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Paper 12
Entered: May 13, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIGN TECHNOLOGY, INC.,
Petitioner,

v.

3SHAPE A/S,
Patent Owner.

Case PGR2018-00103
Patent 9,962,244 B2

Before SALLY C. MEDLEY, IRVIN E. BRANCH, and JESSICA C. KAISER, *Administrative Patent Judges.*

KAISER, *Administrative Patent Judge*.

DECISION
Denying Institution of Post-Grant Review
35 U.S.C. § 324 and 37 C.F.R. § 41.208

Align Technology, Inc. ("Petitioner") filed a Petition pursuant to 35 U.S.C. §§ 321–329 requesting a post-grant review of claims 1–5, 7–10, 12, 15, 16, 18, 21, 22, 24, 26, 28, and 29 of U.S. Patent No. 9,962,244 B2, issued on May 8, 2018 (Ex. 1001, "the '244 patent"). Paper 6 ("Pet.").[1] 3Shape A/S ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). Applying the standard set forth in 35 U.S.C. § 324(a), which requires demonstration that it is more likely than not that at least 1 of the claims challenged in the petition is unpatentable, we deny Petitioner's request and do not institute a post-grant review of any challenged claim.

I. BACKGROUND

A. The '244 Patent (Ex. 1001)

The '244 patent, titled "Focus Scanning Apparatus Recording Color," issued on May 8, 2018. Ex. 1001, at [45], [54]. The '244 patent describes a scanning system and method to generate a digital three-dimensional (3D) representation of an object that has been scanned. *Id.* at 1:6–9, 2:5–13. The scanning system generates the digital 3D representation based on surface geometry and surface color derived from a series of captured two-dimensional (2D) images of the object. *Id.* at 1:64–2:13. Figure 1 of the '244 patent illustrates an exemplary scanner system and associated components and is reproduced below.

[1] Petitioner filed an Original Petition (Paper 2), a Corrected Petition (Paper 3), and a Second Corrected Petition (Paper 6). We address Petitioner's Second Corrected Petition.

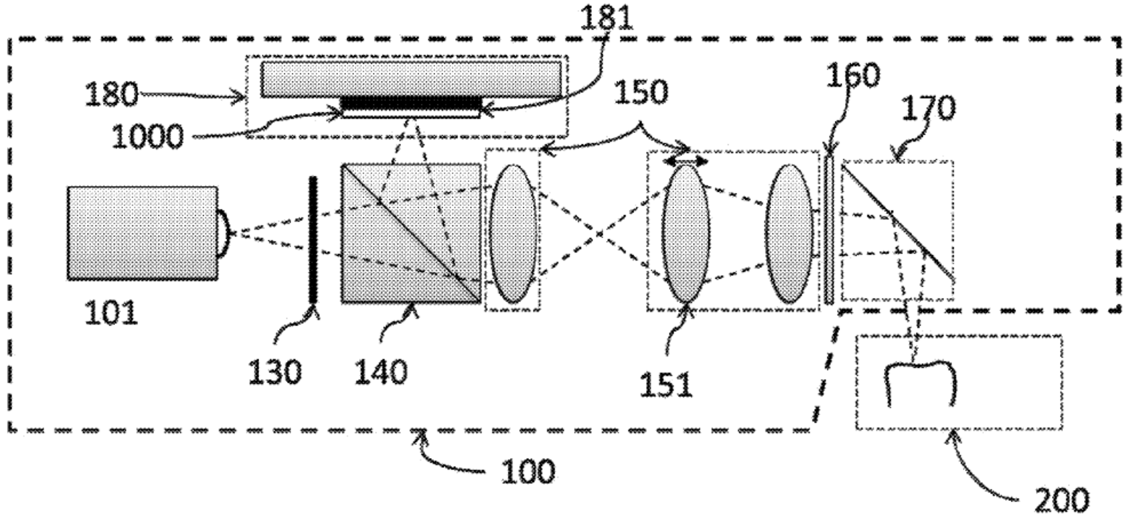

Figure 1 depicts a handheld embodiment of a scanner used to perform intraoral scanning. Ex. 1001, 15:63–64.

As shown in Figure 1, the scanner system includes a multichromatic light source 101, which can be a multi-die LED with green, red, and blue dies. *Id.* at 15:63–66, 16:36–37. The light from the light source travels through optical system 150 and illuminates the object to be scanned 200, e.g., a tooth. *Id.* at 16:4–6, 17:65–66. Color image sensor 180 and associated image sensor 181 capture a 2D image of the illuminated object 200. *Id.* at 16:1–9. The image sensor comprises pixels, which capture the images. *See id.* at 16:52–56. The system captures additional 2D images of the object 200 at different focal imaging planes by shifting a focusing element 151, e.g., a lens, back and forth, thereby capturing a series of 2D images of the object 200 at each focal plane position. *Id.* at 16:14–18, 18:4–7, 65–67; *see id.* at Fig. 6A.

Using one or more of the captured 2D images, the system derives both surface geometry information and surface color information for a block of image sensor pixels. *Id.* at 16:52–56, 18:8–10. To determine surface geometry information, first, a correlation measure is determined using 2D images in the series of 2D images; based on those correlation measures, a correlation measure function is determined. *Id.* at 18:24–26, 33–37, 19:6–11; *see id.* at Fig. 6B. That correlation measure function has a maximum. *Id.* at 19:8–11; *see id.* at Fig. 6B. That maximum is then used to derive surface geometry information. *Id.* at 19:12–15. Accordingly, because the correlation measure function maximum is based on 2D images in the series of 2D images, the derived surface geometry information is based on 2D images in the series of 2D images.

Further, surface color information for the block of pixels is derived from the same 2D images from which surface geometry information was derived. *Id.* at 2:48–59, 19:37–29; *see id.* at Fig. 6C. In particular, surface color information is derived from the same 2D images that were previously used to determine the correlation measure function maximum for deriving surface geometry information. *Id.* at 18:41–47. For example, the color values of two 2D images which previously were used to determine the correlation measure function maximum are averaged to determine surface color information for the block of pixels. *Id.* at 19:21–29; *see id.* Figs. 6A–6C.

The derived surface geometry information and derived surface color information are used to generate sub-scans, i.e., portions of the digital 3D model. *Id.* at 18:8–15. Those sub-scans are combined to generate a digital 3D representation of the object. *Id.* at 10:45–50, 18:16–20.

B. Illustrative Claims

Of the challenged claims, claims 1 and 29 are independent claims and are reproduced below.

1. A focus scanner for recording surface geometry and surface color of an object, the focus scanner comprising:

a multichromatic light source configured for providing a multichromatic probe light for illumination of the object,

a color image sensor comprising an array of image sensor pixels for capturing one or more 2D images of light received from said object,

wherein the focus scanner is configured to operate by translating a focus plane along an optical axis of the focus scanner and capturing a series of the 2D images, each 2D image of the series is at a different focus plane position such that the series of captured 2D images forms a stack of 2D images; and

a data processing system configured to derive surface geometry information for a block of said image sensor pixels from the 2D images in the stack of 2D images captured by said color image sensor, the data processing system also configured to derive surface color information for the block of said image sensor pixels from at least one of the 2D images used to derive the surface geometry information;

wherein the data processing system further is configured to combining a number of sub-scans to generate a digital 3D representation of the object, and determining object color of a least one point of the generated digital 3D representation of the object from sub-scan color of the sub-scans combined to generate the digital 3D representation, such that the digital 3D representation expresses both geometry and color profile of the object, and

wherein determining the object color comprises computing a weighted average of sub-scan color values derived for corresponding points in overlapping sub-scans at that point of the object surface.

29. A focus scanner for recording surface geometry and surface color of an object, the focus scanner comprising:

a multichromatic light source configured for providing a multichromatic probe light for illumination of the object,

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