

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,

Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,

Patent Owner.

Case No. IPR2024-00958

U.S. Patent No. 8,482,638

PETITION FOR *INTER PARTES* REVIEW

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Ex. 1001	U.S. Patent No. 8,482,638 to Shiohara (“the ’638 patent”)
Ex. 1002	File History of U.S. Patent No. 8,482,638
Ex. 1003	Declaration of Dr. Robert Stevenson (“Stevenson”)
Ex. 1004	CV of Dr. Robert Stevenson
Ex. 1005	U.S. Patent Application Publication No. 2008/0218611 to Parulski et al. (“Parulski”)
Ex. 1006	South Korean Patent Publication No. 10-2007-0046010 to Safonov (“Safonov”)
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Ex. 1014	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 46 (N.D. Cal. Oct. 27, 2023).
Ex. 1015	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 1 (N.D. Cal. Jun. 21, 2023).

¹ Citations to Safonov are made to the certified English translation.

Exhibit	Description
Ex. 1016	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 50 (N.D. Cal. Nov. 15, 2023).
Ex. 1017	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 51 (N.D. Cal. Nov. 15, 2023).

I. Relief Requested

Petitioner Google LLC requests *inter partes* review under 35 U.S.C. § 311 of claims 1-2 and 4-6 of U.S. Patent No. 8,482,638 (“the ’638 patent”) (Ex. 1001), assigned to Patent Owner 138 East LCD Advancements Limited, and cancellation of claims 1-2 and 4-6 based on the following grounds:

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)
1	1-2 and 4-6	103	Parulski
2	1-2 and 4-6	103	Parulski and Safonov

II. The ’638 Patent

The ’638 patent² describes a digital camera with a main lens and a sub-lens. Ex. 1001, Abstract. The ’638 patent also describes “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

² Petitioner assumes, for purposes of this proceeding only, a priority date of December 25, 2009, making pre-AIA law applicable.

and the sub-image is magnified at the level of magnification, and an image display unit configured to display the composite image.” *Id.*

Figure 7 below shows the '638 patent's method for creating a composite image. *Id.*, 6:46-7:38, FIG. 7. The '638 patent's method includes generating both the main image and the sub-image, steps S110 and S120. *Id.*, 6:56-64. The method includes inputting the focal length and using the focal length to use a magnification rule to harmonize the magnification of both images. *Id.*, 6:18-45, 7:1-35, 10:31-32. The harmonization of the magnification then allows the images to be combined. *Id.*, 7:14-18. The method then cuts out a partial image from the sub-image and superimposes the cutout onto the main image, and generates and displays the composite image. *Id.*, 7:8-35, 10:32-34.

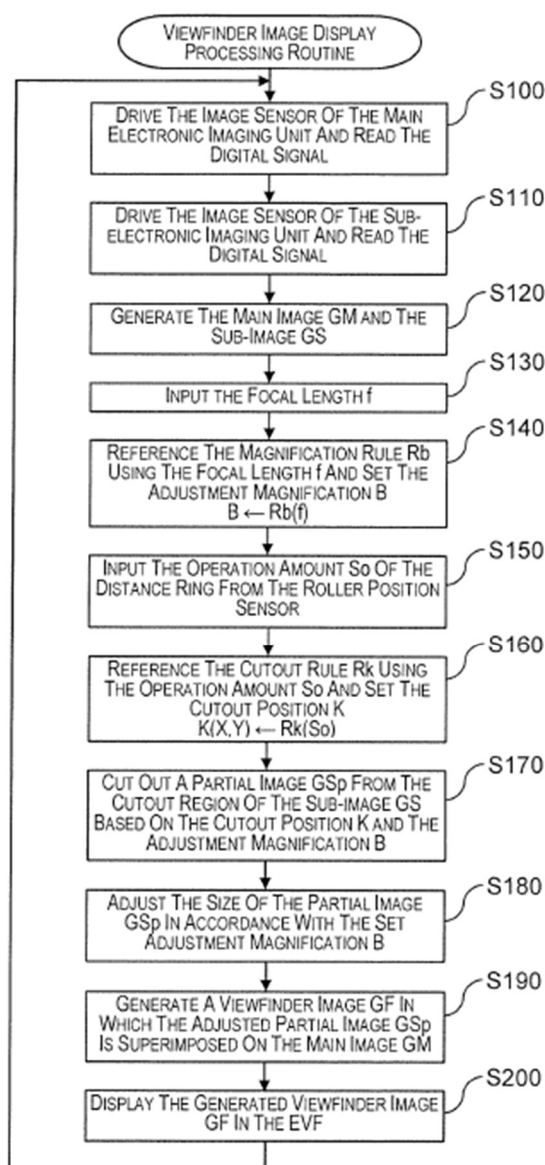


Fig. 7

Id., FIG. 7.

III. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) of the ’638 patent would have had at least a bachelor’s degree in electrical engineering, computer science, or

related engineering disciplines, and two years of experience in multi-lens camera systems. Relevant work experience can substitute for formal education and additional education could substitute for work experience. Stevenson ¶50.

IV. Claim Construction

The Board construes claims using the standards set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Claims should be construed only to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). No terms need construction to resolve the unpatentability issues in this Petition.³

V. Claims 1-2 and 4-6 Are Unpatentable and Should Be Cancelled

A. Prior Art

1. Parulski

Parulski, U.S. Patent Application Publication No. 2008/0218611 (Ex. 1005), was filed March 9, 2007, and published September 11, 2008, making Parulski prior art under at least pre-AIA 35 U.S.C. § 102(a), (b), and (e). Parulski, cover (items (22), (43)).

³ Petitioner reserves the right to argue that certain limitations in the challenged claims are indefinite and/or require construction to resolve controversies in other forums.

Parulski discloses an “electronic camera for producing an output image of a scene from a captured image signal includ[ing] a first imaging stage comprising a first image sensor for generating a first sensor output and a first lens for forming a first image of the scene on the first image sensor, and a second imaging stage comprising a second image sensor for generating a second sensor output and a second lens for forming a second image of the scene on the second image sensor.”

Parulski, Abstract. At least one of Parulski’s lenses generates an ultra-wide angle view. Parulski, [0115]-[0116]. The images obtained from the first image sensor and second image sensor are combined to generate an “enhanced, captured image signal” where a portion of the main image is replaced with a corresponding portion of the second image. Parulski, [0115]-[0116]; *see also* Parulski, Abstract, [0031].

To create a combined image, Parulski describes a “rangefinder-based autofocus system[]” that uses a triangulation calculation to calculate the distance to the scene being photographed and then guides the positioning of an adjustable focus lens to produce the best image quality. Parulski, [0008]-[0009], [0097].

Parulski’s camera determines the zoom for the main lens when the user adjusts the zoom control, and a control processor processes the user’s zoom selection.

Parulski, [0079], [0082]. Parulski’s first image may be captured using a different focal length and the second image can be “upsampled so that corresponding

features in the two autofocus images span the same numbers of pixels.” Parulski, [0104]. This process is shown in Figure 4 below.

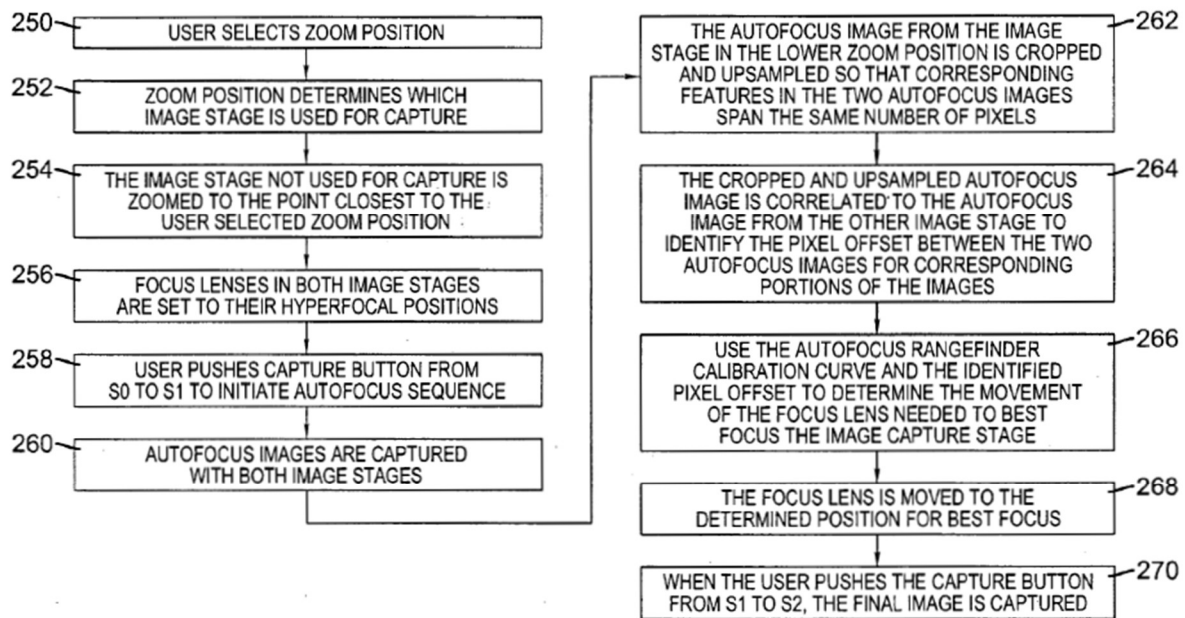


FIG. 4

Parulski, FIG. 4.

The combined image can then be displayed on Parulski’s LCD display 70.

Parulski, [0076], [0087-0090].

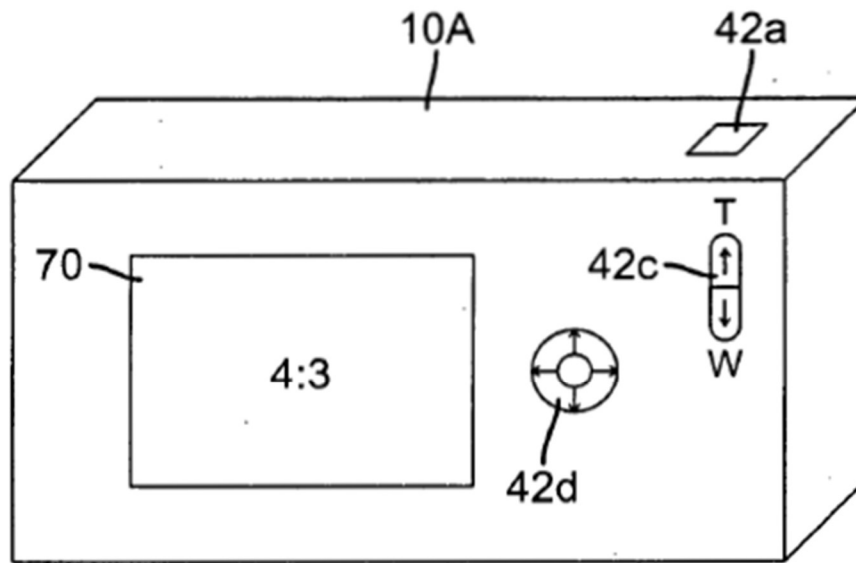


FIG. 2B

Parulski, FIG. 2B.

Parulski is analogous art to the '638 patent. "Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (citations omitted). Parulski is directed to the same field of endeavor as the '638 patent: digital cameras having multiple lenses. Compare Ex. 1001, 1:47-50, with Parulski, [0001], [0025]. For example, both the '638 patent and Parulski describe digital cameras using multiple lenses to capture

multiple images and combine those images to create a single enhanced image.

Compare Ex. 1001, Abstract, 1:47-67, *with* Parulski, [0001], [0025]]; Stevenson ¶50. Alternatively, Parulski seeks to solve at least one of the same problems as the '638 patent: creating an enhanced image by combining multiple images from different lenses of a digital camera. *Compare* Ex. 1001, 1:47-50 (“A main object of the present invention is to provide a digital camera for generating a composite image in which two images are superimposed”), *with* Parulski, [0025] (“The object of this invention is to provide an improved imaging capability in a multi-lens digital camera utilizing both (or more) images to provide an improved output image.”), [0001]; Stevenson ¶50.

2. Safonov

Safonov, Public Patent Notice of Korean Patent Application No. 10-2007-0046010, has a date of disclosure of May 2, 2007, making Safonov prior art under at least pre-AIA 35 U.S.C. § 102(a) and (b). Safonov,⁴ 1 (items (21), (43)).

Safonov discloses “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

⁴ Citations to Safonov are to the certified English Translation (Ex. 1007).

correcting highlight[ing] 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.” Safonov, Abstract.

Safonov also discloses using alpha-blending techniques to blend multiple images together to get the desired contrast or luminance for an image. Safonov, Abstract, 7. For example, Safonov states:

Let’s take [a] “detail image” D_s with high local contrast in shadows and [a] “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 For all pixels (r, c) of Image I , in the above formula, α_s is an alpha-channel of permeability with a value close to 1 in the bright area and a value close to 0 in the dark area, and the factor k'_s controls the amplification level of the local contrast in the shadow.

Safonov, 7.

Safonov is analogous art to the '638 patent because the reference, like the '638 patent, is directed to the same field of endeavor: digital cameras using multiple lenses. For example, digital cameras that use multiple lenses capture multiple images and combine those images to create a single enhanced image.

Compare Ex. 1001, Abstract, 1:47-67, *with* Safonov, 7; Stevenson ¶63.

Alternatively, Safonov seeks to solve at least one of the same problems as the '638 patent: creating an enhanced image by combining multiple images. *Compare* Ex. 1001, 1:47-50 (“A main object of the present invention is to provide a digital camera for generating a composite image in which two images are superimposed”), *with* Safonov, 4 (“The present invention relates generally to the field of digital imaging technology. In particular, it relates to the field of methods for improving digital cameras and grayscale photographs, and more specifically to global (overall) and local tone adjustment of shadow and highlight correction, noise suppression and sharpening.”); Stevenson ¶63.

B. Ground 1: Parulski Renders Obvious Claims 1-2 and 4-6

1. Independent Claim 1

Parulski renders obvious claim 1. Stevenson ¶¶66-118.

- a. [1Preamble] “A digital camera having a focusing function and a focal length varying function of a main lens, the digital camera comprising:”**

To the extent the preamble is limiting,⁵ Parulski discloses “[a] digital camera having a focusing function and a focal length varying function of a main lens.”

Stevenson ¶¶67-68.

⁵ Petitioner does not concede the preamble is limiting.

Parulski discloses a digital camera having autofocus (“focusing function”) and optical zoom range (“focal length varying function”) for a main lens. For example, Parulski discloses a digital camera with “multiple image capture stages, each composed of a lens and an image sensor, wherein the lenses of the multiple image capture stages have different focal lengths to provide an extended optical zoom range.” Parulski, [0064]. Parulski also discloses that “one image capture stage may be used to capture digital still images or video images while another image capture stage is simultaneously being used for another purpose, such as enhanced autofocus, generation of a secondary image, production of a range map, and the like.” Parulski, [0065]. Parulski’s “one image capture stage,” also referred to as the “first imaging stage,” includes a main lens to capture a digital still image having both an “autofocus” focusing function and an “optical zoom range” focal length varying function. Parulski, [0064]-[0065]; Stevenson ¶¶68. The functions described by Parulski corresponding to claims 1-2 and 4-6 may be implemented in Parulski’s structures and software. Parulski, [0063].

b. [1a] “a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens;”

Parulski discloses “a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens.” Stevenson ¶¶69-71.

Parulski explains that, in the prior art, two lenses capture an image of an object 151, such as shown in Figure 27. Parulski, [0007], FIG. 27. Parulski improves on this prior art by, for example, using an image capture assembly 10A having a “first imaging stage [(“main imaging unit”)], including a first zoom lens and a first image sensor.” Parulski, [0072]; *see also* Parulski, [0074]-[0075]. Parulski’s “first image sensor[] is used to capture a first (i.e., primary) still image at a first (i.e., primary) focus distance” from the first zoom lens (“main lens”). Parulski, [0072]. Parulski further discloses that the first image sensor for the first imaging stage can be either a CCD (“charged-coupled device”) or CMOS (“complementary metal oxide semiconductor”) image sensor. Parulski, [0078]. A POSITA would have understood that CCD and CMOS image sensors perform a photoelectric conversion from a subject obtained via the first zoom lens (“main lens”) to generate an electronic image of the subject. *See* Parulski, [0007]; *see also* Ex. 1001, 2:63-65, 3:25-33; Stevenson ¶¶70.

Thus, Parulski discloses a first imaging unit having a CCD or CMOS image sensor configured to generate a main image by performing a photoelectric conversion from the object of the photo being taken obtained via the main lens. Stevenson ¶¶69-71.

c. [1b] “a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens;”

Parulski discloses “a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens.” Stevenson ¶¶72-75.

As discussed above, Parulski improves on the prior art multi-image capture by, for example, using an image capture assembly 10A having a “second imaging stage” (“sub-imaging unit”) that includes a second image lens, such as a “second zoom lens” (“sub-lens”) and a “second image sensor” having a CCD image sensor. Parulski, [0072], [0078]; *see also* Parulski, [0074]-[0075]. Parulski further discloses that its “second image sensor[] is used to simultaneously capture a second (i.e., secondary or sub) still image at a second (i.e., secondary) focus distance.” Parulski, [0072]. As explained for [1a], a POSITA would have understood that a CCD image sensor performs a photoelectric conversion of the incoming light of the object of the image being taken through the second image lens (“sub-lens”). *See* Parulski, [0007]; Ex. 1001, 2:63-65, 3:25-33; Stevenson ¶73.

Parulski’s second image lens describes a sub-lens because, like the ’638 patent, the image can be used to replace a portion of the main lens and/or a portion of the images taken by this lens can be used to create the modified, combined image. *See* Parulski, [0031], [0072], [0097], [0118], [0138]-[0140], [0145];

see also Ex. 1001, 11:13-16. For example, Parulski discloses that “the secondary still image is used to provide an enhancement signal that may, e.g., sharpen portions of the primary still image that are positioned near the secondary focus distance or may modify the dynamic range of the primary still image.” Parulski, [0072]. The second image can be cropped and upsampled to correspond to portions of the primary image. *See* Parulski, [0093], [0104], FIG. 4. “A modified image is then created by replacing portions of the primary image with portions of the secondary image.” Parulski, [0145]; Stevenson ¶74.

Thus, Parulski discloses a CCD image sensor that generates a sub-image by performing a photoelectric conversion obtained from the subject via a sub-lens. Stevenson ¶¶72-75. That sub-image is then used to create the modified image, as explained for [1e] below.

d. [1c] “a focal length acquiring unit configured to acquire the focal length of the main lens;”

Parulski discloses “a focal length acquiring unit configured to acquire the focal length of the main lens.” Stevenson ¶¶76-79.

For example, Parulski discloses that the “lenses of the multiple image capture stages have different focal lengths to provide an extended optical zoom range for the image capture assembly.” Parulski, [0064]. Parulski provides this extended zoom range using control processor 40 that supplies electric signals and

controls the zoom motor of the first zoom lens of the first imaging unit (“main lens”). *See* Parulski, [0079]. Parulski discloses that the control processor 40 “controls the zoom and focus motors.” *Id.* The user selects a focal length by adjusting the zoom position for the main lens (“first imaging stage 1”) using a zoom control 42c of the user controls 42. Parulski, [0075], [0087], [0092], [0094]. Parulski discloses that “the user determines the zoom position by adjusting the zoom control 42c on the camera.” Parulski, [0092]. An image of the scene in the first imaging lens is then captured by a corresponding image sensor 14 of the first imaging unit (main imaging unit) and “provides an image to a first image sensor 12.” Parulski, [0075]. The image processor 50 “selects the sensor output 12e” from sensor 12 “from the first imaging stage 1” as the main lens to “produce[] [a] focus detection signal[] that drive[s] the first ... focus adjuster[]” using the second imaging stage’s autofocus function. Parulski, [0080], [0082]. A POSITA would have understood reading Parulski’s disclosure that to properly focus the main lens, the image processor 50 would have acquired the focal length of the main lens to optimize the composite image, as discussed in more detail below for elements [1d] and [1e]. Stevenson ¶77. “The control processor and timing generator 40, in combination with the image processor 50, ... selects the sensor output 14e from the second imaging stage 2 as the captured image signal and uses the sensor output 12e

from the first imaging stage 1 to generate the focus detection signal for the selected imaging stage 2.” Parulski, [0082]; Stevenson ¶77.

Additionally, Parulski discloses that “[i]n block 500 of FIG. 14, the zoom position is set to a default position when the camera is powered on. In block 502, the zoom position setting is compared to a value X at which the image capture function switches from the first image capture stage to the second image capture stage.” Parulski, [0118]. A POSITA would have understood that the focal length would have been acquired to be able to compare it to the value X. Stevenson ¶78.

Thus, Parulski discloses “a focal length acquiring unit configured to acquire the focal length of the main lens.” Stevenson ¶¶76-79.

e. [1d] “a magnification setting unit configured to set a level of magnification on the basis of the focal length;”

Parulski discloses “a magnification setting unit configured to set a level of magnification on the basis of the focal length.” Stevenson ¶¶80-88.

As discussed above, Parulski discloses a main lens and sub-lens for generating images and acquiring a focal length of the main lens. *See supra* §§ V.B.1.b-V.B.1.d; Stevenson ¶83. Parulski modifies the level of magnification of the image obtained from the sub-lens on the bases of the focal length of the main lens so that the images are the same size and can be used to create a composite image where a portion of the sub-image replaces a portion of the main image.

Parulski, [0031], [0066], [0075], [0093], [0097], [0101], [0104], [0138]-[0140], [0145], FIGS. 4, 6, 9, 11.

Parulski also discloses that the sub-lens, which is part of the second imaging stage 2, can have a second focal length corresponding to the second imaging stage 2. *See* Parulski, [0075]. Parulski discloses that “[t]he image capture assembly 10A includes two imaging stages 1 and 2, both with zoom lenses 3 and 4.... The second zoom lens 4 is controlled by a second lens focus adjuster, e.g., zoom and focus motors 5b, and provides an image to a second image sensor 14.” *Id.* Parulski discloses that “[b]ecause the two lenses have different focal lengths, they have different magnifications.” Parulski, [0066]; Stevenson ¶84.

Parulski also discloses creating a composite image using the main image and sub-image by replacing portions of the main image from the first imaging lens with “corresponding portions” of the sub-image from the second imaging lens to obtain a modified image with relatively low noise and good sharpness. Parulski, [0031], [0138]-[0140], [0145]. For example, Parulski discloses “replac[ing] portions of the primary image (areas of lower noise but with some motion blur) 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.” Parulski, [0031]; Stevenson ¶85.

Because Parulski's lenses "have different focal lengths," and therefore "different magnifications," the system modifies the sub-image by changing the magnification (e.g., upsampling to change the size of the sub-image) to make the images the same scale ("magnification") to replace portions of the main image with corresponding portions of the sub-image. Parulski, [0066]. Parulski discloses that "[w]hen the user adjusts the zoom position on the image capture assembly to a second optical zoom range, the camera automatically switches to use the second imaging stage (containing, e.g., a second zoom lens) to capture the images, and begins using the first imaging stage for autofocus of the second imaging stage. Because the two lenses have different focal lengths, they have different magnifications. Therefore, the digital filters used to determine the autofocus may be adjusted, as a function of this difference in magnification, in order to compensate for the differences in magnification." *Id.* The magnification of the sub-image is modified so that the size of the desired replacement portion is the same in both images. *Id.* ("[T]he digital filters used to determine the autofocus may be adjusted, as a function of this difference in magnification, in order to compensate for the differences in magnification."); Stevenson ¶86.

Parulski discloses that, because the two image capture devices or image capture stages "have different focal lengths, at least one of the images must be modified to make the two or more images comparable to enable the pixel offsets to

be determined.” Parulski, [0104]. Parulski discloses a magnification scaling of the second image by “upsampl[ing]” the second image “so that corresponding features in the two autofocus images span the same numbers of pixels.” *Id.*

A POSITA would have understood that, when two lenses have different focal lengths, they produce images with different magnifications, and to compare these images accurately, especially for autofocus, it is essential to scale the images so that their features align correctly in terms of size. Thus, when the first autofocus image is captured by the first imaging lens with the lower focal length (higher magnification), the second autofocus image from the second imaging lens can then be adjusted to the same magnification. Magnification scaling calculation was well understood by POSITAs because it is a simple proportion or ratio calculation.

Stevenson ¶87. A POSITA would have recognized that upsampling corresponds to setting a level of magnification on the basis of focal length to scale the images using a ratio so they can be combined. *Id.* For example, in Figure 4 below, box 262 (yellow) states that “[t]he autofocus image from the image stage in the lower zoom position is cropped and upsampled so that corresponding features in the two autofocus images span the same number of pixels.” Parulski, FIG. 4 at 262 (annotated below); *see also* Parulski, [0093], [0097], [0101], [0104], FIGS. 3, 6, 9, 11. As explained above, this corresponds to setting a level of magnification of the

upsampled image to correspond to the focal length of the primary image.

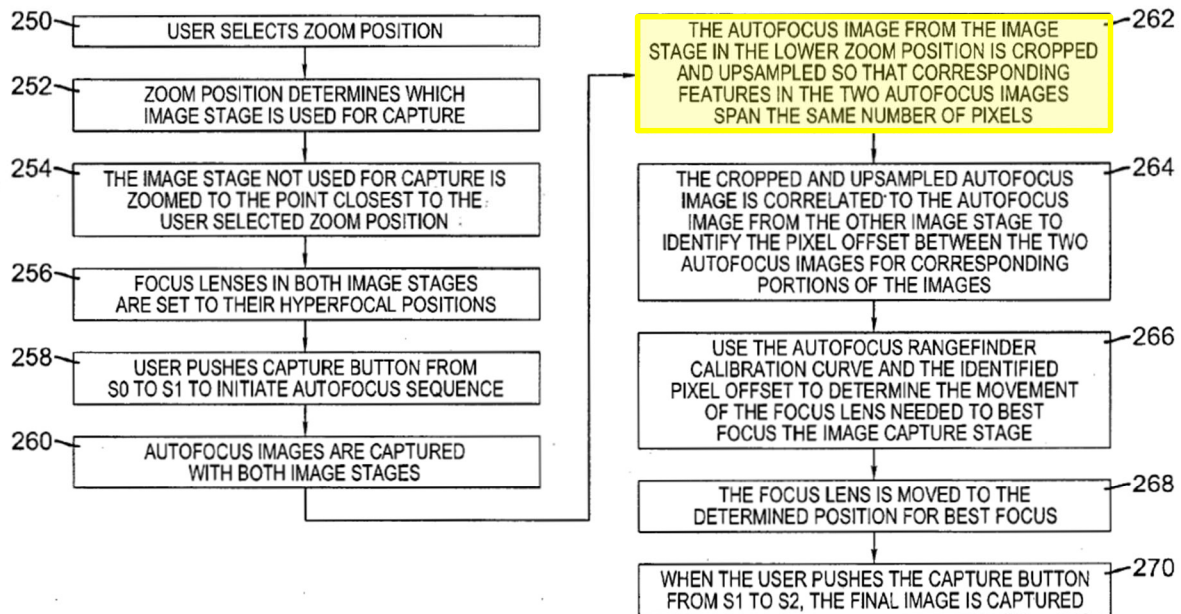


FIG. 4

Parulski, FIG. 4 (annotated); Stevenson ¶87.

Thus, Parulski discloses “a magnification setting unit configured to set a level of magnification on the basis of the focal length.” Stevenson ¶¶80-88.

- f. [1e] “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;”

Parulski discloses or renders obvious “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.” Stevenson ¶¶89-103.

Parulski discloses replacing portions of the first image (“main image”) obtained using the main lens of the first imaging stage 1 with a “corresponding portion” of the second image (“sub-image”) obtained using the lens of the second imaging stage 2 to create an enhanced or modified image with “relatively low noise and good sharpness.” *See* Parulski, [0031], [0138]-[0140], [0145]; *see also* Parulski, Abstract, [0026], [0030], [0032], [0064], [0065], [0106]-[0113], [0118], [0120], [0142]. For example, Parulski discloses that “the secondary still image [(“sub-image”)] is used to provide an enhancement signal that may, e.g., sharpen portions of the primary still image that are positioned near the secondary focus distance or may modify the dynamic range of the primary still image.” Parulski, [0072]; Stevenson ¶90. As one example, the “modified image is created with a broadened dynamic range by replacing portions of the primary image with portions of the secondary image.” Parulski, [0140]. Similarly, “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.” Parulski, [0145]; *see also* Parulski, [0031], claims 11, 40.

An example of the process used to create an enhanced composite image combining the first image from the main lens and the sub-image from the secondary lens is shown below in Figure 26 of Parulski.

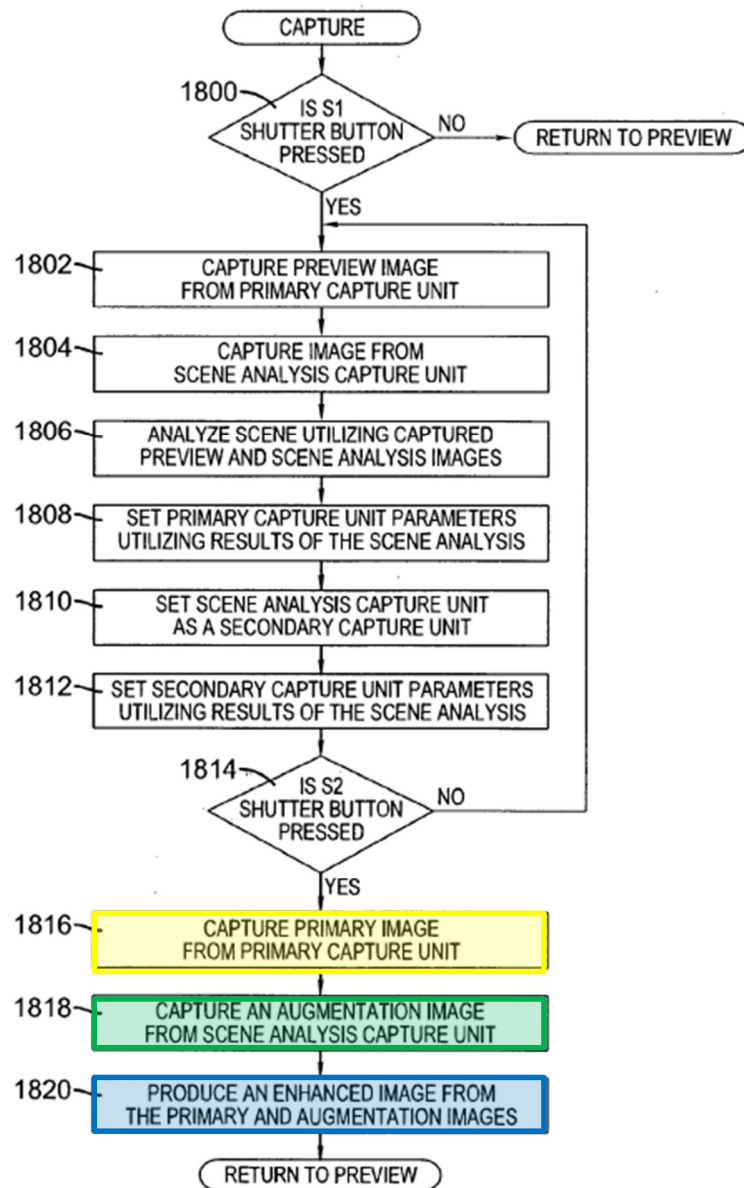


FIG. 26

Parulski, FIG. 26 (annotated); Stevenson ¶91.

As discussed above, Parulski's system replaces portions of the main image with corresponding portions of the sub-image by making the magnification of the images the same size (e.g., by upsampling) based on their respective focal lengths. This would make the images the same scale ("magnification") to permit the system to create the modified image, for example, to reduce noise or increase sharpness. *See supra* § V.B.1.e; Stevenson ¶92. Because the upsampled sub-image is upsampled to the same size as the main image, it has been magnified at the level of magnification. *See* Parulski, [0093], [0097], [0101], [0104], FIGS. 3, 4, 6, 9, 11; Stevenson ¶92.

To the extent Patent Owner argues or the Board finds that element [1e] requires alpha blending, *see* Ex. 1001, 7:8-35, a POSITA would have found it obvious to use alpha blending when generating the composite image by combining the main image and the sub-image. For example, a POSITA would have understood that the combined image should be created in a way that minimizes or hides the edges where the main image and the sub-image meet, and would have recognized that blending the images would have smoothed the boundary or overlap to prevent the user from seeing where the second image is added to create the composite image. Stevenson ¶93. For example, a POSITA would have found it obvious to alpha-blend some (e.g., edges) or all of the sub-image added to the main image, such as where the sub-image would be superimposed over (e.g.,

overlapping) the main image to blend away any differences in resolution, color variation, sharpness, or gain settings, thereby cohesively integrating the sub-image into the main image to form the composite image. *Id.*

i. Motivation to Modify Parulski

A POSITA would have been motivated to modify Parulski's composite image generating unit to use alpha blending to combine the main image and the sub-image when creating the composite, augmented, or enhanced image.

Stevenson ¶¶94-100.

A POSITA would have known that alpha blending was a common, conventional technique to combine the images and would have immediately envisioned this technique when reading Parulski because it was well known in the art. *See* Safonov, 7 (“[I]t is possible to increase the local contrast of the source image *I* and also reduce luminance using the following alpha blending formula”); Ex. 1009, [0003] (“In computer graphics, alpha blending, or alpha channel blending, refers to the use of an alpha channel with other channels in an image in order to show translucency.”); *see also* Ex. 1009, [0007]. Indeed, the very purpose of alpha blending is to smooth the combination of two different images or layers, such as the replaced or overlapping portions of the main image and the sub-image in Parulski. Ex. 1001, 7:21-35; Ex. 1009, [0003], [0007]; Stevenson ¶¶95-97.

A POSITA would have been motivated to incorporate the well-known alpha-blending technique when creating the composite image because its translucency would have helped smooth over the altered region, allowing the added sub-image to be more seamlessly integrated into the main image. Stevenson ¶98.

A POSITA also would have been motivated to incorporate alpha blending because it was a well-known technique used in image editing and image combining software to combine multiple images into a single composite image, and thus represents a known technique in the art that would have yielded predictable results. Ex. 1009, [0003]; Stevenson ¶99; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

Similarly, because alpha blending was a conventional technique in the prior art for combining two images, a POSITA would have recognized that it was a known, predictable solution that would have had a reasonable expectation of success and, therefore, been obvious to try as a method of combining the main image and the sub-image. Stevenson ¶100. A POSITA also would have been motivated to modify Parulski’s composite image generating system to further enhance the quality of the augmented modified image to achieve Parulski’s goal of the modified image having “relatively low noise and good sharpness,” which a POSITA would have recognized would be accomplished by alpha blending because the deviations between high-noise and low-noise layers and high- and low-

sharpness layers could be smoothed over to create a transition region that obscures the high-noise portion and provides a high-sharpness definition over the low-sharpness region. Parulski, [0031]; Stevenson ¶100.

ii. Expectation of Success

A POSITA would have had a reasonable expectation of success in incorporating alpha blending into Parulski's composite image generating unit because it would have merely involved incorporating a well-known image blending technique that was known to be used with digital camera images and was well within the POSITA's skill to incorporate. Stevenson ¶101.

A POSITA would have recognized that incorporating alpha blending into Parulski's composite image generating unit would have required only the application of known, conventional software and image processing techniques for alpha blending and then applying the alpha blending to portions of the second image ("sub-image") with a "corresponding portion" of the first image ("main image") to obtain an enhanced or modified image with "relatively low noise and good sharpness," improved focus depth, increased local contrast, and reduced luminance. Parulski, [0031], [0138]-[0140], [0145]; *see supra* § V.B.1.f; Stevenson ¶102. Using alpha blending when combining the main image and the sub-image would have been merely the straightforward application of known, conventional techniques applied to Parulski's already-disclosed combination of the main image

and the sub-image, *see supra* § V.B.1.f, used according to their known functions to yield predictable results (creating a composite image using the processes disclosed in Parulski). Stevenson ¶102; *see KSR*, 550 U.S. at 416; *Slot Speaker Techs., Inc. v. Apple Inc.*, 680 F. App’x 932, 943-44 (Fed. Cir. 2017).

Thus, Parulski discloses or renders obvious “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.” Stevenson ¶¶89-103.

g. [1f] “an image display unit configured to display the composite image; and”

Parulski discloses or renders obvious “an image display unit configured to display the composite image.” Stevenson ¶¶104-115.

For example, Parulski discloses that the image capture assembly has a color liquid crystal display (“LCD”) for displaying the images generated using Parulski’s multiple image stages. *See* Parulski, [0076], [0087]-[0090]. For example, Figure 2B of Parulski, annotated below, shows “a color LCD image display 70” (yellow) that displays the captured composite image preview created using the first and second image stages. Parulski [0076].

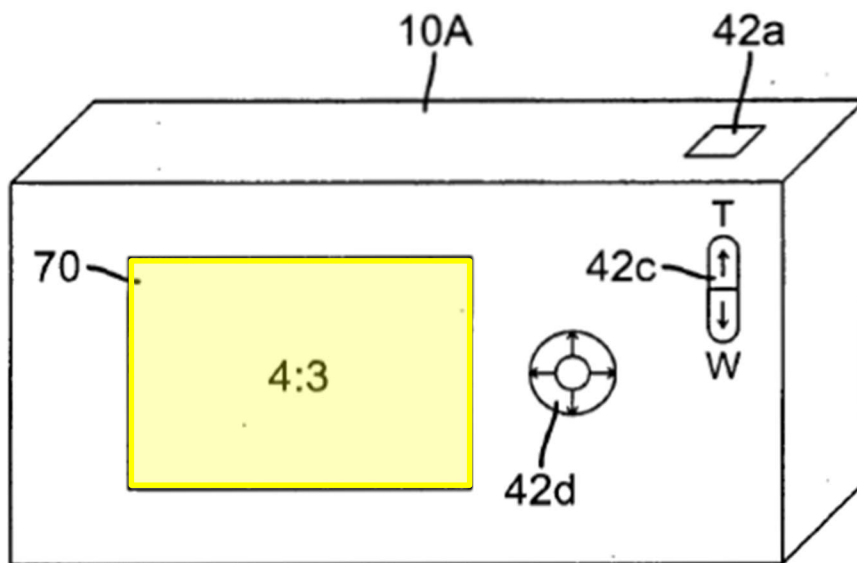


FIG. 2B

Parulski, FIG. 2B (annotated); Stevenson ¶105.

Because the LCD image display 70 is the only display in Parulski, a POSITA would have understood that Parulski's LCD image display 70 would be used to display the modified composite image so that the user can see the image that will be saved or reproduced later. Stevenson ¶106.

To the extent Patent Owner argues or the Board finds that Parulski does not disclose using LCD image display 70 to display the composite image, a POSITA would have found it obvious to modify Parulski so the LCD image display 70 displays the modified image so that the user can view the final image from the

camera and determine whether it is acceptable. Parulski, [0031], [0076], [0087]-[0090]; Stevenson ¶¶84-107.

i. Motivation to Modify Parulski

A POSITA would have been motivated to display the composite, augmented, modified, or enhanced image on Parulski's LCD image display 70 so that the user can view the "final" image being taken and determine whether it is acceptable or should be retaken. Stevenson ¶108.

A POSITA would have known that an LCD was a common, conventional device used to display a captured image on a digital camera. *See* Parulski, [0076], [0087]-[0090]. Indeed, one of the purposes of LCD display 70 is to display images or videos, which provides an advantage over traditional film cameras because the user can immediately see the image that is being saved to the camera's memory and determine whether it is acceptable or should be retaken. *Id.*; Stevenson ¶109. Indeed, Parulski's LCD already had the capability to display the two images from the two image capture stages in several ways, including "one within the other." Parulski, [0131]; Stevenson ¶109; *see also* Parulski, FIG. 19.

A POSITA would have further been motivated to display the composite image on the LCD screen because it would allow the user to ensure that the captured image was satisfactory, including having "relatively low noise and good sharpness." Parulski, [0031]; Stevenson ¶110. By displaying the composite image,

the digital camera could also free up memory because it needs only to store the composite image, rather than holding both the main image and the sub-image in memory for later combination. Stevenson ¶110. For digital cameras, this could have a significant effect on the number of images that a user can take and store because the single composite image requires less storage than the two separate images. By displaying the composite image on the LCD screen, Parulski's digital camera can show the user the actual image being stored for subsequent display, thereby facilitating the user's review and approval or rejection of the image. *Id.* If the composite image is deemed satisfactory, the user can proceed to take other photographs. If it is deemed unsatisfactory, the user will be able to delete it and retake the image. A POSITA would have been motivated to display this composite image viewing to the user because it would also mitigate the user needing to take multiple photographs of the same subject that might appear different in composite images. *Id.*

A POSITA also would have been motivated to use Parulski's LCD screen to display the composite image because it was a well-known technique used in digital cameras to display a captured image or video and thus represents a known technique in the art that would have yielded predictable results. Parulski, [0076], [0087]-[0090]; Stevenson ¶111; *KSR*, 550 U.S. at 416.

Similarly, because LCD screens were a conventional technique in the prior art for displaying images or videos, a POSITA would have recognized that it was a known, predictable solution that would have had a reasonable expectation of success and, therefore, been obvious to try as a method for displaying the composite image. Stevenson ¶112.

ii. Expectation of Success

A POSITA would have had a reasonable expectation of success in displaying the composite image using Parulski's existing LCD screen because it would have merely involved incorporating a known technique for displaying images and videos that was known to be used with digital cameras and was well within the POSITA's skill to incorporate. Indeed, Parulski discloses that its LCD screen had the capability to display the two images "one within the other," and thus displaying the composite image would have been well within the POSITA's skill to display because it involves only a single image display. Parulski, [0131]; Stevenson ¶113.

A POSITA would have recognized that displaying the composite image using Parulski's LCD screen would have required only the application of known, conventional software and processing techniques for displaying an image in a screen. *See supra* § V.B.1.g; Stevenson ¶114; Parulski, [0076], [0087]-[0090], [0131]. Using an LCD screen to display the composite image would have been

merely the straightforward application of known, conventional techniques applied to Parulski's already-disclosed display of an image, such as the main image and the sub-image, *see supra* § V.B.1.g, used according to their known functions to yield predictable results (displaying a composite image on an LCD display). Stevenson ¶114; *see KSR*, 550 U.S. at 416; *Slot Speaker*, 680 F. App'x at 943-44.

Thus, Parulski discloses or renders obvious “an image display unit configured to display the composite image.” Stevenson ¶¶104-115.

- h. [1g] “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.”**

Parulski discloses or renders obvious “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.” Stevenson ¶¶116-118.

As discussed above, Parulski discloses or renders obvious replacing a portion of the main image with a corresponding portion of the sub-image that has been upsampled to create a modified composite image because this describes setting the level of magnification so that the size of the main image and sub-image are substantially the same size or scale. *See supra* §§ V.B.1.e, V.B.1.f; Parulski, [0031], [0066], [0075], [0093], [0097], [0101], [0104], [0138]-[0140], [0145], FIGS. 4, 6, 9, 11; Stevenson ¶117.

Thus, Parulski renders obvious “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.” Stevenson ¶¶116-118.

2. [Claim 2] “The digital camera according to claim 1, wherein the sub-lens is a pan-focus lens.”

Parulski renders obvious the additional limitation of claim 2, “wherein the sub-lens is a pan-focus lens.” Stevenson ¶¶119-129.

Parulski discloses that the second imaging stage 2 includes a fixed focal length lens that “generates an ultra-wide angle field of view” so “objects from 4 feet to infinity are in focus.” Parulski, [0115]-[0116]. A POSITA would have understood that this disclosure describes a pan-focus lens, which is a lens that maintains all objects, from a certain distance to infinity, in focus. *See, e.g.*, Ex. 1010, 4:60-5:2; Stevenson ¶120.

To the extent Patent Owner argues or the Board finds that Parulski does not disclose that the sub-lens is a pan-focus lens, a POSITA would have found it obvious to use a pan-focus lens as the sub-lens because a larger portion of the captured image would be in focus and, thus, the subject being used to replace a portion of the main image would be in focus, regardless of its relative position to the in-focus object of the main lens. Stevenson ¶121.

a. Motivation to Modify Parulski

A POSITA would be motivated to modify Parulski's second imaging stage 2 to include a pan-focus lens to allow for greater depth of field to be achieved across a larger portion of the sub-image. Stevenson ¶¶122-126.

A POSITA would have known that a pan-focus lens was a common, conventional technique to provide for greater depth of field across a larger portion of the sub-image. *See, e.g.*, Ex. 1010, 4:60-5:2; Stevenson ¶123. For example, a POSITA would have been motivated to incorporate a pan-focus lens into the second imaging stage 2 to permit greater flexibility when replacing a portion of the main image because a greater portion of the sub-image would be in focus and therefore able to be used to create the composite image. Stevenson ¶123. A POSITA would have further been motivated to incorporate the well-known pan-focus lens in Parulski's second imaging stage 2 to permit a larger portion of the sub-image to be combined with the main image without having to worry about whether the replacement portion of the composite image is in focus because the pan-focus lens puts all objects in its field of view in focus. *See, e.g.*, Ex. 1010, 4:60-5:2; Stevenson ¶123.

A POSITA also would have been motivated to use a pan-focus lens in Parulski's second imaging stage 2 because it was a well-known technique used in

cameras and optical systems to achieve a greater depth of field across a larger portion of an image. Ex. 1010, 4:60-5:2; Stevenson ¶124; *KSR*, 550 U.S. at 416.

Further, a POSITA also would have been motivated to incorporate a pan-focus lens into Parulski's second imaging stage 2 because a pan-focus lens is less complex and less expensive than a zoom lens. Because a pan-focus lens does not have a modifiable focal length, it requires fewer mechanisms to operate. Because a pan-focus lens is not capable of zooming in and out, the lens is less complex because the pan-focus lens does not need to coordinate and align the multiple lenses at varying relationships to one another when zooming or include a zooming mechanism to achieve a precise focal length. Stevenson ¶125. This also means that less computer processing is required to determine a relationship between the two lenses. All these factors would have resulted in a less expensive camera, which could thereby reduce the consumer's purchasing cost, making it desirable to a POSITA. *Id.*

Similarly, because pan-focus lenses were a conventional technique in the prior art, including for digital cameras, a POSITA would have recognized that it was a known, predictable solution that would have had a reasonable expectation of success and, therefore, been obvious to try as a method for achieving a greater depth of field across a larger portion of the image captured by Parulski's second imaging stage 2. Stevenson ¶126.

b. Expectation of Success

A POSITA would have had a reasonable expectation of success in modifying Parulski's second imaging stage lens to be a pan-focus lens because it would have been a simple swap of one lens type already known to a POSITA for another and that was known to work in the digital camera. Stevenson ¶127.

Parulski discloses that a pan-focus lens could be used in the first imaging stage and also that whether the first or second imaging stage acts as the main imaging unit or the secondary imaging unit can switch depending on the focal length of the zoom lens. Parulski, [0047], [0118]-[0120], FIG. 14. Additionally, at least one embodiment of Parulski includes three image capture stages, where the second stage has an ultra-wide focus lens, which as described above is equivalent to a pan-focus lens, which shows a POSITA would have understood how to modify the second stage lens to be a pan-focus lens. *See* Parulski, [0117]; Stevenson ¶127.

A POSITA would have recognized that modifying Parulski's second imaging stage lens to be a pan-focus lens would have needed to apply only conventional manufacturing and image processing techniques to install the pan-focus lens and then extract the sub-image from the image captured by the pan-focus lens in the same way as Parulski describes extracting the sub-image from the second imaging stage. *See supra* § V.B.1.c; Stevenson ¶128; Parulski, [0093], [0104]. Using Parulski's already-disclosed pan-focus lens as the lens for the

second imaging stage would have been a straightforward application of known, conventional manufacturing (installing a known pan-focus lens in Parulski's system) and applying Parulski's already-disclosed sub-image extraction and processing techniques to create a composite image, *see supra* §§ V.B.1.c-V.B.1.f, used according to their known functions to yield predictable results (creating a composite image using the processes disclosed in Parulski). Stevenson ¶128; *see KSR*, 550 U.S. at 416; *Slot Speaker*, 680 F. App'x at 943-44.

Thus, Parulski renders obvious claim 2. Stevenson ¶¶119-129.

3. Claim 4

Parulski renders obvious claim 4.

a. [4Preamble] “The digital camera according to claim 1, further comprising”

As discussed above, claim 1 is rendered obvious by Parulski. *See supra* V.B.1; Stevenson ¶130.

b. [4a] “an [sic] focusing amount acquiring unit configured to acquire amount [sic] of the focusing, wherein”

Parulski discloses or renders obvious “an [sic] focusing amount acquiring unit configured to acquire amount [sic] of the focusing.” Stevenson, ¶¶131-145.

As one example, Parulski discloses acquiring a focus amount by acquiring the focal length of the main lens, as explained in [1c]. *See supra* § V.B.1.d; Stevenson ¶132.

As another example, Parulski discloses increasing an image's depth of field by allowing the system to take an out-of-focus portion of the main image and replace that same portion with an in-focus portion of the sub-image. Parulski, [0031]; Stevenson ¶133. For example, Figure 14, annotated below, “depicts a flow diagram showing a method for enhancing the depth of field of an image by using images from both image capture stages according to an embodiment of the invention.” Parulski, [0047]; *see also* Parulski, [0118]-[0120].

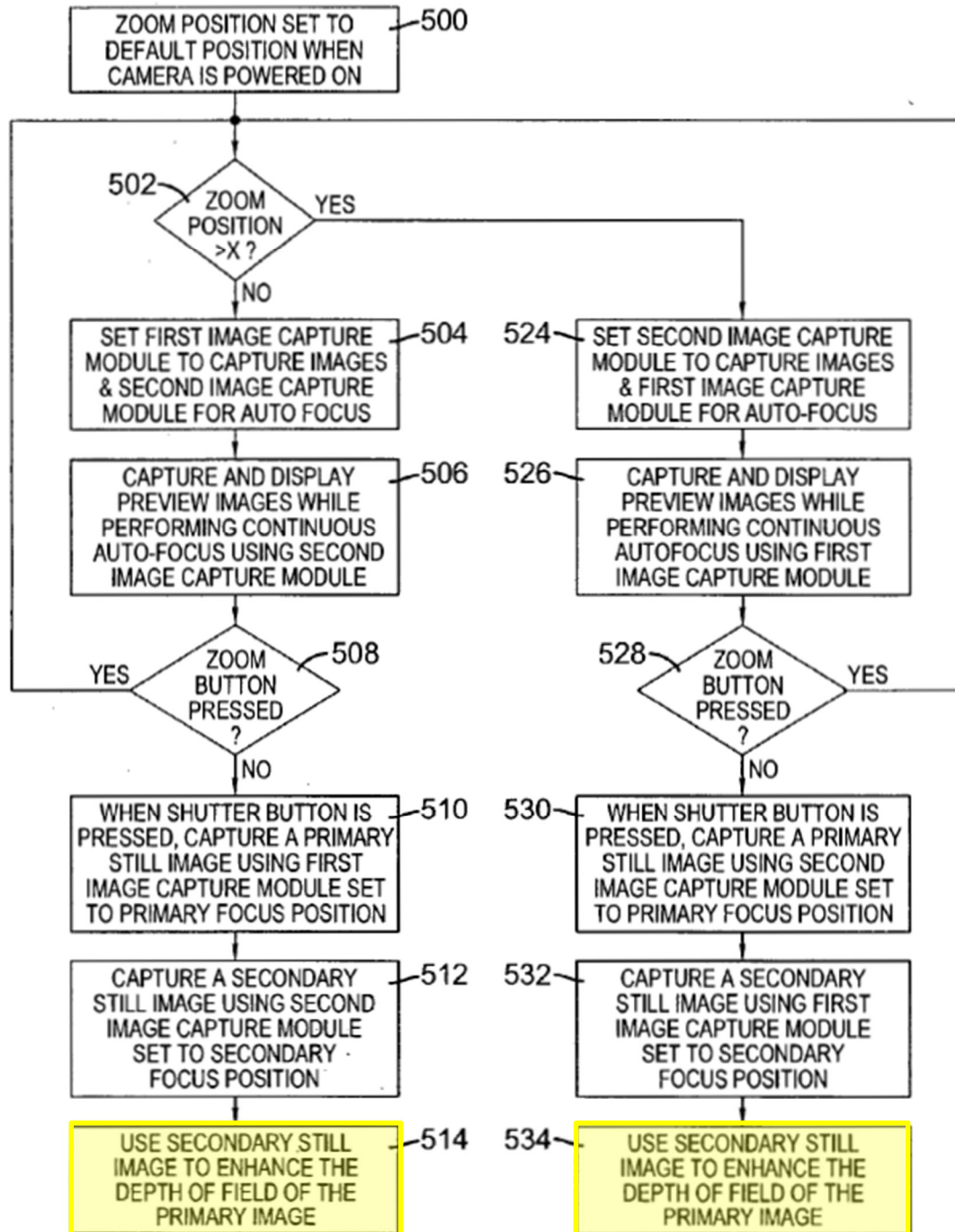


FIG. 14

Parulski, FIG. 14 (annotated); Stevenson ¶133.

“In block 500 of FIG. 14, the zoom position is set to a default position when the camera is powered on. In block 502, the zoom position setting is compared to a value X at which the image capture function switches from the first image capture stage to the second image capture stage.” Parulski, [0118]. The value of X determines which imaging stage serves as the primary still image using a set focus position and which imaging stage will be the secondary still image that performs autofocus. Parulski, [0118]-[0120]. As discussed above in [1c], the autofocus (second imaging stage 2 in [1c]) is then used to set the best focus for the primary image. *See supra* § V.B.1.d; Stevenson ¶134. The image captured by the second imaging stage is then used to enhance the depth of field of the primary still image captured by the main lens. Parulski, [0118]-[0120]; Stevenson ¶134. A POSITA would have understood that Parulski’s system acquires the autofocus amount to properly adjust the focus amount of the primary image. Stevenson ¶134. A POSITA would also have understood that to adjust the focus of the primary image to the desired value, Parulski’s system acquires the current amount of focusing (e.g., when comparing the focal length to X) to know how much to modify to achieve the desired value determined by the autofocus. *Id.*

To the extent Patent Owner argues or the Board finds that element [4a] requires using a roller and roller position sensor in the lens assembly, *see* Ex. 1001, 2:66-3:24, a POSITA would have found it obvious to include a roller and a roller

position sensor in Parulski's lens assembly so the lens can be displaced in the forward and backward directions and the amount displacement can be detected, for example, to compare the focal length to X, as taught by Parulski. Parulski, [0118], FIG. 14; Stevenson ¶135. The use of a roller and roller position sensor would have been obvious to a POSITA because their use was well known in the art and conventional in zoom lens assemblies. Stevenson ¶135; *see also* Ex. 1012, 7:16-35, FIG. 2; Ex. 1013, 7:39-10:42, FIGS. 11-19.

i. Motivation to Modify Parulski

A POSITA would have been motivated to include a roller and a roller position sensor in Parulski's lens assembly to control the lens displacement in the forward and backward directions to adjust the zoom and to detect that displacement to acquire the focal length of the lens during zooming, for example, to compare the focal length to X or to determine the offset between the main lens and the sub-lens. Parulski, [0118], FIG. 14; Stevenson ¶136.

A POSITA would have known that a roller and roller position sensor were common, conventional mechanisms and techniques to adjust and detect the position of a lens assembly and would immediately have envisioned this technique when reading Parulski because they were well known in the art. *See* Ex. 1012, 7:16-35, FIG. 2; Ex. 1013, 7:39-10:42, FIGS. 11-19; Stevenson ¶137.

A POSITA would have further been motivated to incorporate the well-known roller and roller position sensor into Parulski's camera assembly to adjust the main lens's position to accomplish mechanically zooming in and out and to detect the lens's zoom position (and focal length) to perform the composite image creation processes disclosed in Parulski. Stevenson ¶¶138-140.

A POSITA also would have been motivated to incorporate a roller and roller position sensor into Parulski's camera assembly because they were well-known techniques used in cameras to mechanically move a zoom lens assembly to zoom in and out and to detect the position of the lens's assembly, thereby acquiring the zoom or focal length, and thus represents a known technique in the art and would have yielded predictable results. Ex. 1012, 7:16-35, FIG. 2; Ex. 1013, 7:39-10:42, FIGS. 11-19; Stevenson ¶141; *KSR*, 550 U.S. at 416.

Similarly, because a roller and roller position sensor were conventional techniques in the prior art to mechanically adjust the zoom position of a lens assembly, a POSITA would have recognized that these were known, predictable solutions that would have had a reasonable expectation of success and, therefore, been obvious to try as a method to mechanically adjust the zoom lens and detect the amount of zoom and focal length of the lens. Stevenson ¶142.

ii. Expectation of Success

A POSITA would have reasonably expected success in incorporating a roller and roller position sensor into Parulski's camera assembly because it would have merely involved incorporating a known mechanism for moving the lens assembly to adjust the zoom lens and to determine the position of the assembly to determine the focal length of the lens that was known to work for digital cameras and was well within the POSITA's skill to incorporate. Stevenson ¶143.

A POSITA would have recognized that incorporating a roller and roller position sensor into Parulski's camera assembly would have required only the application of known, conventional software and mechanical techniques for zoom functions and then applying the roller and sensor to set and detect a zoom position for improved focus depth. *See supra* §§ V.B.1.d, V.B.3.b; Stevenson ¶144; Parulski, [0031], [0047], [0118]-[0120]. Using a roller and roller position sensor to adjust the focal length and zoom of the main lens and to detect that adjustment would have been merely the straightforward application of known, conventional techniques applied to Parulski's already-disclosed camera used according to their known functions to yield predictable results (adjusting the zoom and detecting the zoom amount). Stevenson ¶144; *see KSR*, 550 U.S. at 416; *Slot Speaker*, 680 F. App'x at 943-44.

Thus, Parulski renders obvious “[a] focusing amount acquiring unit configured to acquire amount [sic] of the focusing.” Stevenson ¶¶131-145.

- c. **[4b] “the composite image generating unit is configured to generate the composite image by combining the main image and the sub-image by setting a cutout position on the sub-image, cutting out a partial image from the cut out position, and adding the partial image on the main image, and”**

Parulski discloses that “the composite image generating unit is configured to generate the composite image by combining the main image and the sub-image by setting a cutout position on the sub-image, cutting out a partial image from the cut out position, and adding the partial image on the main image.” Stevenson, ¶¶146-149.

As discussed above for [1e], Parulski discloses that the composite image generating unit is configured to generate the composite image by combining the main image and a portion of the sub-image. *See supra* § V.B.1.f. Parulski “enable[s] object extraction from an image” or “improve[s] the dynamic range within images” to “modify the captured image signal or the output image,” which describes cutting out an extracted object or portion from the secondary image or sub-image for replacement or augmentation into the primary or main image. Parulski, [0071]. In other words, Parulski’s system registers a cutout position at the portion of the second image that will be added to the first image and cuts out that

portion of the second image, which is then used to replace, enhance, or augment the main image to create the enhanced or augmented image. *See supra* § V.B.1.f; Stevenson ¶147.

For example, Parulski discloses that the generated composite image is created “by replacing portions of the primary image with portions of the secondary image,” such as to sharpen a black dog sitting in the foreground of a picture. Parulski, [0114], [0145]; *see also* Parulski, Abstract, [0026], [0030]-[0032], [0064], [0065], [0106]-[0113], [0118]-[0120], [0142], FIG. 14. As one example, “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.” Parulski, [0145]. Parulski also discloses that the secondary image may also be used by the processing stage to “sharpen portions of the primary image,” “modify the dynamic range of the primary image,” and “provide scene analysis data for setting the capture parameters for the primary image.” Parulski, [0031]. In the dog example, the “black dog is too dark (underexposed) and out of focus (because, e.g., the camera was set on landscape mode),” but the “depth of field can be adjusted so that, e.g., the dog is in focus” and “the range data can be used ... to isolate the dog, which is sharpened to obtain a nice sharp image.” Parulski, [0114]. This describes Parulski’s process of creating

the enhanced or augmented composite image by, for example, cutting out the dog from the sub-image and using it to replace the underexposed and out-of-focus dog in the primary image with one that is sharpened and has better exposure to improve the overall image. Stevenson ¶148.

Thus, Parulski discloses that “the composite image generating unit is configured to generate the composite image by combining the main image and the sub-image by setting a cutout position on the sub-image, cutting out a partial image from the cut out position, and adding the partial image on the main image.” Stevenson ¶¶146-149.

- d. **[4c] “misalignment of the composite image decreases as the composite image is in focus with the subject on the basis of the amount and a predetermined cutout rule.”**

Parulski discloses that “misalignment of the composite image decreases as the composite image is in focus with the subject on the basis of the amount and a predetermined cutout rule.” Stevenson ¶¶150-156.

Parulski discloses a cutout rule that uses a range map and pixel offset to determine which position to cut out from the sub-image to replace the main image. This is determined from the sets of calibration curves. *See, e.g.*, Parulski, [0093], [0097], [0101], FIG. 4 at 266, FIG. 9 at 444-446; Stevenson ¶151.

For example, Parulski discloses an autofocus function that determines a “zoom position” of a “zoom ... motor” to determine the focusing amount of the main lens. Parulski, [0065], [0092], [0093]. This position is associated with a “range map” to determine a pixel offset of the object’s position between the main image captured by the first lens and the sub-image captured by the second lens, which corresponds to the distance to the object, or focusing amount. *See* Parulski, [0005], [0008], [0093], FIGS. 17A and 17B. Figures 17A and 17B, below, show “a representation of a cropped and upsampled autofocus image 352 [FIG. 17B] from the image stage in the lower zoom position” (sub-image) and “show the offset between the two images that is used to determine the distance to portions of the scene.” Parulski, [0093]; *see also* Parulski, [0050] (“FIG. 17A and FIG. 17B are representations of images captured with two image capture stages showing the offset between the two images that is used to determine the distance to portions of the scene.”); Stevenson ¶152.

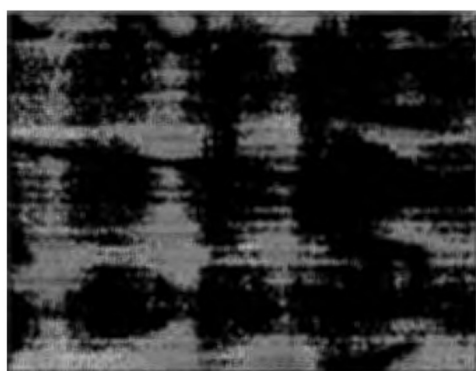


FIG. 17A



FIG. 17B

Parulski, FIGS. 17A, 17B.

Parulski further discloses that “a calibration factor is then applied to the focus detection signal to determine the distance that the focus lens must be moved to produce a best focus condition for the image capture.” Parulski, [0093]; Stevenson ¶153.

For example, Parulski discloses calibration curves used to “determine the movement of the focus lens needed in the capture stage [e.g., main lens] to produce [the] best focus.” Parulski, [0097]. Parulski, discussing Figure 6, further discloses that “a series of image sets are captured with objects at known distances, using the shorter focal length first image capture stage and the longer focal length second image capture stage at a series of focus lens positions,” and then “the autofocus image from the lower focal length first image stage is cropped and upsampled so that corresponding features in the two autofocus images span the same number of pixels.” Parulski, [0097], FIG. 6; *see also* Parulski, FIG. 4. “[T]he images from the second image capture stage are correlated to corresponding portions of the images from the cropped and upsampled image from the first image capture stage to determine the pixel offset between the images in each image set,” and then “the data of pixel offset between images in each image set versus known distance to objects is stored as the autofocus rangefinder calibration curve.” Parulski, [0097]. These steps are shown below in Figure 6 in boxes 300-306. Stevenson ¶154.

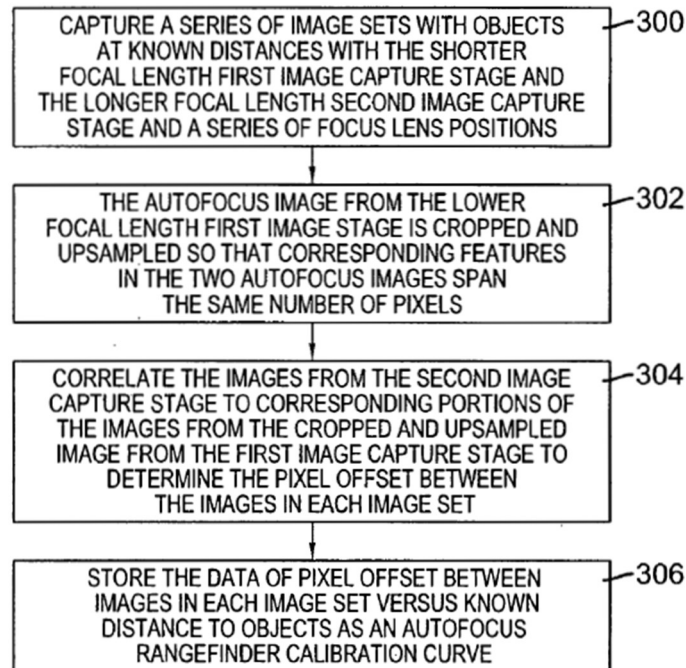


FIG. 6

Parulski, FIG. 6.

A POSITA would have recognized that this disclosure shows that Parulski uses a predetermined cutout rule, based on the pixel offset between the images and the known distance to objects in the calibration curve. *See* Parulski, [0093], FIG. 4 at 266; Stevenson ¶155; *see also* Parulski, [0097], [0101], FIG. 9 at 444-446. The calibration curve is then used to modify the focus of the primary image to “guide the positioning of an adjustable focus lens to produce the best image quality.”

See Parulski, [0008]; Stevenson ¶155; *see also* Parulski, [0093], [0097], [0101], FIG. 4 at 266, FIG. 9 at 444-446.

Thus, Parulski discloses that “misalignment of the composite image decreases as the composite image is in focus with the subject on the basis of the amount and a predetermined cutout rule.” Stevenson ¶¶150-156.

4. **[Claim 5] “The digital camera according to claim 4, wherein the predetermined cutout rule is based on a principle of triangulation based on an interval between the main lens and the sub-lens, and distance from the digital camera to the subject on the basis of the amount.”**

Parulski discloses or renders obvious the additional limitations of claim 5, “wherein the predetermined cutout rule is based on a principle of triangulation based on an interval between the main lens and the sub-lens, and distance from the digital camera to the subject on the basis of the amount.” Stevenson ¶¶157-160.

Parulski’s calibration curve for the predetermined cutout rule, discussed above for element [4c], *see supra* § V.B.3.d, is based on well-known triangulation calculations described in the “Background of the Invention” section in Parulski. Parulski, [0008]; Stevenson ¶158. Parulski discloses that “the offset information x is used along with the lens separation distance b and the focal length f to calculate the distance[] to the scene by triangulation.” Parulski, [0008]. The interval between Parulski’s main lens and the sub-lens corresponds to the separation distance b , *see* Parulski, [0007]-[0008], which is also discussed as the “[s]eparation [distance]

between lenses” in Table 1. Parulski, [0105] (Table 1). Similarly, Parulski’s triangulation calculation uses the distance d from the camera to the object, as explained in Parulski’s equation $d=s \cdot f/(p \cdot m)$ and the “[d]istance” shown in Table 1. Parulski, [0105] & Table 1; *see also* Parulski, [0007]-[0008] (describing triangulating distance to an object using the “lens separation distance b ” and the “distance d to the scene”); Stevenson ¶158.

“The calculated distance d to the scene is used to guide the positioning of an adjustable focus lens to produce the best image quality.” Parulski, [0008]; *see also* Parulski, [0105]. This triangulated distance calculation is used to prepare the “autofocus rangefinder calibration curve,” for example, in block 266 (yellow) of Figure 4 with respect to a “rangefinder module” or a “rangefinder-based autofocus system[.]” *See* Parulski, [0008]-[0009], [0097]; Stevenson ¶159.

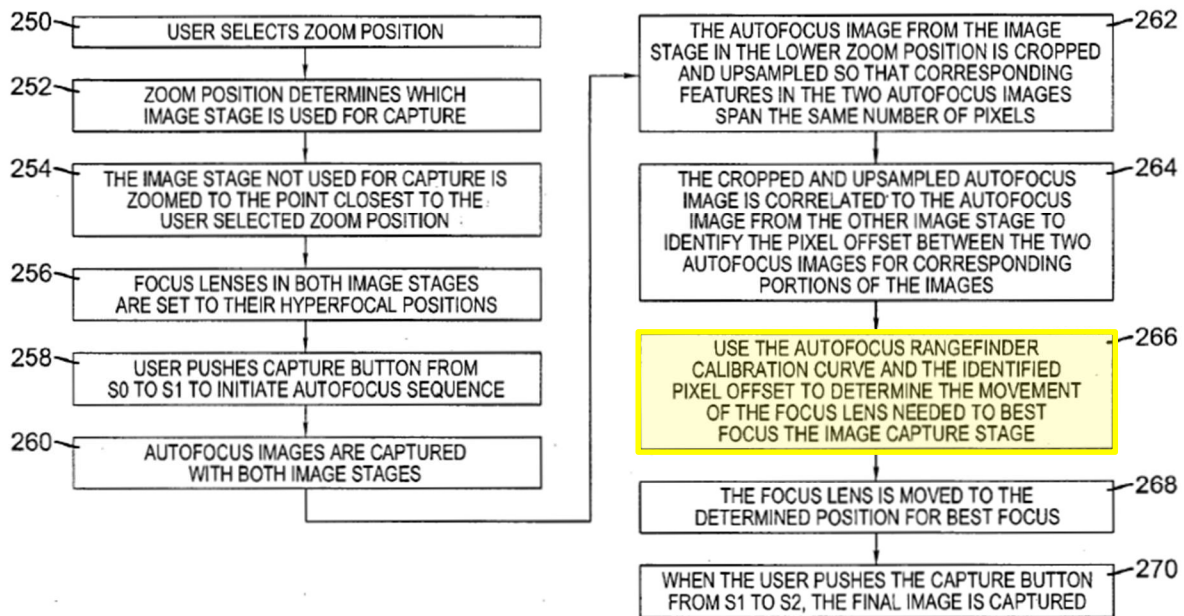


FIG. 4

Parulski, FIG. 4 (annotated); Stevenson ¶159.

Thus, Parulski discloses that “the predetermined cutout rule is based on a principle of triangulation based on an interval between the main lens and the sub-lens, and distance from the digital camera to the subject on the basis of the amount.” Stevenson ¶¶157-160.

5. [Claim 6] “The digital camera according to claim 1, wherein the main image of the object is captured from a different angle from the sub-image of the subject.”

Parulski discloses the additional limitations of claim 6, “wherein the main image of the object is captured from a different angle from the sub-image of the subject.” Stevenson ¶¶161-165.

For example, Parulski explains that “the two lenses” of the first image system (main lens) capturing the main image and the second image system (sub-lens) capturing the sub-image “have different focal lengths” and “different magnifications,” which a POSITA would have understood describes different fields of view. Parulski, [0066]; Stevenson ¶162. These different fields of view represent different angles being captured by each lens because field of view is related to the focal length and magnification of the lens. Parulski, [0066]; Stevenson ¶162.⁶

Parulski confirms this, explaining that the first image lens 3 and the second image lens 4 “typically” have “different fields of view.” Parulski, [0077]. Because the field of view describes the viewing angle of the lens, a POSITA would have known that two lenses with different fields of view would have different viewing angles for the main image (taken by the first image lens) and the sub-image (taken by the second image lens). Stevenson ¶163. For example, Parulski explains that an image lens may be a “wide angle” lens having a fixed field of view angle or a zoom lens where the user can “set a desired field of view” (angle) for the lens, which describes the main lens and sub-lens capturing the object of the image from

⁶ The ’638 patent recognizes this basic principle of optical systems, stating that “the angle of view changes when the focal length ... changes.” Ex. 1001, 6:31-37.

different angles. Parulski, [0087]; Stevenson ¶163; *see also* Ex. 1001, 5:20-34, 6:9-13.

To the extent Patent Owner argues or the Board finds that the “different angle” means a different viewing angle from each lens to the object being captured, Parulski discloses this interpretation. Parulski teaches that the first image lens and the second image lens are separated by a “separation distance b ,” which, along with the difference in focal length, leads to an offset between the main image and the sub-image that permits triangulation to be used to determine the distance to the object. Parulski, [0008], [0105]; *see also* Parulski, [0067] (discussing using “a larger separation distance between the two lenses” to determine the distance to the object being photographed). This offset corresponds to each of the lenses having a slightly different angle between the lens and the object being captured. Stevenson ¶164.

Thus, Parulski discloses claim 6. Stevenson ¶¶161-165.

C. Ground 2: Parulski and Safonov Render Obvious Claims 1-2 and 4-6

1. Independent Claim 1

As discussed above, Parulski discloses or renders obvious all elements of claim 1. *See supra* § V.B.1. However, if Patent Owner argues or the Board finds

that element [1e] requires alpha blending and that Parulski does not disclose or render it obvious, Safonov discloses and renders it obvious. Stevenson ¶¶166-179.

Safonov discloses “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[ing] 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.” Safonov, Abstract. Safonov achieves this by performing alpha blending on two images to obtain a higher quality single, composite image. *See* Safonov, Abstract, 7. For example, Safonov discloses taking a “‘detail image’ D_s with high local contrast in shadows, and [a] ‘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 ... alpha blending formula of I and D_s ” and “also reduce luminance using the following alpha blending formula of I and D_h ” shown in Safonov’s equation (1). Safonov, 7; Stevenson ¶167.

A POSITA would have found it obvious to use Safonov’s alpha blending as part of generating the composite image when combining the main image and sub-

image. For example, a POSITA would have understood that the combined image should be created in a way that minimizes or hides the edges where the main image and the sub-image meet, and would have recognized that blending the images would have smoothed the transition to prevent the user from seeing where the second image was used to replace part of the main image. Stevenson ¶168. A POSITA would have found it obvious to use alpha blending on some (e.g., edges) or all of the sub-image portion added to the main image, such as where the sub-image has been superimposed over the main image, to blend away any differences in resolution, color variation, or gain settings, thereby cohesively integrating the sub-image into the main image. *Id.*

a. Motivation to Combine Parulski and Safonov

A POSITA would have been motivated to use Safonov's alpha blending as part of Parulski's composite image generating unit to combine the main image and the sub-image when creating the composite, augmented, or enhanced image. Stevenson ¶¶169-176.

As discussed above, both Parulski and Safonov relate to cameras that combine multiple images into a single enhanced image. *See supra* § V.A. A POSITA would have known that the alpha blending disclosed in Safonov was a common, conventional technique used when combining images because it permits one image to be overlaid on the other, and the alpha channel or transparency can be

used to smooth away differences in the images. *See* Safonov, 7 (“[I]t is possible to increase the local contrast of the source image *I* and also reduce luminance using the following alpha blending formula”); Ex. 1009, [0003] (“In computer graphics, alpha blending, or alpha channel blending, refers to the use of an alpha channel with other channels in an image in order to show translucency.”); *see also* Ex. 1009, [0007]. Indeed, one known purpose of alpha blending was to smooth the combination of two different images or layers. Ex. 1009, [0003], [0007]; Stevenson ¶170; *see also* Ex. 1001, 7:21-35.

A POSITA would have further been motivated to use the well-known alpha-blending technique in Safonov with Parulski’s composite image generating unit when creating the composite image because the alpha-blending translucency would have helped smooth over the altered region, allowing the added sub-image to be more seamlessly integrated into the main image. *See* Ex. 1009, [0003]; Stevenson ¶¶171-172.

A POSITA also would have been motivated to incorporate Safonov’s alpha blending into creating the composite image because it was a well-known technique used in image editing, image processing, and image combination software to combine multiple images into a single composite image, and thus represents a known technique in the art that would have yielded predictable results. Ex. 1009, [0003]; Stevenson ¶173; *KSR*, 550 U.S. at 416.

Similarly, because alpha blending was a conventional technique in the prior art for combining two images, a POSITA would have recognized that it was a known, predictable solution that would have had a reasonable expectation of success to combine Parulski's main image and sub-image into a composite image and, therefore, would have been obvious to try as a method of combining the main image and the sub-image. Stevenson ¶¶174-175.

A POSITA also would have been motivated to incorporate Safonov's alpha blending into Parulski's creation of a modified image to further enhance the quality of the modified image to achieve Parulski's goal of the modified image having "relatively low noise and good sharpness." Parulski, [0031]; Stevenson ¶176. For example, Safonov discloses that the alpha blending can enhance the modified image by increasing contrast and modifying the luminance, which is one known way of achieving Parulski's desired improvements. Safonov, 7; Stevenson ¶176.

b. Expected Success

A POSITA would have had a reasonable expectation of success in using Safonov's alpha blending to enhance Parulski's modified image because it would have merely involved incorporating a known image blending technique that was known to be used with digital camera images and was well within the POSITA's skill to incorporate. Stevenson ¶177.

A POSITA would have recognized that incorporating Safonov's alpha blending into Parulski's composite image generating unit would have required only the application of known, conventional software and image processing techniques for alpha blending and then applying the alpha blending to portions of the second image (sub-image) over a "corresponding portion[]" of the first image (main image) to obtain the enhanced or modified image with "relatively low noise and good sharpness," improved focus depth, increased local contrast, and reduced luminance. *See supra* § V.C.1; Stevenson ¶178; Parulski, [0031], [0138]-[0140], [0145]. Using alpha blending to combine the main image and the sub-image would have been merely the straightforward application of known, conventional techniques applied to Parulski's already-disclosed combination of the main image and the sub-image, *see supra* §§ V.B.1.f, V.C.1, used according to their known functions to yield predictable results (creating a composite image using the processes disclosed in Parulski). Stevenson ¶178; *see KSR*, 550 U.S. at 416; *Slot Speaker*, 680 F. App'x at 943-44.

Thus, Parulski in combination with Safonov discloses or renders obvious "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." Stevenson ¶¶166-179.

2. Claims 2 and 4-6

As discussed above, Parulski discloses or renders obvious the additional limitations of claims 2 and 4-6. *See supra* §§ V.B.2- V.B.5; Stevenson ¶180.

VI. Discretionary Denial Is Not Warranted

A. 35 U.S.C. § 314(a) Does Not Warrant Discretionary Denial

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11, at 5-6 (Mar. 20, 2020) (precedential), and the Office’s interim guidelines dated June 21, 2022 (“Guidance Memo”), do not warrant discretionarily denying institution. There is no active parallel district court litigation. Ex. 1017. After the court in *Longitude Licensing Ltd.*⁷ *v. Google LLC*, No. 3:23-cv-03046 (N.D. Cal.) dismissed part of the proceeding under Rule 12(b)(6) upon determining that the claims of several asserted patents are directed to patent ineligible subject matter under 35 U.S.C. § 101, the plaintiff voluntarily dismissed the remaining claims, including its claim asserting infringement of the ’638 patent, and the Court entered final judgment and closed the file. Exs. 1014-1017. No claim construction proceedings were underway, fact discovery had only begun, and the parties had not exchanged any infringement or invalidity contentions (and therefore no § 102/§ 103 issues had

⁷ Longitude Licensing Ltd. “is the exclusive worldwide licensee” of the ’638 patent. Ex. 1015, ¶13.

been raised or addressed). Although Longitude has appealed the § 101 order, that appeal does not involve the '638 patent and institution is appropriate here.

Thus, the *Fintiv* factors favor institution because there is no case to stay or trial date (factors 1 and 2); minimal investment by the parties (factor 3); no overlapping issues (factor 4); and the evidence of obviousness is strong (factor 6). Factor 5 is at worst neutral.

B. 35 U.S.C. § 325(d) Does Not Warrant Discretionary Denial

The '638 patent has not been involved in any other proceeding before the Office.

The Examiner did not consider Parulski or Safonov during prosecution. Therefore, the same or substantially the same prior art or arguments have not been presented to the Office and denial of institution is not warranted under § 325(d).

VII. Mandatory Notices

A. Real Parties-in-Interest Under 37 C.F.R. § 42.8(b)(1)

Google LLC is the real party-in-interest for this Petition.⁸

⁸ Google LLC is a subsidiary of XXVI Holdings Inc., a subsidiary of Alphabet Inc.

XXVI Holdings Inc. and Alphabet Inc. are not real parties-in-interest here.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

To the best of Petitioner's knowledge, the '638 patent was involved in the following district court litigation, but has been voluntarily dismissed from the case:

Name	Number	Court	Filed
<i>Longitude Licensing Ltd. v. Google LLC</i>	3:23-cv-03046	N.D. Cal.	June 21, 2023

C. Lead and Backup Counsel Under 37 C.F.R. § 42.8(b)(3)

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D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please address correspondence to lead and backup counsel at the addresses above and Google-Longitude-IPRs@finnegan.com. Petitioner consents to electronic service by e-mail.

VIII. Standing

Petitioner certifies that the '638 patent is available for *inter partes* review and Petitioner is not barred or estopped from requesting *inter partes* review to challenge the claims on the grounds herein.

IX. Conclusion

Petitioner has established a reasonable likelihood of prevailing for the challenged claims and requests the Board institute *inter partes* review and cancel each challenged claim as unpatentable.

Date: June 20, 2024

Respectfully submitted,

/Erika H. Arner/

Erika H. Arner, Lead Counsel
Reg. No. 57,540

CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing **Petition for *Inter Partes* Review** contains 11,898 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

/Erika H. Arner/
Erika H. Arner, Lead Counsel
Reg. No. 57,540

CLAIMS APPENDIX

1. **[1Preamble]** A digital camera having a focusing function and a focal length varying function of a main lens, the digital camera comprising:
 - [1a]** a main imaging unit configured to generate a main image by performing a photoelectric conversion from a subject obtained via the main lens;
 - [1b]** a sub-imaging unit configured to generate a sub-image by performing a photoelectric conversion from the subject obtained via a sub-lens;
 - [1c]** a focal length acquiring unit configured to acquire the focal length of the main lens;
 - [1d]** a magnification setting unit configured to set a level of magnification on the basis of the focal length;
 - [1e]** 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;
 - [1f]** an image display unit configured to display the composite image; and
 - [1g]** 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.

2. The digital camera according to claim 1, wherein the sub-lens is a pan-focus lens.
4. **[4Preamble]** The digital camera according to claim 1, further comprising
[4a] an [sic] focusing amount acquiring unit configured to acquire amount [sic] of the focusing, wherein
[4b] the composite image generating unit is configured to generate the composite image by combining the main image and the sub-image by setting a cutout position on the sub-image, cutting out a partial image from the cut out position, and adding the partial image on the main image, and
[4c] misalignment of the composite image decreases as the composite image is in focus with the subject on the basis of the amount and a predetermined cutout rule.
5. The digital camera according to claim 4, wherein the predetermined cutout rule is based on a principle of triangulation based on an interval between the main lens and the sub-lens, and distance from the digital camera to the subject on the basis of the amount.

6. The digital camera according to claim 1, wherein the main image of the object is captured from a different angle from the sub-image of the subject.

CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. §§ 42.6(e) and 42.105, the **Petition for *Inter Partes* Review of U.S. Patent No. 8,482,638, the associated Power of Attorney, and Exhibits 1001-1007, 1009-1017** were served via FedEx Priority Overnight on the correspondence address of record with the USPTO as follows:

David Tarnoff
GLOBAL IP COUNSELORS, LLP
1233 20th Street, NW, Suite 600
Washington, DC 20036-2680

A courtesy copy has also been mailed to litigation counsel for Patent Owner
at:

David Martinez
ROBINS KAPLAN LLP
2121 Avenue of the Stars
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Los Angeles, CA 90067

Dated: June 20, 2024

By: /Lisa C. Hines/
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Case Manager
Finnegan, Henderson, Farabow,
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