzaka 348/240.1
6,839,086 B1 * 1/2005 Katagiri 348/347
7,289,152 B2 * 10/2007 Watanabe et al. 348/357
7,305,180 B2 * 12/2007 Labaziewicz et al. 396/60
7,509,041 B2 * 3/2009 Hosono 396/60
7,676,146 B2 * 3/2010 Border et al. 396/80
7,680,411 B2 * 3/2010 Ye 396/334
7,738,016 B2 * 6/2010 Toyofuku 348/240.1
7,856,181 B2 * 12/2010 Maczono 396/324
7,884,862 B2 * 2/2011 Ishii et al. 348/240.3
8,035,725 B2 * 10/2011 Chen et al. 348/349
8,089,527 B2 * 1/2012 Tomita 348/222.1
8,194,168 B2 * 6/2012 Mowry 348/335
8,363,126 B2 * 1/2013 Kurokawa 348/240.3
2003/0020814 A1 * 1/2003 Ono 348/220.1
2003/0160886 A1 * 8/2003 Mitsuwa et al. 348/347

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2002-122907 A 4/2002

Primary Examiner — Tuan Ho

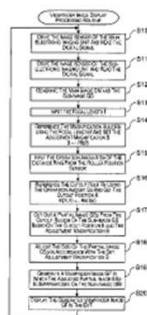
Assistant Examiner — Selam Gebriel

(74) Attorney, Agent, or Firm — Global IP Counselors, LLP

(57) ABSTRACT

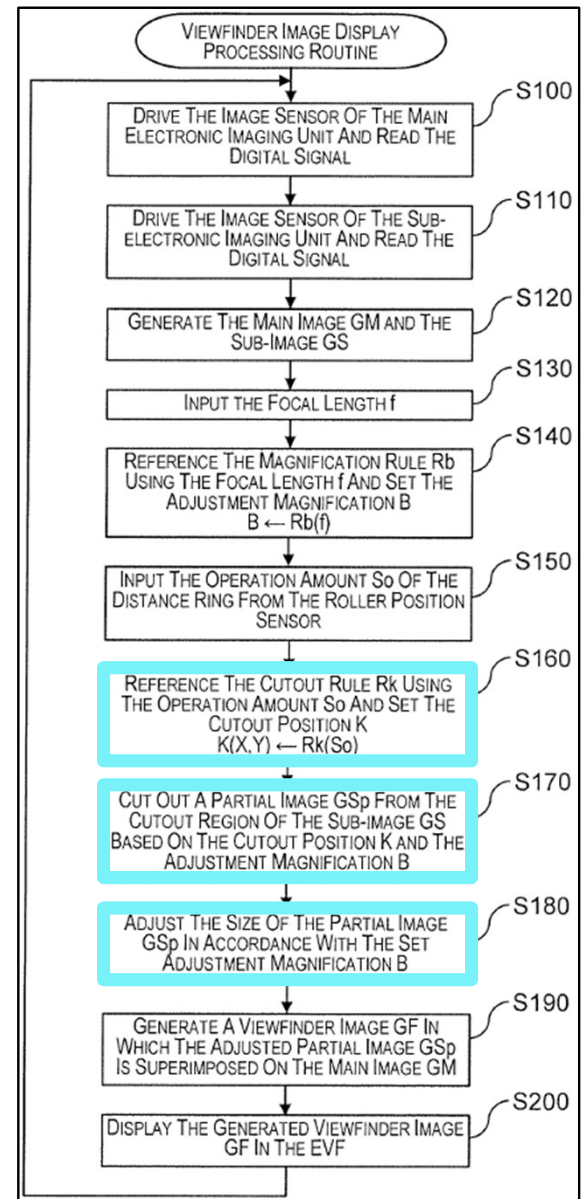
A digital camera is provided with a focusing function and a focal length varying function of a main lens. The digital camera includes a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens, a focal length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.

6 Claims, 11 Drawing Sheets



Page 1 of 20

GOOGLE EXHIBIT 1001



EX1001 at Fig. 7

'638 Patent Background

(12) United States Patent Shiohara

(10) Patent No.: US 8,488,638
(45) Date of Patent: Jan. 14, 2013

(54) DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME

(75) Inventor: Ryuichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data
US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data
Dec. 25, 2009 (JP) 2009-295202

(51) Int. Cl.
H04N 5/262 (2006.01)
G03B 17/00 (2006.01)

(52) U.S. CL.
USPC 348/240.99; 348/240.3; 396/72

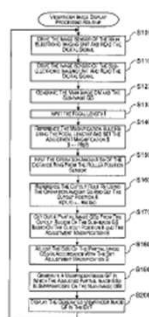
(58) Field of Classification Search
USPC 348/345-356, 42, 47, 48, 51, 333.01, 348/240.1, 240.99, 240.2, 240.3
See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396/103
5,682,198 A * 10/1997 Katayama et al. 348/47
6,226,459 B1 * 5/2001 Hamada et al. 396/54
6,433,824 B1 * 8/2002 Tanaka et al. 348/345

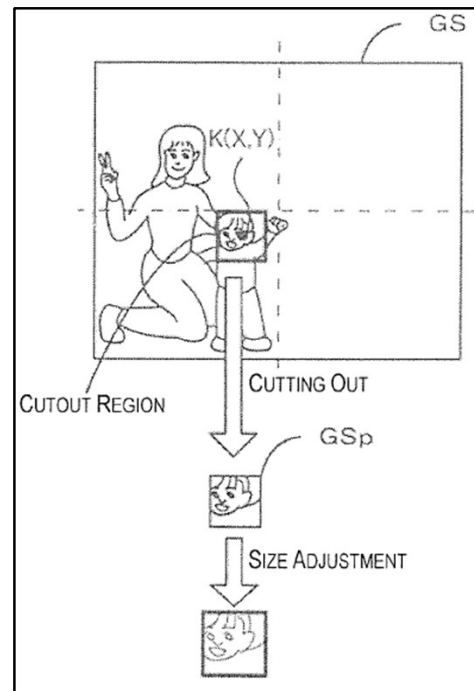
6 Claims, 11 Drawing Sheets



US00848638B2

When the adjustment magnification B and the cutout position K are thus set, a partial image GSp is cut out from a cutout region having a size based on the adjustment magnification B, at a position based on the cutout position K in the sub-image GS (step S170), and a size adjustment in accordance with the adjustment magnification B is applied to the cut-out partial image GSp (step S180). Since the adjustment magnification B is set by referencing the magnification rule Rb using the focal length f, the subject appearing in the size-adjusted partial image GSp is of the same size as the subject appearing in the main image GM. A viewfinder image GF is generated,

ABSTRACT
A digital camera is provided with a focusing unit having a focal length varying function of a main lens. The digital camera includes a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens, a focal length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.



EX1001 at 7:8-18; Fig. 8

'638 Patent Background



US008482638B2

(12) United States Patent Shiohara

(10) Patent No.: US 8,482,638 B2
(45) Date of Patent: Jul. 9, 2013

(54) DIGITAL CAMERA GENERATING
COMPOSITE IMAGE FROM MAIN IMAGE
AND SUB-IMAGE, AND METHOD FOR
MANUFACTURING SAME

(75) Inventor: Ryuichi Shiohara, Nagano (JP)

(73) Assignee: Seiko Epson Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 161 days.

(21) Appl. No.: 12/976,048

(22) Filed: Dec. 22, 2010

(65) Prior Publication Data

US 2011/0157404 A1 Jun. 30, 2011

(30) Foreign Application Priority Data

Dec. 25, 2009 (JP) 2009-295202

(51) Int. Cl.

H04N 5/262 (2006.01)

G03B 17/00 (2006.01)

(52) U.S. Cl.

USPC 348/240.99; 348/240.3; 396/72

(58) Field of Classification Search

USPC 348/345, 356, 42, 47, 48, 51, 333.01,

348/240.1, 240.99, 240.2, 240.3

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kitai et al. 396/103
5,682,198 A * 10/1997 Katayama et al. 348/47
6,226,459 B1 * 5/2001 Hamada et al. 396/54
6,433,824 B1 * 8/2002 Tanaka et al. 348/345

6,731,339 B2 * 5/2004 Ohkawara 348/347
6,757,013 B2 * 6/2004 Matsuzaka 348/240.1
6,839,086 B1 * 1/2005 Katagiri 348/347
7,289,152 B2 * 10/2007 Watanabe et al. 348/357
7,305,180 B2 * 12/2007 Labaziewicz et al. 396/60
7,509,041 B2 * 3/2009 Hosono 396/60
7,676,146 B2 * 3/2010 Border et al. 396/80
7,680,411 B2 * 3/2010 Ye 396/334
7,738,016 B2 * 6/2010 Toyofuku 348/240.1
7,856,181 B2 * 12/2010 Maczono 396/324
7,884,862 B2 * 2/2011 Ishii et al. 348/240.3
8,035,725 B2 * 10/2011 Chen et al. 348/349
8,089,527 B2 * 1/2012 Tomita 348/222.1
8,194,168 B2 * 6/2012 Mowry 348/335
8,363,126 B2 * 1/2013 Kurokawa 348/240.3
2003/0020814 A1 * 1/2003 Ono 348/220.1
2003/0160886 A1 * 8/2003 Mitsuwa et al. 348/347

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2002-122907 A 4/2002

Primary Examiner — Tuan Ho

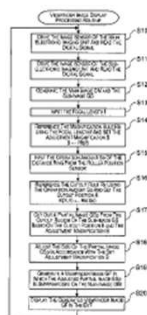
Assistant Examiner — Selam Gebriel

(74) Attorney, Agent, or Firm — Global IP Counselors, LLP

(57) ABSTRACT

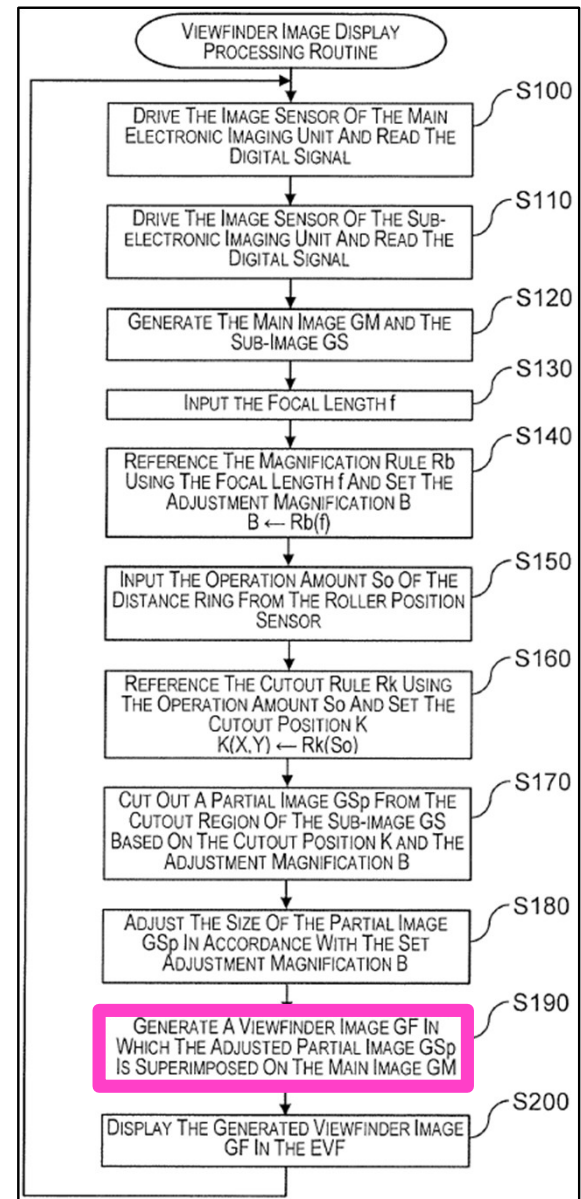
A digital camera is provided with a focusing function and a focal length varying function of a main lens. The digital camera includes a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens, a focal length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.

6 Claims, 11 Drawing Sheets



Page 1 of 20

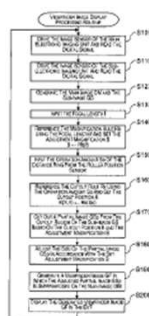
GOOGLE EXHIBIT 1001



EX1001 at Fig. 7

'638 Patent Background

 US008482638B	
(12) United States Patent Shiohara	(10) Patent No.: US (45) Date of Patent:
(54) DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME	6,731,339 B2 * 5/2004 Ohkawara 6,757,013 B2 * 6/2004 Matsuzaki 6,839,086 B1 * 1/2005 Katagiri 7,289,152 B2 * 10/2007 Watanabe 7,305,180 B2 * 12/2007 Labaziev 7,509,041 B2 * 3/2009 Hosono 7,676,146 B2 * 3/2010 Border 7,680,411 B2 * 3/2010 Ye 7,738,016 B2 * 6/2010 Toyofuku 7,856,181 B2 * 12/2010 Maczom 7,884,862 B2 * 2/2011 Ishii et al. 8,035,725 B2 * 10/2011 Chen et al. 8,089,527 B2 * 1/2012 Tomita 8,194,168 B2 * 6/2012 Mowry 8,363,126 B2 * 1/2013 Kurokawa 2003/0020814 A1 * 1/2003 Ono 2003/0160886 A1 * 8/2003 Mitsuwa et al.
(75) Inventor: Ryuichi Shiohara, Nagano (JP)	
(73) Assignee: Seiko Epson Corporation, Tokyo (JP)	
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.	
(21) Appl. No.: 12/976,048	
(22) Filed: Dec. 22, 2010	(Continued)
(65) Prior Publication Data US 2011/0157404 A1 Jun. 30, 2011	FOREIGN PATENT DOCUMENTS JP 2002-122907 A 4/2002 Primary Examiner — Tuan Ho Assistant Examiner — Selam Gebriel (74) Attorney, Agent, or Firm — Global IP Counselors, P.C.
(30) Foreign Application Priority Data Dec. 25, 2009 (JP) 2009-295202	(57) ABSTRACT A digital camera is provided with a focusing function of focal length varying function of a main lens. The digital camera includes a main imaging unit configured to generate a main image by performing a photoelectric conversion from subject obtained via the main lens, a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens, a length acquiring unit configured to acquire the focal length of the main lens, a magnification setting unit configured to set a level of magnification on the basis of the focal length of the main lens, a composite image generating unit configured to generate a composite image by combining the main image and the sub-image, after at least one of the main image and the sub-image is magnified at the level of magnification, and an image play unit configured to display the composite image.
(51) Int. Cl. H04N 5/262 (2006.01) G03B 17/00 (2006.01)	
(52) U.S. CL. USPC 348/240.99; 348/240.3; 396/72	
(58) Field of Classification Search USPC 348/345-356, 42, 47, 48, 51, 333.01, 348/240.1, 240.99, 240.2, 240.3 See application file for complete search history.	
(56) References Cited U.S. PATENT DOCUMENTS 4,231,647 A * 11/1980 Kitai et al. 396/103 5,682,198 A * 10/1997 Katayama et al. 348/47 6,226,459 B1 * 5/2001 Hamada et al. 396/54 6,433,824 B1 * 8/2002 Tanaka et al. 348/345	

6 Claims, 11 Drawing Sheets 	8119 8118 8117 8116 8115 8114 8113 8112 8111 8110 8109 8108 8107 8106 8105 8104 8103 8102 8101 8100 8099 8098 8097 8096 8095 8094 8093 8092 8091 8090 8089 8088 8087 8086 8085 8084 8083 8082 8081 8080 8079 8078 8077 8076 8075 8074 8073 8072 8071 8070 8069 8068 8067 8066 8065 8064 8063 8062 8061 8060 8059 8058 8057 8056 8055 8054 8053 8052 8051 8050 8049 8048 8047 8046 8045 8044 8043 8042 8041 8040 8039 8038 8037 8036 8035 8034 8033 8032 8031 8030 8029 8028 8027 8026 8025 8024 8023 8022 8021 8020 8019 8018 8017 8016 8015 8014 8013 8012 8011 8010 8009 8008 8007 8006 8005 8004 8003 8002 8001 8000 7999 7998 7997 7996 7995 7994 7993 7992 7991 7990 7989 7988 7987 7986 7985 7984 7983 7982 7981 7980 7979 7978 7977 7976 7975 7974 7973 7972 7971 7970 7969 7968 7967 7966 7965 7964 7963 7962 7961 7960 7959 7958 7957 7956 7955 7954 7953 7952 7951 7950 7949 7948 7947 7946 7945 7944 7943 7942 7941 7940 7939 7938 7937 7936 7935 7934 7933 7932 7931 7930 7929 7928 7927 7926 7925 7924 7923 7922 7921 7920 7919 7918 7917 7916 7915 7914 7913 7912 7911 7910 7909 7908 7907 7906 7905 7904 7903 7902 7901 7900 7899 7898 7897 7896 7895 7894 7893 7892 7891 7890 7889 7888 7887 7886 7885 7884 7883 7882 7881 7880 7879 7878 7877 7876 7875 7874 7873 7872 7871 7870 7869 7868 7867 7866 7865 7864 7863 7862 7861 7860 7859 7858 7857 7856 7855 7854 7853 7852 7851 7850 7849 7848 7847 7846 7845 7844 7843 7842 7841 7840 7839 7838 7837 7836 7835 7834 7833 7832 7831 7830 7829 7828 7827 7826 7825 7824 7823 7822 7821 7820 7819 7818 7817 7816 7815 7814 7813 7812 7811 7810 7809 7808 7807 7806 7805 7804 7803 7802 7801 7800 7799 7798 7797 7796 7795 7794 7793 7792 7791 7790 7789 7788 7787 7786 7785 7784 7783 7782 7781 7780 7779 7778 7777 7776 7775 7774 7773 7772 7771 7770 7769 7768 7767 7766 7765 7764 7763 7762 7761 7760 7759 7758 7757 7756 7755 7754 7753 7752 7751 7750 7749 7748 7747 7746 7745 7744 7743 7742 7741 7740 7739 7738 7737 7736 7735 7734 7733 7732 7731 7730 7729 7728 7727 7726 7725 7724 7723 7722 7721 7720 7719 7718 7717 7716 7715 7714 7713 7712 7711 7710 7709 7708 7707 7706 7705 7704 7703 7702 7701 7700 7699 7698 7697 7696 7695 7694 7693 7692 7691 7690 7689 7688 7687 7686 7685 7684 7683 7682 7681 7680 7679 7678 7677 7676 7675 7674 7673 7672 7671 7670 7669 7668 7667 7666 7665 7664 7663 7662 7661 7660 7659 7658 7657 7656 7655 7654 7653 7652 7651 7650 7649 7648 7647 7646 7645 7644 7643 7642 7641 7640 7639 7638 7637 7636 7635 7634 7633 7632 7631 7630 7629 7628 7627 7626 7625 7624 7623 7622 7621 7620 7619 7618 7617 7616 7615 7614 7613 7612 7611 7610 7609 7608 7607 7606 7605 7604 7603 7602 7601 7600 7599 7598 7597 7596 7595 7594 7593 7592 7591 7590 7589 7588 7587 7586 7585 7584 7583 7582 7581 7580 7579 7578 7577 7576 7575 7574 7573 7572 7571 7570 7569 7568 7567 7566 7565 7564 7563 7562 7561 7560 7559 7558 7557 7556 7555 7554 7553 7552 7551 7550 7549 7548 7547 7546 7545 7544 7543 7542 7541 7540 7539 7538 7537 7536 7535 7534 7533 7532 7531 7530 7529 7528 7527 7526 7525 7524 7523 7522 7521 7520 7519 7518 7517 7516 7515 7514 7513 7512 7511 7510 7509 7508 7507 7506 7505 7504 7503 7502 7501 7500 7499 7498 7497 7496 7495 7494 7493 7492 7491 7490 7489 7488 7487 7486 7485 7484 7483 7482 7481 7480 7479 7478 7477 7476 7475 7474 7473 7472 7471 7470 7469 7468 7467 7466 7465 7464 7463 7462 7461 7460 7459 7458 7457 7456 7455 7454 7453 7452 7451 7450 7449 7448 7447 7446 7445 7444 7443 7442 7441 7440 7439 7438 7437 7436 7435 7434 7433 7432 7431 7430 7429 7428 7427 7426 7425 7424 7423 7422 7421 7420 7419 7418 7417 7416 7415 7414 7413 7412 7411 7410 7409 7408 7407 7406 7405 7404 7403 7402 7401 7400 7399 7398 7397 7396 7395 7394 7393 7392 7391 7390 7389 7388 7387 7386 7385 7384 7383 7382 7381 7380 7379 7378 7377 7376 7375 7374 7373 7372 7371 7370 7369 7368 7367 7366 7365 7364 7363 7362 7361 7360 7359 7358 7357 7356 7355 7354 7353 7352 7351 7350 7349 7348 7347 7346 7345 7344 7343 7342 7341 7340 7339 7338 7337 7336 7335 7334 7333 7332 7331 7330 7329 7328 7327 7326 7325 7324 7323 7322 7321 7320 7319 7318 7317 7316 7315 7314 7313 7312 7311 7310 7309 7308 7307 7306 7305 7304 7303 7302 7301 7300 7299 7298 7297 7296 7295 7294 7293 7292 7291 7290 7289 7288 7287 7286 7285 7284 7283 7282 7281 7280 7279 7278 7277 7276 7275 7274 7273 7272 7271 7270 7269 7268 7267 7266 7265 7264 7263 7262 7261 7260 7259 7258 7257 7256 7255 7254 7253 7252 7251 7250 7249 7248 7247 7246 7245 7244 7243 7242 7241 7240 7239 7238 7237 7236 7235 7234 7233 7232 7231 7230 7229 7228 7227 7226 7225 7224 7223 7222 7221 7220 7219 7218 7217 7216 7215 7214 7213 7212 7211 7210 7209 7208 7207 7206 7205 7204 7203 7202 7201 7200 7199 7198 7197 7196 7195 7194 7193 7192 7191 7190 7189 7188 7187 7186 7185 7184 7183 7182 7181 7180 7179 7178 7177 7176 7175 7174 7173 7172 7171 7170 7169 7168 7167 7166 7165 7164 7163 7162 7161 7160 7159 7158 7157 7156 7155 7154 7153 7152 7151 7150 7149 7148 7147 7146 7145 7144 7143 7142 7141 7140 7139 7138 7137 7136 7135 7134 7133 7132 7131 7130 7129 7128 7127 7126 7125 7124 7123 7122 7121 7120 7119 7118 7117 7116 7115 7114 7113 7112 7111 7110 7109 7108 7107 7106 7105 7104 7103 7102 7101 7100 7099 7098 7097 7096 7095 7094 7093 7092 7091 7090 7089 7088 7087 7086 7085 7084 7083 7082 7081 7080 7079 7078 7077 7076 7075 7074 7073 7072 7071 7070 7069 7068 7067 7066 7065 7064 7063 7062 7061 7060 7059 7058 7057 7056 7055 7054 7053 7052 7051 7050 7049 7048 7047 7046 7045 7044 7043 7042 7041 7040 7039 7038 7037 7036 7035 7034 7033 7032 7031 7030 7029 7028 7027 7026 7025 7024 7023 7022 7021 7020 7019 7018 7017 7016 7015 7014 7013 7012 7011 7010 7009 7008 7007 7006 7005 7004 7003 7002 7001 7000 6999 6998 6997 6996 6995 6994 6993 6992 6991 6990 6989 6988 6987 6986 6985 6984 6983 6982 6981 6980 6979 6978 6977 6976 6975 6974 6973 6972 6971 6970 6969 6968 6967 6966 6965 6964 6963 6962 6961 6960 6959 6958 6957 6956 6955 6954 6953 6952 6951 6950 6949 6948 6947 6946 6945 6944 6943 6942 6941 6940 6939 6938 6937 6936 6935 6934 6933 6932 6931 6930 6929 6928 6927 6926 6925 6924 6923 6922 6921 6920 6919 6918 6917 6916 6915 6914 6913 6912 6911 6910 6909 6908 6907 6906 6905 6904 6903 6902 6901 6900 6899 6898 6897 6896 6895 6894 6893 6892 6891 6890 6889 6888 6887 6886 6885 6884 6883 6882 6881 6880 6879 6878 6877 6876 6875 6874 6873 6872 6871 6870 6869 6868 6867 6866 6865 6864 6863 6862 6861 6860 6859 6858 6857 6856 6855 6854 6853 6852 6851 6850 6849 6848 6847 6846 6845 6844 6843 6842 6841 6840 6839 6838 6837 6836 6835 6834 6833 6832 6831 6830 6829 6828 6827 6826 6825 6824 6823 6822 6821 6820 6819 6818 6817 6816 6815 6814 6813 6812 6811 6810 6809 6808 6807 6806 6805 6804 6803 6802 6801 6800 6799 6798 6797 6796 6795 6794 6793 6792 6791 6790 6789 6788 6787 6786 6785 6784 6783 6782 6781 6780 6779 6778 6777 6776 6775 6774 6773 6772 6771 6770 6769 6768 6767 6766 6765 6764 6763 6762 6761 6760 6759 6758 6757 6756 6755 6754 6753 6752 6751 6750 6749 6748 6747 6746 6745 6744 6743 6742 6741 6740 6739 6738 6737 6736 6735 6734 6733 6732 6731 6730 6729 6728 6727 6726 6725 6724 6723 6722 6721 6720 6719 6718 6717 6716 6715 6714 6713 6712 6711 6710 6709 6708 6707 6706 6705 6704 6703 6702 6701 6700 6699 6698 6697 6696 6695 6694 6693 6692 6691 6690 6689 6688 6687 6686 6685 6684 6683 6682 6681 6680 6679 6678 6677 6676 6675 6674 6673 6672 6671 6670 6669 6668 6667 6666 6665 6664 6663 6662 6661 6660 6659 6658 6657 6656 6655 6654 6653 6652 6651 6650 6649 6648 6647 6646 6645 6644 6643 6642 6641 6640 6639 6638 6637 6636 6635 6634 6633 6632 6631 6630 6629 6628 6627 6626 6625 6624 6623 6622 6621 6620 6619 6618 6617 6616 6615 6614 6613 6612 6611 6610 6609 6608 6607 6606 6605 6604 6603 6602 6601 6600 6599 6598 6597 6596 6595 6594 6593 6592 6591 6590 6589 6588 6587 6586 6585 6584 6583 6582 6581 6580 6579 6578 6577 6576 6575 6574 6573 6572 6571 6570 6569 6568 6567 6566 6565 6564 6563 6562 6561 6560 6559 6558 6557 6556 6555 6554 6553 6552 6551 6550 6549 6548 6547 6546 6545 6544 6543 6542 6541 6540 6539 6538 6537 6536 6535 6534 6533 6532 6531 6530 6529 6528 6527 6526 6525 6524 6523 6522 6521 6520 6519 6518 6517 6516 6515 6514 6513 6512 6511 6510 6509 6508 6507 6506 6505 6504 6503 6502 6501 6500 6499 6498 6497 6496 6495 6494 6493 6492 6491 6490 6489 6488 6487 6486 6485 6484 6483 6482 6481 6480 6479 6478 6477 6476 6475 6474 6473 6472 6471 6470 6469 6468 6467 6466 6465 6464 6463 6462 6461 6460 6459 6458 6457 6456 6455 6454 6453 6452 6451 6450 6449 6448 6447 6446 6445 6444 6443 6442 6441 6440 6439 6438 6437 6436 6435 6434 6433 6432 6431 6430 6429 6428 6427 6426 6425 6424 6423 6422 6421 6420 6419 6418 6417 6416 6415 6414 6413 6412 6411 6410 6409 6408 6407 6406 6405 6404 6403 6402 6401 6400 6399 6398 6397 6396 6395 6394 6393 6392 6391 6390 6389 6388 6387 6386 6385 6384 6383 6382 6381 6380 6379 6378 6377 6376 6375 6374 6373 6372 6371 6370 6369 6368 6367 6366 6365 6364 6363 6362 6361 6360 6359 6358 6357 6356 6355 6354 6353 6352 6351 6350 6
--	---

Proposed Substitute Claim 7

7. (Proposed Substitute for original claim 1) A digital camera having a focusing function and a focal length varying function of a main lens, the digital camera comprising:

- a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens;

- a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens;

- a focal length acquiring unit configured to acquire the focal length of the main lens;

- a magnification setting unit configured to set a level of magnification on the basis of the focal length;

- a composite image generating unit configured to determine a cutout region in the sub-image, cut out a partial image from the cutout region, magnify at the level of magnification at least one of the main image and the sub-image, and generate a composite image by [combining] superimposing the partial image on the main image[and the sub-image] by mixing pixel values of the partial image with pixel values of the main image,

- wherein the generation of the composite image occurs after at least one of the main image and the sub-image is magnified at the level of magnification;

- an image display unit configured to display the composite image; and

- wherein the magnification setting unit is configured to set the level of the magnification in order to match substantially a size of the main image and a size of the sub-image.

Appendix A to RMTA at 1.

Petitioner Bears the Burden of Persuasion

- **Petitioner's burden.** A petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.

37 C.F.R. 42.121(d)(2)

Petitioner Bears the Burden of Persuasion

United States
for the

CISCO SYSTEM
COMCAST CABLE
COMMUNICATIO
ENTERPRISES L
AR

20

Appeals from the
Office, Patent Trial
01020, IPR2016-010
IPR2017-00417, IPR

Decid

PETER J. MCAN
Ltd., Chicago, IL, ar
by ANDREW B. KARP.

THEODORE M. FO
TX, argued for all ap
also represented by

694 F.3d at 1327–28. In addressing six prior art refer-
ences, the challenger’s expert testified that “[t]hese are all
components that are modular, and when I add one, it
doesn’t change the way the other one works,” without
providing any factual basis for that assertion. *Id.* at 1327
(alteration in original). We explained that such a conclu-
sory statement is “not sufficient and is fraught with hind-
sight bias.” *Id.* (first citing *KSR*, 550 U.S. at 418; then
citing *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363,
1373–74 (Fed. Cir. 2008)). In particular, “[t]he expert
failed to explain how specific references could be combined,
which combination(s) of elements in specific references
would yield a predictable result, or how any specific combi-
nation would operate or read on the asserted claims.” *Id.*

TQ Delta, LLC v. CISCO Sys., Inc., 942 F.3d 1352, 1360 (Fed. Cir. 2019); Reply at 7.

GROUND #1: PARULSKI AND SAFONOV

NO MOTIVATION TO COMBINE, HINDSIGHT REASONING

Petitioner Admits Parulski Does Not Teach Mixing Pixel Values

Paper No. _____

As explained in the Petition and Opposition to MTA, a POSITA would have been motivated to modify Parulski's composite image generating unit to use alpha blending to combine Parulski's main image and sub-image portion when creating the composite, augmented, or enhanced image. Pet. 24-26, 56-59; Opp. MTA 3-10; Stevenson 3rd ¶¶72-87. A POSITA would have been motivated to improve upon Parulski's replacement by using Safonov's alpha blending to mix the pixels of the main and sub-images or, to the extent Parulski's replacement is silent on the replacement method, a POSITA would have looked to Safonov's alpha blending to mix pixels of two images as a known way to combine Parulski's main image and sub-image. Stevenson ¶¶94-103, 169-179; Pet. 24-26, 55-60; Opp. MTA 3-10;

Opp. at 6.

Parulski Teaches Completely Replacing Pixels

(19) United States
(12) Patent Application Publication
Parulski et al.

(54) METHOD AND APPARATUS FOR
OPERATING A DUAL LENS CAMERA TO
AUGMENT AN IMAGE

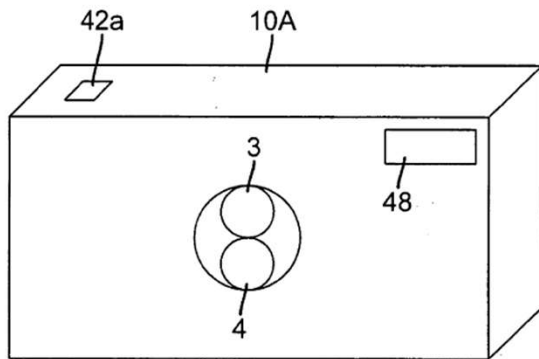
(76) Inventors: Kenneth A. Parulski, Rochester,
NY (US); Wilbert E. Janson,
Shortsville, NY (US); John N.
Border, Walworth, NY (US); John
R. Fredlund, Rochester, NY (US);
Joseph A. Manico, Rochester, NY
(US); Robert J. Parada, Rochester,
NY (US)

Correspondence Address:
Frank Pincelli
Patent Legal Staff
Eastman Kodak Company, 343 State Street
Rochester, NY 14650-2201 (US)

(21) Appl. No.: 11/684,025
(22) Filed: Mar. 9, 2007



of the primary image. A modified image is then created by replacing portions of the primary image with portions of the secondary image. In effect, portions of the primary image (areas of lower noise but with some motion blur) are replaced with corresponding portions of the secondary image (areas of higher noise but little or no motion blur) to obtain a modified image with relatively low noise and good sharpness.



Page 1 of 51

GOOGLE EXHIBIT 1005

EX1005 at ¶ [0145]

- “Replacing” means “pixels in a portion of a first image completely take the place of pixels of a corresponding portion of a second image.”

Preliminary Guidance at 10-11.

Safonov Teaches Filtering and Blending Within One Image

All blending-related terms are derived from the single source image.

Publicized Patent 10-2007-0046010

(57) Abstract

The present invention relates to a method of digital image enhancement and comprises a step of converting from an RGB color space to the luminance channel of an image, a step of filtering the luminance channel of the image by a bilateral filter, a step of correcting shadow to increase local contrast and luminance, respectively, and correcting highlight to increase local contrast and decrease luminance at the luminance channel of the image, and a step of converting the corrected image into an RGB color space. By this, the quality of photographs can be improved while being printed on a photo printer.

(51) Int. Cl. H04N 1/39

(21) Application No. 10-2005-0133120

(22) Application Date October 28, 2005

(30) Claim of Priority RU2005133120 October 28, 2005 Russia (RU)

(71) Applicant Samsung Electronics Co., Ltd.
416 Maetan-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea

(72) Inventor Ilya Vladimirovich Safonov
Russian

(74) Representative

Total number of pages 18

(54) Method

$$I_e(r,c) = (I_{es}(r,c) + I_{eh}(r,c)) / 2 = I(r,c) + k_s * (1 - \alpha_s(r,c)) * (D_s(r,c) - I(r,c)) - k_h * (1 - \alpha_h(r,c)) * (I(r,c) - D_h(r,c))$$

(57) Abstract

The present invention relates to a method of digital image enhancement and comprises a step of converting from an RGB color space to the luminance channel of an image, a step of filtering the luminance channel of the image by a bilateral filter, a step of correcting shadow to increase local contrast and luminance, respectively, and correcting highlight to increase local contrast and decrease luminance at the luminance channel of the image, and a step of converting the corrected image into an RGB color space. By this, the quality of photographs can be improved while being printed on a photo printer.

Representative drawing

FIG. 3

Scope of Claims

Claim 1.

A method of digital image enhancement, comprising:

a step of converting from an RGB color space to the luminance channel of an image;

Page 1 of 18 - 1 - GOOGLE EXHIBIT 1007

The diagram illustrates the derivation of terms in the patent equation from a 'Source Image'. A central blue box labeled 'Source Image' has arrows pointing to various components of the equation:

- A red arrow points to the α -coefficients, which are highlighted in red boxes in the equation: $\alpha_s(r,c)$ and $\alpha_h(r,c)$.
- A green arrow points to the 'Detail image', which is highlighted in a green box: $D_s(r,c)$.
- A blue arrow points to the source image term, which is highlighted in a blue box: $I(r,c)$.
- A yellow arrow points to the 'Digital image', which is highlighted in a yellow box: $D_h(r,c)$.

EX1007 at 1, 8; Reply at 3, 4.

Safonov Teaches Filtering and Blending Within One Image

All blending-related terms are derived from the single source image.

Let's take "detail image" D_s with high local contrast in shadows, and "digital image" D_h with high local contrast in the highlight area, i.e. images that can identify digital correspondingly well in shadows and highlights. It is then possible to increase the local contrast and luminance of the source image I using the following alpha blending formula of I and D_s :

(A)

(51) . Int. Cl. H04N 1/56 (January 2006)	(11) Disclosure No. 10-2007-0046010 (43) Date of MAY 2, 2007
(21) Application No. 10-2006-0105281 (22) Application Date October 27, 2006 (30) Claim of Priority RU2005133120 October 28, 2005 (71) Applicant Samsung Electronics Co., Ltd. 416 Maetan-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea (72) Inventor Ilya Vladimirovich Safonov Russian (74) Representative Sung Won Heo Dong Wook Lee Dong Heon Seo Chang Il Yoon	$D_s(r, c) = \frac{1.3 * I(r, c)}{I_f(r, c) + 3 * \sigma_R}$

Source Image

Filtered Source Image

Total number of claims: 13 claims in total

(54) Method of Digital Image Enhancement

(57) Abstract

The present invention relates to a method of digital image enhancement and computer luminance channel of an image, a step of filtering the luminance channel of the image to increase local contrast and luminance, respectively, and correcting highlight to luminance channel of the image, and a step of converting the corrected image into can be improved while being printed on a photo printer.

Representative drawing

FIG. 3

Scope of Claims

Claim 1.

A method of digital image enhancement, comprising:
a step of converting from an RGB color space to the luminance channel of an image;

	$D_h(r, c) = \frac{3 * \sigma_R * I_f(r, c)}{1.3 - I(r, c)}$	
--	--	--

Filtered Source Image

Source Image

Page 1 of 18

- 1 -

GOOGLE EXHIBIT 1007

EX1007 at 7, 10-11; Reply at 3, 4.

Safonov's α -Coefficients Are Derived from the Bilateral Filtering Process

All blending-related terms are derived from the single source image.

(19) Korean
Property O
(12) Public I
(1)

(51) . Int. Cl.
H04N 1/56 (January 2006)

(21) Application No.	10-2006-0105281
(22) Application Date	October 27, 2006
Examination Request Date	None
(30) Claim of Priority	RU2005133120 October 28, 2005
(71) Applicant	Samsung Electronics Co., Ltd. 416 Maetan-dong, Yeongtong-gu, Suwon-si
(72) Inventor	Ilya Vladimirovich Safonov Russian
(74) Representative	Sung Won Heo Dong Wook Lee Dong Heon Seo Chang Il Yoon

Total number of claims: 13 claims in total

(54) Method of Digital Image Enhancement

(57) Abstract

The present invention relates to a method of digital image enhancement and correction of a luminance channel of an image, a step of filtering the luminance channel of an image to increase local contrast and luminance, respectively, and correcting highlights in the luminance channel of the image, and a step of converting the corrected image to a color image can be improved while being printed on a photo printer.

Representative drawing

FIG. 3

Scope of Claims

At that time, the removable bilateral filter is simpler and faster:

$$I_f^*(r, c) = \frac{\sum_{j=-S/2}^{S/2} I(r, c+j) * w(I(r, c+j) - I(r, c))}{S * \sum_{j=-S/2}^{S/2} w(I(r, c+j) - I(r, c))}$$

$$I_f(r, c) = \frac{\sum_{i=-S/2}^{S/2} I_f^*(r+i, c) * w(I_f^*(r+i, c) - I_f^*(r, c))}{S * \sum_{i=-S/2}^{S/2} w(I_f^*(r+i, c) - I_f^*(r, c))}$$

Image I_f filtered by a bilateral filter can be used as an alpha-channel α_s . The negative of I_f can be used as an alpha-channel α_h .

Page 1 of 18

- 1 -

GOOGLE EXHIBIT 1007

EX1007 at 10; Reply at 4.

No Motivation to Combine Parulski and Safonov

Parulski	Safonov
• Combines two different images, has no single source image	• Corrects highlights and shadows using a filtered version of a single source image
• Doesn't use any filtering	• Uses bilateral filtering to create "digital images"
• Has no α-coefficients	• Derives α-coefficients from the single source image
• Completely replaces a portion of one image with a corresponding portion of another image	• α-blends filtered versions of a single source image together to create a corrected image

Reply at 4-5.

Not Enough that α -Blending Was Generally Known

It is clear, moreover, that the district court concluded that the invention was obvious because it believed the claims contained elements that were not new. This reasoning is incorrect: “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. Because none of the

Decided: August 13, 2012

MATTHEW D. POWERS, Weil, Gotshal & Manges LLP, of Redwood Shores, California, argued for plaintiff-appellant. With him on the brief were ELIZABETH STOTLAND WEISWASSER, PETER SANDEL, JENNIFER H. WU,

Kinetic Concepts, Inc. v. Smith & Nephew, Inc., 688 F.3d 1342, 1369 (Fed. Cir. 2012) (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007); Reply at 5.

GROUND #2: PARULSKI AND JOHNSON

NO MIXING OF PIXEL VALUES

Johnson Teaches Completely Replacing Pixels

US007659923B1

(12) **United States Patent**
Johnson

(10) **Patent No.:** **US 7,659,923 B1**
(45) **Date of Patent:** **Feb. 9, 2010**

(54) **ELIMINATION OF BLINK-RELATED CLOSED EYES IN PORTRAIT PHOTOGRAPHY**

(76) Inventor: **David Alan Johnson**, 13044 W. Woodspring St., Boise, ID (US) 83713

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 285 days.

(21) Appl. No.: **11/309,090**

(22) Filed: **Jun. 20, 2006**

Related U.S. Application Data

(60) Provisional application No. 60/595,348, filed on Jun. 24, 2005.

(51) Int. Cl. **H04N 5/225** (2006.01)
G06B 17/00 (2006.01)
G06K 9/00 (2006.01)

(52) U.S. Cl. **348/218.1**; 396/51; 382/117

(58) Field of Classification Search **348/78**,
348/218.1, 239; 396/18, 51
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,345,109 B1 * 2/2002 Souma et al. 382/118

3 Claims, 3 Drawing Sheets

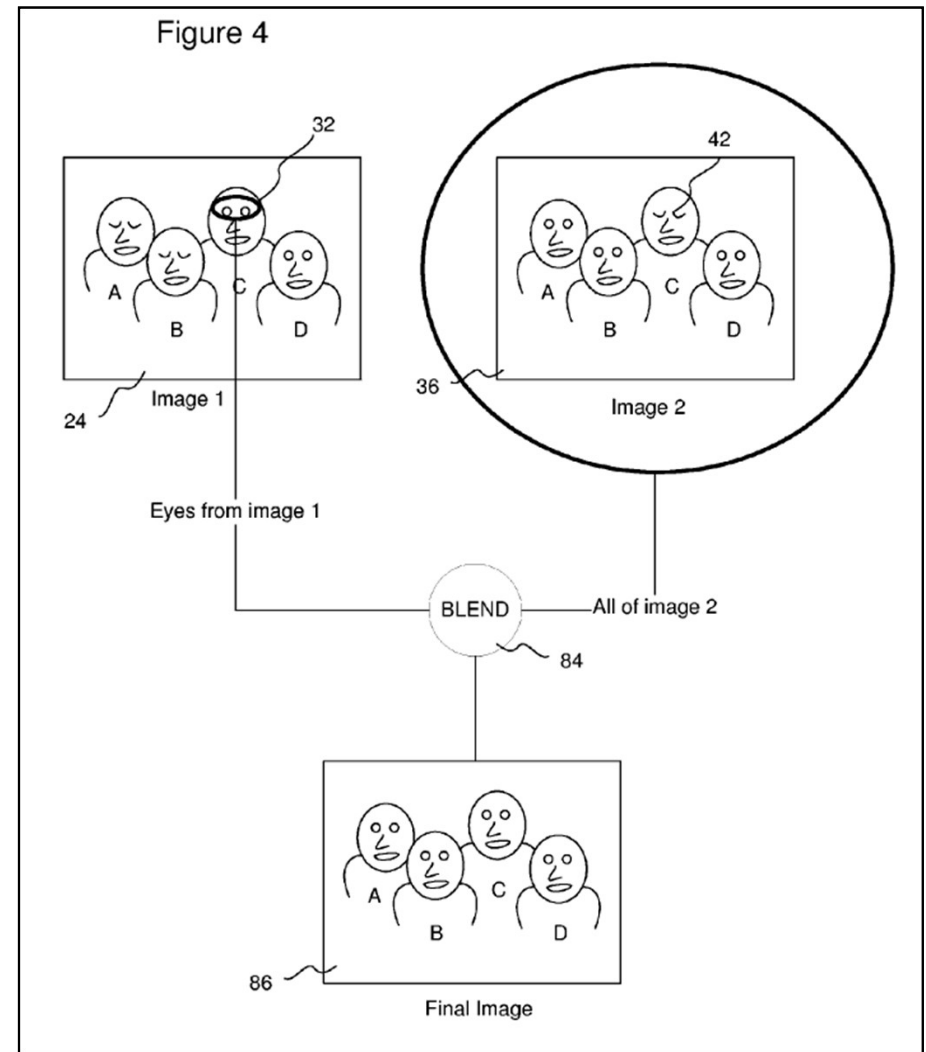
ABSTRACT

A system and method of eliminating closed or partially closed eyes of subject in photography, caused by subjects blinking at the moment of image capture. A digital camera is configured to capture two images in quick succession. The image processing unit of the camera identifies regions of difference between the two images that indicate that eyes are partially or fully closed in one of the two images, and creates a single composite image from the two original images, in which all eyes are open for all subjects in the image.

Figure 4

Page 1 of 8

GOOGLE EXHIBIT 1018
GOOGLE v. 138 EAST
IPR2024-00958



EX1018 at Fig. 4; Reply at 10.

Johnson Teaches Completely Replacing Pixels


US00765923B1

(12) **United States Patent**
Johnson

(10) **Patent No.:** US 7,659,923 B1
(45) **Date of Patent:** Feb. 9, 2010

(54) **ELIMINATION OF BLINK-RELATED CLOSED EYES IN PORTRAIT PHOTOGRAPHY**

(76) Inventor: **David Alan Johnson**, 13044 W. Woodspring St., Boise, ID (US) 83713

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 285 days.

(21) Appl. No.: 11/309,090
(22) Filed: Jun. 20, 2006

Related U.S. Application
(60) Provisional application No. 60/24, 2005.

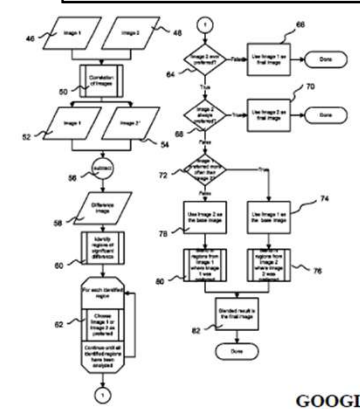
(51) Int. Cl. H04N 5/225 (2006.01)
G06B 17/00 (2006.01)
G06K 9/00 (2006.01)

(52) U.S. Cl. 348

(58) Field of Classification Search 348
See application file for complete search history.

(56) References Cited
U.S. PATENT DOCUMENTS
6,345,109 B1 * 2/2002 Sorn...

tion. The region of each eye from Subject C 32 is blended 84 into the content of the second image 36, which effectively replaces the closed eyes of Subject C 42, creating a single final image 86 where all subjects have open eyes.



Page 1 of 8

GOOGLE EXHIBIT 1018
GOOGLE v. 138 EAST
IPR2024-00958

EX1018 at 3:47-50; Reply at 10.

Johnson Does Not Disclose Mixing Pixel Values

UNITED STATES PATENT AND
BEFORE THE PATENT TRI-
GOOGLE
Petition
v.
138 EAST LCD ADVANCE
Patent Office
Case No. IPR
U.S. Patent No.
PATENT OWNER'S REPLY TO OPPOSITION
MOTION TO

is incorrect. Johnson repeatedly refers to its process as blending *images*, but is silent as to mixing *pixel values*. In other words, when a portion of one image completely replaces a corresponding portion of another image, it can be said that the two *images* have been blended. That replacement, however, does not teach that the replacement is done by mixing *pixel* values. Indeed, Johnson never uses the words “pixel,” “mix,” “mixed,” or “mixing” or “alpha blending.” See generally, EX1018.

GROUND #3: PARULSKI, JOHNSON AND SAFONOV

NO MOTIVATION TO COMBINE, HINDSIGHT REASONING

Parulski, Safonov, and Johnson

Parulski and Johnson	Safonov
• Combines two different images, has no single source image	• Corrects highlights and shadows using a filtered version of a single source image
• Doesn't use any filtering	• Uses bilateral filtering to create "digital images"
• Has no α-coefficients	• Derives α-coefficients from the single source image
• Completely replaces a portion of one image with a corresponding portion of another image	• α-blends filtered versions of a single source image together to create a corrected image

GROUND #4: PARULSKI AND HOSHINO

HOSHINO IS NOT PRIOR ART

Hoshino is Not Prior Art

US008482638B2

(12) **United States Patent**
Shiohara

(10) Patent No.: **US 8,482,638 B2**
(45) Date of Patent: **Jul. 9, 2013**

(54) **DIGITAL CAMERA GENERATING COMPOSITE IMAGE FROM MAIN IMAGE AND SUB-IMAGE, AND METHOD FOR MANUFACTURING SAME**

(75) Inventor: **Ryuichi Shiohara, Nagano (JP)**

(73) Assignee: **Seiko Epson Corporation, Tokyo (JP)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

(21) Appl. No.: **12/976,048**

(22) Filed: **Dec. 22, 2010**

FOREIGN PATENT DOCUMENTS

(30) **Foreign Application Priority Data**

Dec. 25, 2009 (JP) 2009-295202

(58) **Field of Classification Search**
USPC 348/345-356, 42, 47, 48, 51, 333.01, 348/240.1, 240.99, 240.2, 240.3
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,231,647 A * 11/1980 Kiti et al. 396/103
5,682,198 A * 10/1997 Katayama et al. 348/47
6,226,459 B1 * 5/2001 Hamada et al. 396/54
6,433,824 B1 * 8/2002 Tanaka et al. 348/345

6 Claims, 11 Drawing Sheets

Page 1 of 20

GOOGLE EXHIBIT 1001

EX1001 at (30)

US 20100238325A1

(19) **United States**
(12) **Patent Application Publication** (10) Pub. No.: **US 2010/0238325 A1**
HOSHINO et al. (43) Pub. Date: **Sep. 23, 2010**

(54) **IMAGE PROCESSOR AND RECORDING MEDIUM**

(75) Inventors: **Hiroyuki HOSHINO, Tokyo (JP); Jun Muraki, Tokyo (JP); Hiroshi Shimizu, Tokyo (JP); Erina Ichikawa, Sagami-cho-shi (JP)**

Correspondence Address:
FRISHAUF, HOLTZ, GOODMAN & CHICK, PC
220 Fifth Avenue, 16TH Floor
NEW YORK, NY 10001-7708 (US)

(73) Assignee: **Casio Computer Co., Ltd., Tokyo (JP)**

(21) Appl. No.: **12/727,816**

(50) **Foreign Application Priority Data**
Mar. 19, 2009 (JP) 2009-068030

Publication Classification

(51) **Int. Cl.**
H04N 9/74 (2006.01)
H04N 5/262 (2006.01)

(52) **U.S. Cl.** **348/239; 348/586; 348/E09.055; 348/E05.051**

(57) **ABSTRACT**

A camera device 100 comprises a CPU 13, a characteristic area specifier 8d, and a combine subunit 8f. CPU 13 detects a command to combine a background image and a foreground image. In response to detection of the command by CPU 13, the characteristic area specifier 8d specifies a foreground area for the foreground image. The combine subunit 8f combines the background image and the foreground image such that the

(22) Filed: **Mar. 19, 2010**

D

Page 1 of 18

GOOGLE EXHIBIT 1021
GOOGLE v. 138 EAST
IPR2024-00958

EX1021 at (22)

Amended Claim 7 is Entitled to a December 25, 2009 Priority Date

UNITED STATES — BEFORE THE P — 138 EAST L PATENT OWNER'S R	a composite image generating unit configured to <u>determine a cutout region in the sub-image, cut out a partial image from the cutout region, magnify at the level of magnification at least one of the main image and the sub-image, and generate a composite image by [combining] superimposing the partial image on the main image[and the sub-image] by mixing pixel values of the partial image with pixel values of the main image,</u> wherein the <u>generation of the composite image occurs</u> after at least one of the main image and the sub-image is magnified at the level of magnification;	<u>U.S. App. No. 12/976,048</u>: EX1002 at 26 (¶¶5, 7); <i>id.</i> at 29 (¶25); <i>id.</i> at 30 (¶¶28); <i>id.</i> at 31-35 (¶¶29-33); <i>id.</i> at 44 (original claim 1); <i>id.</i> at 45 (original claim 5); <i>id.</i> at 46 (Abstract); <i>id.</i> at 47 (Fig. 1); <i>id.</i> at 52 (Fig. 7); <i>id.</i> at 53 (Fig. 8). <u>JP App. No. 2009-295202</u>: EX2001 at 1 (Abstract); <i>id.</i> at 2 (¶¶5, 7); <i>id.</i> at 3 (¶¶8-10); <i>id.</i> at 3-4 (¶¶11-12); <i>id.</i> at 6 (¶19); <i>id.</i> at 7-10 (¶¶22-28); <i>id.</i> at 11-12 (¶32); <i>id.</i> at 12 (¶34); <i>id.</i> at 12-13 (¶36); <i>id.</i> at 13 (¶¶40-41); <i>id.</i> at 14 (¶¶45-46); <i>id.</i> at 15 (original claims 1 and 5); <i>id.</i> at 17 (Fig. 1); <i>id.</i> at 20 (Fig. 5); <i>id.</i> at 21 (Fig. 6); <i>id.</i> at 22 (Fig. 7); <i>id.</i> at 23 (Fig. 8); <i>id.</i> at 24 (Fig. 9).
---	---	---

Petitioner's Arguments and Motion to Exclude Fail

Trials@uspto.gov
571-272-7822

Date:

UNITED STATES PATENT AND TRADEMARK
BEFORE THE PATENT TRIAL AND APPEAL BOARD

GLOBUS MEDICAL, INC.,
Petitioner,

v.

MOSKOWITZ FAMILY LLC,
Patent Owner.

IPR2020-01306
Patent 10,478,319 B2

Before MEREDITH C. PETRAVICK, NEIL T. POWELL,
JAMES J. MAYBERRY, *Administrative Patent Judges*,
MAYBERRY, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Globus Medical, Inc. ("Petitioner") filed a Petition ("inter partes review of claims 1-5, 7-9, 11, 12, 14, 15, and 16") of U.S. Patent No. 10,478,319 B2 (E

Also, we determine Patent Owner's argument that the certification was not signed by the linguist with personal knowledge of the accuracy of the translation is unpersuasive of a deficiency on the current record. Although the certification uses the phrase "[t]o the best of my knowledge," suggesting that the affiant is making the statement on information and belief, this statement goes to the weight of the evidence. *Cf.* 37 C.F.R. § 1.68 (allowing, for a declaration filed in lieu of an oath, to be based on the declarant's own knowledge or on information and belief). Our rules require a translation, but do not require the certification to be signed by someone with personal knowledge of the translation. *See* 37 C.F.R. § 42.63(b) ("When a party relies on a document or is required to produce a document in a language other than English, a translation of the document into English and an affidavit attesting to the accuracy of the translation must be filed with the document.")

We note also that Patent Owner does not offer any argument or evidence that the translation is inaccurate, such that we should afford the translation little weight.

Conclusion

- Ground #1: Parulski and Safonov
 - No motivation to combine, hindsight reasoning
- Ground #2: Parulski and Johnson
 - No mixing of pixel values
- Ground #3: Parulski, Johnson, and Safonov
 - Same problems as Grounds #1 and #2
- Ground #4: Parulski and Hoshino
 - Hoshino is not prior art
- The Revised Motion to Amend should be granted.