

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.

Petitioner

v.

IMMERVISION, INC.

Patent Owner

Case IPR2023-00471

Patent No. 6,844,990

PATENT OWNER'S RESPONSE UNDER 37 C.F.R. § 42.120

TABLE OF CONTENTS

	page
I. INTRODUCTION	1
II. THE RELEVANT INVENTION OF THE ‘990 PATENT.....	2
III. THE ASSERTED PRIOR ART	8
A. Baker.....	8
B. Shiota	9
C. Fisher	11
IV. PERSON OF ORDINARY SKILL IN THE ART	12
V. CLAIM CONSTRUCTION	13
VI. PETITIONER FAILED TO DEMONSTRATE BY A PREPONDERANCE OF EVIDENCE THAT THE CLAIMS OF THE ‘990 PATENT ARE UNPATENTABLE	13
A. Legal Standards	13
B. Petitioner Has Not Shown Claims 2, 4, 27, or 29 Would Have Been Obvious Over Baker and Shiota.....	14
1. Shiota Does Not Teach or Suggest Retrieving Image Points On the Obtained Image Using a Size L of the Obtained Image	14
2. Claims 2, 4, and 29 are Not Unpatentable Due At Least to Their Dependence on Claim 27.....	20
C. Petitioner Has Not Shown Claims 29 or 30 Would Have Been Obvious Over Baker, Shiota, and Fisher.....	20
VII. CONCLUSION.....	21

TABLE OF AUTHORITIES**Page(s)****Cases**

<i>Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.</i> , 800 F.3d 1375 (Fed. Cir. 2015)	13
<i>Harmonic Inc. v. Avid Tech., Inc.</i> , 815 F.3d 1356 (Fed. Cir. 2016)	13
<i>Kinetic Concepts, Inc. v. Smith & Nephew, Inc.</i> , 688 F.3d 1342 (Fed. Cir. 2012)	14
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007).....	14

Statutes

35 U.S.C. § 103	14
35 U.S.C. § 312(a)(3).....	13
35 U.S.C. § 316(e)	13

EXHIBIT LIST

Exhibit No.	Description
2001	Declaration of James F. Munro
2002	Excerpt from Tinku Acharya & Ajoy K. Ray, <i>Image Processing Principles and Applications</i> (2005) (pp. 23-25)
2003	EV76C560 CMOS Image Sensor Datasheet from e2v Semiconductors SAS (2011)
2004	Excerpt from Michael P. Keating, <i>Geometric, Physical, and Visual Optics</i> (2 nd Ed. 2002) (pp. 347-350)
2005	U.S. Patent Application Publication No. 2004/0201764

I. INTRODUCTION

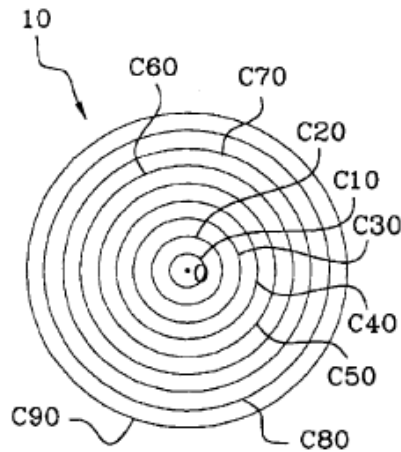
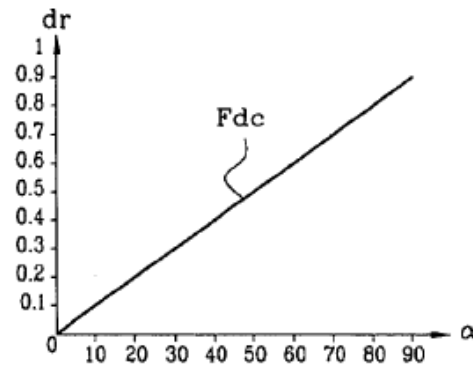
Petitioner fails to meet its burden to show unpatentability of the challenged claims of the ‘990 Patent. To demonstrate independent claim 27 would have been obvious, Petitioner must show the combination of Baker and Shiota taught or suggested a step of “displaying the obtained panoramic image by correcting the non-linearity of the initial image, performed by retrieving image points on the obtained image...using at least...a size L of the obtained image.” Petitioner admitted that Baker fails to disclose such a feature and relied entirely on Shiota.

But Shiota does not expressly indicate that it retrieves image points for correcting distortion using the size of the obtained image. Petitioner and its expert, Dr. Kessler, improperly read this feature into Shiota’s discussion of “magnification” by ignoring the surrounding context and established understandings in the field. As Patent Owner’s expert, Mr. James Munro, explains in his declaration (attached as Exhibit 2001), Dr. Kessler himself links together multiple references to “magnification” and other synonyms (*i.e.*, “scale factor” and “zoom ratio”) but omits description showing these terms actually relate to operator selections for final display, not a size of the initial captured image. Dr. Kessler’s conclusion that “magnification” merely leads to the same use of the size L of the obtained image as stated in claim 27 is without any substantial explanation or support and is contrary to a reasoned reading of the text.

Without demonstrating the existence of the above-identified feature in the combination of Baker and Shiota, Petitioner is unable to prove claim 27 is unpatentable in this proceeding. The same applies to challenged dependent claims 2, 4, 29, and 30, as well, at least because Petitioner's analysis for these claims does not remedy the deficiency discussed above. Patent Owner therefore requests the PTAB find claims 2, 4, 27, 29, and 30 of the '990 Patent *not* unpatentable.

II. THE RELEVANT INVENTION OF THE '990 PATENT

The '990 Patent is directed to improvements in panoramic image capture and subsequent display. Ex. 1001 at 1:13-15; Ex. 2001 at ¶ 26. A panoramic camera's objective lens often utilized an image point distribution function that was as linear as possible. Ex. 1001 at 2:4-8. That is, an image point's (*e.g.*, b' in Fig. 5) relative distance (dr) from the image center should equal a field angle (*e.g.*, α_2 in Fig. 5) of the corresponding object point (*e.g.*, b in Fig. 5) multiplied by a constant (*e.g.*, $dr = Fdc(\alpha) = K \cdot \alpha$). *Id.* at 2:30-42. Figs. 4A and 4B of the '990 patent, reproduced below, neatly illustrate the concept:

**Fig. 4A****Fig. 4B**

The concentric circles in Fig. 4A represent image points that correspond to object points sharing a common field angle (in increments of 10°). *Id.* at 2:14-29. The plot in Fig. 4B similarly shows a function (F_{dc}) where a ratio between field angles (α) of two object points in the panorama is the same as a ratio of relative distances (dr) of the corresponding image points from the image center.¹ *Id.* at 2:9-13.

The inventors of the '990 Patent recognized that this arrangement presents disadvantages when enlarging digital image portions for display. *Id.* at 3:1-9. The '990 Patent's solution includes providing an objective lens with a *non-linear* image point distribution function having a maximum divergence of at least $\pm 10\%$ compared to the linear distribution function, such that the image has at least one

¹ For example, an object point at twice the field angle of another object point would have a corresponding image point located twice as far from center.

substantially expanded zone and at least one substantially compressed zone. *Id.* at 4:11-21; Ex. 2001 at ¶¶ 31, 35, 37. The “maximum divergence” refers to the point

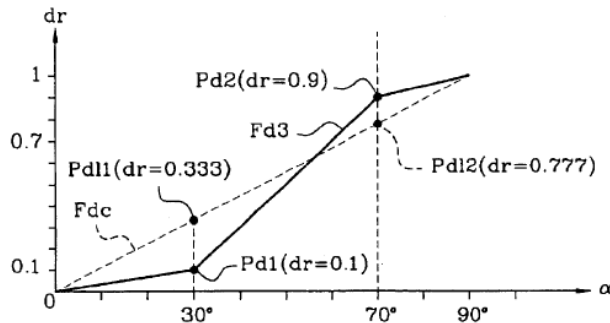


Fig. 9

on the image point distribution function plot that is farthest away from a corresponding point on the linear distribution function plot. Ex. 1001 at 8:44-67. Take, for example, in Fig. 9

(reproduced above), where a maximum divergence of -70% can be found between point Pd1 on image point distribution function Fd3 and point Pd11 on the linear distribution function Fdc. *Id.* at 9:53-58.

An image zone that is “expanded” would cover a greater number of pixels on an image sensor than it would as part of a linear distribution lens. *Id.* at 3:66-4:10; Ex. 2001 at ¶ 27. One simple example is where a lens with a linear distribution function projects two degrees of field angle that cover one hundred pixels – a non-linear distribution function could be used for expansion such that the same two degrees can now be projected onto two hundred pixels, doubling the resolution for objects contained within those two degrees. Ex. 2001 at ¶ 28. Conversely, a “compressed” zone would cover fewer image sensor pixels. *Id.* at ¶ 29; Ex. 1001 at 3:66-4:10. Using the previous example, a non-linear distribution

function could compress the aforementioned two degrees of field to project onto only fifty pixels, cutting the resolution in half in that zone. Ex. 2001 at ¶ 29.

Expanded and compressed zones can be graphically represented in the image point distribution plot. *Id.* at ¶¶ 32-33. A slope of the distribution function that is greater than the slope of the linear distribution function indicates an expanded zone, while a lesser slope indicates a compressed zone. *Id.* at ¶ 34; Ex. 1001 at 9:13-35. Expansion or compression provides advantages for efficient bandwidth usage or higher sampling rates for large amounts of detail (Ex. 2001 at ¶ 30; Ex. 1009 at 1:37-51; Ex. 2002 at 23-25), and in the specific context of the ‘990 patent, the expanded zone(s) contain more useful portions of the image and cover a greater number of pixels on the corresponding image sensor than if a linear distribution function were provided. Ex. 1001 at 3:43-4:10. The image point distribution function Fd3 in Fig. 9, above, exhibits two compressed zones at the center and edges of the field of view (shown by the shallow slopes) in order to create an expanded zone between 30° and 70° (illustrated by the steep slope). *Id.* at 9:53-10:5; Ex. 2001 at ¶ 34.

However, the claimed non-linear distribution function may introduce, *inter alia*, unpleasant or undesirable optical distortion into the image (*e.g.*, a sort of “carnival mirror” effect), which typically should be addressed so that the image presented for display is clear and coherent to the viewer. Ex. 1001 at 10:12-17;

Ex. 2001 at ¶ 30. The '990 Patent provides several example methods for correcting the non-linearity. Ex. 2001 at ¶¶ 36-37. In the method recited by claim 27, the initially captured image, which may form an image disk, has a size L (in pixels). Ex. 1001 at 13:47. Image points p (p_u, p_v) from a digital image obtained via the panoramic objective lens can be retrieved in a coordinate system having center O' using, *inter alia*, the size L of the obtained image and the non-linear distribution function. *See e.g., id.* at 12:66-14:35.

Fig. 13 (reproduced below) visually portrays various parameters used in an example algorithm for this type of image point mapping. A display window DW includes display image points designated by line and column coordinates $E(i, j)$.

Id. at 12:59-13:1. The display image points $E(i, j)$ may be projected onto a position of a sphere HS having a

center O and axes Ox, Oy, Oz . *Id.* at

13:2-9. The sphere portion HS has a

radius R from the center O . *Id.* at

13:64-67. A “Zoom” parameter

characterizes the relationship of the

display window DW to the sphere

portion HS – if the Zoom parameter is equal to R , the display window DW is

tangential to the sphere portion HS (as shown in Fig. 13). *Id.* at 14:6-7, 37-41. If

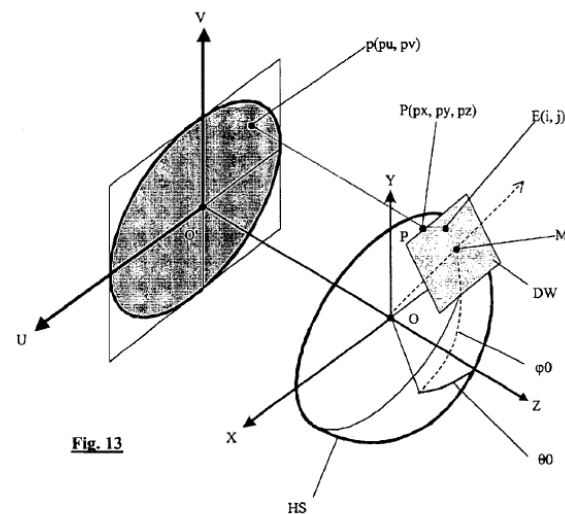


Fig. 13

the Zoom parameter is greater than R, the display DW is moved away from the sphere portion HS, which enlarges the portion of the obtained image presented in the display window DW. *Id.* at 14:41-48. The advantage of the expanded zone(s) created by the non-linear distribution function is apparent here because the expansion causes a gain in definition that can remain even as the image in the display window DW is enlarged through Zoom adjustment. *Id.* at 14:49-63.

The projection of the display image points $E(i, j)$ onto the sphere portion HS obtains image points $P(p_x, p_y, p_z)$ in the Ox, Oy, Oz coordinate system belonging to the sphere portion HS surface. *Id.* at 13:2-4. The image points P may then be projected onto the image disk having a coordinate system of center O' and axes $O'U$ and $O'V$. *Id.* at 13:18-22. The image disk and the sphere portion HS may be aligned along the OZ axis. *Id.* at 13:22-25. In this example algorithm, the image points $p(p_u, p_v)$ on the image disk may ultimately be calculated as $p_u = L * U * F_d(\alpha)$ and $p_v = L * U * F_d(\alpha)$, where the non-linear distribution function F_d at the corresponding field angle α and the image disk size L are multiplied with U and V , which are respectively manipulated values derived from p_x and p_y on the sphere portion HS. *Id.* at 13:26-14:35.

III. THE ASSERTED PRIOR ART

A. Baker

Baker relates to a video conferencing system with automatic, voice-directional image steering through electronic selection from a panoramic video scene. Ex. 1006 at 1:10-14; Ex. 2001 at ¶ 39. Baker references other types of non-multimedia applications (*e.g.*, security, surveillance, unmanned exploration, etc.) as similarly employing hemispheric data, but which have “certain limitations in capturing and manipulating valuable information and hemispheric scenes in a rapid (*i.e.*, real-time) and cost-effective manner.” Ex. 1006 at 2:11-20; Ex. 2001 at ¶ 39.

Baker clarifies that in typical large field-of-view lenses, “the valuable content from the peripheral areas lacks in potential image quality (resolution) mapping because the imaging device and system does not differentiate between these areas and the central areas of less valuable detail,” meaning important “information of the horizon in the scene can be underutilized or worse yet, lost.” Ex. 1006 at 3:60-64, 4:8-14. In the example of a video conference, a hemispheric lens is pointed at the ceiling, and participants will be seated around a table, captured by the edge of the lens’s field of view. *Id.* at 13:56-64; Ex. 2001 at ¶¶ 39-40. Compared to conventional wide angle lenses, which dedicate a large portion of the imaging surface to the central field, Baker’s lens “has a fairly significant portion of the imaging surface dedicated to the peripheral field,” which in Baker’s

applications includes the more important subject matter to be imaged. Ex. 1006 at 12:23-55; Ex. 2001 at ¶¶ 40-41.

Baker teaches a transform processor 22 that manipulates captured images for subsequent display on a screen or monitor. Ex. 1006 at 6:5-12, 9:5-13. One of the functions of the transform processor 22 is to compensate for the distortion created by Baker's lens arrangement emphasizing peripheral content. *Id.* at 6:12-17; Ex. 2001 at ¶ 41. The compensated image can then be viewed in a standard viewing format. Ex. 1006 at 6:12-17. However, Baker does not provide any details regarding specific corrections applied by the transform processor 22.

B. Shiota

Shiota is directed to an arithmetic unit that can be used to transform a fisheye image into a plane image for display. Ex. 1012 at ¶ [0001]; Ex. 2001 at ¶ 42. Conventional arithmetic units inevitably became expensive because of the need to execute difficult mathematical equations, including square roots, trigonometric functions, and the like. Ex. 1012 at ¶ [0006]. In particular, Shiota aimed to provide an inexpensive arithmetic unit. *Id.* at ¶ [0007]; Ex. 2001 at ¶ 45.

Shiota first obtains coordinates on a surface of a hemisphere (X, Y, Z) that are projected from a plane display image (u, v), then obtains corresponding coordinates in the fisheye image (p, q) projected from the hemisphere. Ex. 1012 at ¶¶ [0008], [0022]-[0023]; Ex. 2001 at ¶ 43. The center of the plane display image

coordinate system (u, v) is assumed to be a distance 1 apart from the original of the (X, Y, Z) coordinate system origin. Ex. 1012 at ¶ [0022]; Ex. 2001 at ¶ 43. A coefficient k_1 , used to map coordinates from the hemispherical surface to the plane image in the (X, Y, Z) coordinate system, is stored in a lookup table for various distances L from the origin in the (u, v) coordinates.² Ex. 1012 at ¶¶ [0028]-[0032]; Ex. 2001 at ¶ 43. In the first step, calculation is limited to addition, subtraction, multiplication, and square root, while all other functions are obtained using a lookup table. Ex. 1012 at ¶ [0042]; Ex. 2001 at ¶ 43.

In the second step, Shiota may use the distribution function of the lens to compute a coefficient k_2 , which equals h (defined by the distribution function) divided by distance r from the origin. Ex. 1012 at ¶¶ [0036]-[0040]; Ex. 2001 at ¶ 44. The radius of the fisheye image is assumed as 1. Ex. 1012 at ¶ [0023]; Ex. 2001 at ¶ 44. To reduce the complexity (and, therefore, expense) of the arithmetic unit, the second step involves only multiplication and the use of a lookup table to find k_2 . Ex. 1012 at ¶ [0042]; Ex. 2001 at ¶¶ 44-45.

² For clarity, “L” in Shiota is a distance from the origin of the displayed planar image to a point P on that same plane. *See* Ex. 1012 at Fig. 2; ¶ [0031]. This differs significantly from the “L” in the ‘990 Patent’s claim 27, which represents the size of the original image captured from the lens.

Shiota does not mention that the size of the fisheye image (shown in the p, q coordinate system of Fig. 1) is used for any step in the transformation. *Id.* at ¶ 51. Shiota remarks that “[a]t the time of actually (sic) use, magnification adjustment is performed.” Ex. 1012 at ¶ [0023]. Shiota then describes how, to transform an image, the operator inputs “[i]nformation of the view points (ϕ , θ , α) and the scale factor (zoom ratio) as the size of the plane image” using a keyboard, pointing device, or the like. *Id.* at ¶ [0024]; Ex. 2001 at ¶ 54. The system obtains this information in advance from the operator for use in a higher-order arithmetic processing unit. Ex. 1012 at ¶ [0024]. Necessary parameters for the transformation include center coordinates of the plane image and change amounts, all in the X, Y, Z coordinate system. *Id.* at ¶ [0025]; Ex. 2001 at ¶ 55. According to Shiota, these “parameters can be easily obtained from the information of the angle information (ϕ , θ , α) and the magnification of the image.” Ex. 1012 at ¶ [0026]; Ex. 2001 at ¶ 55.

C. Fisher

Fisher relates to a lens design that distorts the field of view in such a way that objects in the center “occupy a disproportionately large area” and objects at the periphery “occupy a disproportionately small area.” Ex. 1009 at 2:19-26; Ex. 2001 at ¶ 47. At the time of Fisher’s invention, advanced television systems utilized an 875 line system and a bandwidth of 10.9 MHz, which allowed a field of

view of 20° at one minute arc resolution. Ex. 1009 at 1:37-42. This equipment was insufficient for 180° or similar fields of view. *Id.* at 1:30-42.

Recognizing that the human eye has one minute arc resolution only along the optical axis, Fisher sought to allow wide angle video transmission approaching 160° but reduce the required bandwidth by tailoring the final cast image resolution to resemble the optical characteristics of the eye. *Id.* at 1:52-2:3, 2:56-59, 4:35-5:21. Fisher's lens exhibits a variable function relationship approximating $H = \sin^{1/3}(\theta)$, in which objects centered on the optical axis cast a much larger image than those at the periphery. *Id.* at 2:60-3:20; Ex. 2001 at ¶ 47.

Fisher also discloses a viewing system including a projector at the observer location. Ex. 1009 at 3:43-48; Ex. 2001 at ¶¶ 46-47. The projector projects the image onto a spherical screen. Ex. 1009 at 4:1-4. The projector is fitted with a lens having identical distortion characteristics to the camera lens described above, but the lens is mounted in reverse to rectify the distortion caused by the camera lens. *Id.* at 3:48-53; Ex. 2001 at ¶ 47. With this mechanical correction, Fisher does not provide any algorithm or other processing for addressing distortion caused by the camera lens. Ex. 2001 at ¶ 48.

IV. PERSON OF ORDINARY SKILL IN THE ART

Solely for purposes of this Response, Patent Owner does not object to Petitioner's definition of a POSA. Ex. 2001 at ¶ 25. Patent Owner reserves the

right to assert an alternative definition for a POSA in this or another proceeding involving the ‘990 Patent, where appropriate.

V. CLAIM CONSTRUCTION

While not necessarily agreeing with Petitioner’s proposed constructions (or lack thereof) for certain claim terms, *solely* for purposes of this Preliminary Response, Patent Owner does not object to the constructions proposed by Petitioner. Ex. 2001 at ¶ 38. Patent Owner reserves the right to assert alternative constructions for relevant claim terms in this or another proceeding involving the ‘990 Patent, where appropriate.

VI. PETITIONER FAILED TO DEMONSTRATE BY A PREPONDERANCE OF EVIDENCE THAT THE CLAIMS OF THE ‘990 PATENT ARE UNPATENTABLE

A. Legal Standards

A claim in an *inter partes* review is not unpatentable unless the Petitioner can demonstrate to the contrary by a preponderance of the evidence. 35 U.S.C. § 316(e). “[T]he petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (petitions must identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)); 35 U.S.C. § 316(e). This burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–79 (Fed. Cir. 2015).

To demonstrate obviousness under 35 U.S.C. § 103, Petitioner must demonstrate that the references, when combined, teach or suggest *each* of the elements of the challenged claim. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1366-67 (Fed. Cir. 2012). However, even if all of the elements are present in the prior art, Petitioner must still provide an apparent reason why one of ordinary skill in the art would have combined the elements in the fashion claimed. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“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,” but ““there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

B. Petitioner Has Not Shown Claims 2, 4, 27, or 29 Would Have Been Obvious Over Baker and Shiota

Petitioner and Dr. Kessler admit that “Baker does not expressly describe how [distortion] corrections are applied as part of its image transformation.” Petition at 23; Ex. 1003 at ¶ 132. This includes the use of “a size L of the obtained image” to retrieve points on the image to correct the non-linearity, so Petitioner relies exclusively on Shiota as prior disclosure of this feature. Petition at 50-51; Ex. 1003 at ¶¶ 205-207; Ex. 2001 at ¶ 57. Petitioner’s reliance is misplaced as Dr. Kessler has not adequately demonstrated that Shiota teaches this aspect as part of its image transformation.

1. Shiota Does Not Teach or Suggest Retrieving Image Points On the Obtained Image Using a Size L of the Obtained Image

Shiota never once teaches or suggests using the size of its captured fisheye image, in pixels or any other readily accepted dimensioned quantity, to retrieve points from the fisheye image for correcting the distortion when transforming the image for display. Ex. 2001 at ¶¶ 50-51; Ex. 1001 at 13:47; Ex. 2003 at 1.

Instead, Petitioner and Dr. Kessler rely on Shiota's reference to "magnification" throughout paragraphs [0023]-[0026] as evidence of the missing claim element. Petition at 50-51; Ex. 1003 at ¶¶ 205-206. This is not how a POSA would have understood the cited paragraphs in Shiota.

Shiota's paragraph [0023] concludes by discussing how the radius of the fisheye image is set to 1. Ex. 2001 at ¶ 51. The final sentence recites that "[a]t the time of actually (sic) use, magnification adjustment is performed." Ex. 1012 at ¶ [0023]; Ex. 2001 at ¶ 51. Dr. Kessler conclusorily leaps to the assumption that a POSA would have understood this to be an adjustment that accounts for the actual size of the image.³ Ex. 1003 at ¶ 205. Dr. Kessler first ignores that

³ Petitioner suggests that "magnification adjustment" accounts for the "actual size of the image pickup device," which by extension accounts for the "actual size of the image." Petition at 50-51. These concepts are not so inextricably linked – it is

“magnification” is well understood in the optics field as being a dimensionless quantity. Ex. 2001 at ¶ 52; Ex. 2004 at 347-350. Dr. Kessler offers no explanation as to how or why a POSA would have initially understood from Shiota’s reference to a dimensionless number that Shiota suggests using the claimed linear quantity for retrieving image points and correcting image distortion. Ex. 2001 at ¶ 52.

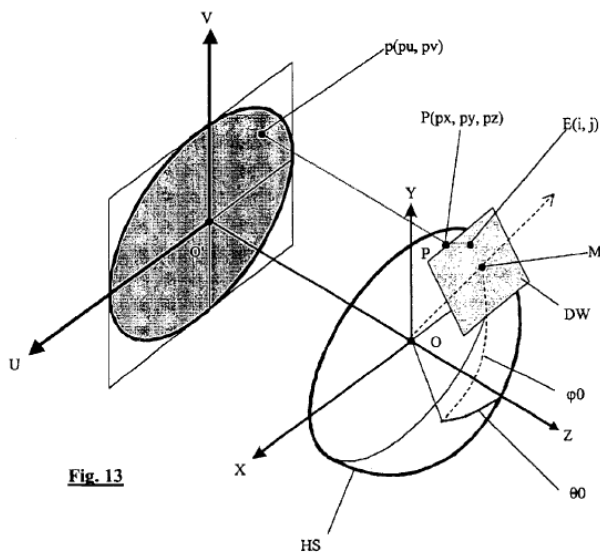
Beyond this bare statement, Dr. Kessler points to paragraphs [0024]-[0026] as further evidence a POSA would understand “magnification” in Shiota as using the image size to correct distortion. Ex. 2001 at ¶ 53; Ex. 1003 at ¶ 205 (“APPLE-1012, [0025]-[0026] (explaining that necessary parameters for the image transformation operations include, e.g., the magnification of the image), [0024] (using ‘the scale factor (zoom ratio) as the size of the plane image’ to perform the described image transformation)”). Dr. Kessler has entirely mischaracterized these

a conventional practice to intentionally underfill (entire image disk captured by sensor, leaving unused space) or overfill (sensor captures only portion of overall image disk) the image sensor, meaning various size images may be used with the same image sensor size. Ex. 2001 at ¶ 58; Ex. 1001 at Fig. 2, 1:29-34; Ex. 2003 at 11-19; Ex. 2005 at Fig. 11, ¶ [0106]. This argument is just another conclusory stretch by Dr. Kessler devoid of context from the remainder of Shiota.

passages in Shiota and, in so doing, has incorrectly interpreted Shiota's usage of "magnification."

Paragraph [0024] immediately follows Shiota's reference to "magnification adjustment" and provides image transformation details including that "[i]nformation of the view points (ϕ , θ , α) and the scale factor (zoom ratio) as the *size of the plane image is information inputted by the operator through a keyboard, pointing device, or the like.*" Ex. 1012 at ¶ [0024] (emphasis added); Ex. 2001 at ¶ 54. The "plane image" refers to the displayed image in the (u , v) coordinates. Ex. 1012 at Fig. 1, ¶ [0024] ("a point (u , v coordinates) on a plane image"), *see also, e.g.*, ¶¶ [0022], [0025], [0028]; Ex. 2001 at ¶ 54. The listed characteristics are *operator-selected* and relate to the orientation and placement of the plane image with respect to the hemisphere shown in Fig. 1. Ex. 2001 at ¶ 54. For example, the view point angles (ϕ , θ , α) are selected by the operator to determine which part of the hemisphere will appear within the displayed image. *Id.*; Ex. 1012 at ¶¶ [0004], [0024].

The *operator also controls* the “scale factor (zoom ratio)” to select how much of the image should be presented in the final display. Ex. 2001 at ¶ 54. This is comparable to the ‘990 Patent’s description of user modification to the “Zoom” parameter. For example, the “Zoom” parameter is set by default to the radius R of the sphere portion HS shown in Fig. 13 (reproduced below) but can be modified by the user to move the display window DW away from the sphere portion HS. Ex. 1001 at 14:6-7, 37-48; Ex. 2001 at ¶ 54. The distance between the display window



DW and the sphere portion HS determines how much of the original image will be shown in the display window DW following transformation. Ex. 1001 at 14:37-48; Ex. 2001 at ¶ 54. In Shiota, the plane image must have its center on

the hemisphere to simplify calculations, so a similar zoom effect can be obtained by allowing the operator to adjust the size of the plane image, which is exactly what paragraph [0024] describes. Ex. 1012 at ¶¶ [0022], [0024]; Ex. 2001 at ¶ 54.

Shiota’s paragraph [0025] continues the discussion by defining various necessary parameters when moving among coordinates (u, v) in the plane image, including the plane image’s origin in X, Y, Z coordinates (X_0, Y_0, Z_0) and change

amounts $\partial u_x, \partial v_x, \partial u_y, \partial v_y, \partial u_z, \partial v_z$. Ex. 1012 at ¶ [0025]; Ex. 2001 at ¶ 55.

Paragraph [0026] further explains these “parameters can be easily obtained from the information of the angle information (φ, θ, α) of the view point and the magnification of the image.” Ex. 1012 at ¶ [0026]; Ex. 2001 at ¶ 55. Paragraph [0026] is easily understood to be referring back to the operator-entered information from paragraph [0024], *all relating to the plane image for display*. Ex. 2001 at ¶ 55.

With Dr. Kessler confirming that the discussion within Shiota’s paragraphs [0023]-[0026] is related, and the clear context that “magnification” and “scale factor (zoom ratio)” discussed in these passages refer to operator-selectable properties of the final image to be displayed, a POSA would not reach the conclusion that Shiota’s discussion of “magnification” here relates to using the size of the fisheye image to retrieve image points for performing distortion correction operations. Ex. 2001 at ¶ 56; Ex. 1003 at ¶ 205. Rather, a POSA would have understood from Shiota’s full disclosure that “magnification” in this context refers to being able to properly perform image transformation based on the operator’s selected parameters for the final plane image display. Ex. 2001 at ¶ 56. The above-identified feature is therefore missing from Baker and Shiota, and Petitioner has failed to demonstrate by a preponderance of evidence that claim 27 would have been obvious over the combination of references. *Id.* at ¶ 57.

2. Claims 2, 4, and 29 are Not Unpatentable Due At Least to Their Dependence on Claim 27

By virtue of their dependency, claims 2, 4, and 29 include the same features as claim 27. Petitioner does not present additional arguments or evidence with respect to these dependent claims that remedy the deficiency in its analysis of the combined teachings of Baker and Shiota. Petition at 55-62; Ex. 2001 at ¶ 60. For at least the same reasons identified above for claim 27, Petitioner has not demonstrated by a preponderance of evidence that the subject matter of dependent claims 2, 4, and 29 would have been obvious over the combination of Baker and Shiota.

C. Petitioner Has Not Shown Claims 29 or 30 Would Have Been Obvious Over Baker, Shiota, and Fisher

Petitioner contends in Ground 2 that claims 29 and 30 would have been obvious over the combined teachings of Baker, Shiota, and Fisher. Petition at 62. Claims 29 and 30 depend on claim 27 and therefore include the same features. Petitioner utilizes Fisher solely to argue for replacing Baker's GRIN lens with an aspherical lens. Petition at 65-69. While not agreeing with Petitioner's specific arguments on claims 29 and 30, Petitioner does not present additional arguments or evidence with respect to Ground 2 that remedy the deficiency in its analysis of the combined teachings of Baker and Shiota. *Id.*; Ex. 2001 at ¶ 59. For at least the same reasons identified above for claim 27, Petitioner has not demonstrated by a

preponderance of evidence that the subject matter of dependent claims 29 and 30 would have been obvious over the combination of Baker, Shiota, and Fisher.

VII. CONCLUSION

For at least the reasons recited above, Patent Owner requests that the PTAB find the challenged claims not unpatentable.

Date: October 10, 2023

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §§ 42.24(a)(1)(i), 42.24(b)(1), and 42.24(d), the undersigned certifies that, according to the “Word Count” tool in Microsoft Word, which was used to prepare this paper, the number of words in this Patent Owner’s Response Under 37 C.F.R. § 42.120 is 4,640.

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CERTIFICATE OF SERVICE UNDER 37 CFR § 42.6(e)

I hereby certify that true copies of the foregoing PATENT OWNER'S RESPONSE UNDER 37 CFR § 42.120 and accompanying exhibits have been served in their entireties this 10th day of October 2023, by electronic mail on Petitioner's lead and back-up counsel, as follows:

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