Trials@uspto.gov
571-272-7822

Paper: 9
Entered: June 11, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S and 3SHAPE INC.,
Petitioner,

v.

ALIGN TECHNOLOGY, INC.,
Patent Owner.

Case IPR2019-00160
Patent 8,675,207 B2

Before BRIAN J. MCNAMARA, NEIL T. POWELL, and ELIZABETH M. ROESEL, *Administrative Patent Judges*.

ROESEL, *Administrative Patent Judge*.

DECISION
Instituting *Inter Partes* Review
35 U.S.C. § 314

3Shape A/S and 3Shape Inc. ("Petitioner") filed a Petition (Paper 3, "Pet.") seeking *inter partes* review of claims 1–7 and 12–21 ("the challenged claims") of U.S. Patent No. 8,675,207 B2 (Ex. 1001, "the '207 patent"). Align Technology, Inc. ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). An *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Applying that standard and considering the arguments and evidence presented in the Petition and Preliminary Response, we institute an *inter partes* review.

The following findings of fact and conclusions of law are not final, but are made for the sole purpose of determining whether Petitioner meets the threshold for initiating review. Any final decision will be based on the full trial record, including any response timely filed by Patent Owner.

I. BACKGROUND

A. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), the parties identify the following matters:

> *Align Technology, Inc. v. 3Shape A/S*, No. 1:17-cv-01649 (D. Del., filed Nov. 14, 2017) ("Delaware litigation"); and
>
> *In the Matter of Certain Intraoral Scanners and Related Hardware and Software*, Inv. No. 337-TA-1091 (U.S. Int'l Trade Comm'n, complaint filed Nov. 14, 2017) ("ITC investigation").

Pet. 2; Paper 5, 1 (Patent Owner's Mandatory Notices).

The parties identify the following *inter partes* review proceedings in which Petitioner challenges the '207 patent or related patents:

Case No. IPR2019-00154, involving U.S. Patent No. 8,363,228 ("the '228 patent);

Case No. IPR2019-00155, involving U.S. Patent No. 8,451,456 ("the '456 patent");

Case No. IPR2019-00156, involving the '207 patent;

Case No. IPR2019-00157, involving the '228 patent;

Case No. IPR2019-00159, involving the '456 patent; and

Case No. IPR2019-00163, involving U.S. Patent No. 9,101,433.

Pet. 2–3; Paper 5, 2.

B. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability under 35 U.S.C. § 103:

	References	**Claim(s)**
1	Babayoff,[1] Okamoto,[2] and Engelhardt[3]	1–7, 12–17, and 19–21

[1] PCT Publication No. WO 00/08415, published February 17, 2000, Ex. 1003 ("Babayoff"). According to the front faces of the documents, the '207 patent and Babayoff both identify Noam Babayoff as an inventor, and both were originally assigned to Cadent Ltd. Babayoff is incorporated by reference in the '207 patent. Ex. 1001, 1:49–51, 14:61–63, 25:32–34.

[2] Japanese Patent Publication No. 2001-82935, published March 30, 2001, Ex. 1004 ("Okamoto"). Exhibit 1004 includes a Japanese language document, a certified English translation, and two certificates of translation.

[3] U.S. Patent No. 6,263,234, issued July 17, 2001, Ex. 1005 ("Engelhardt").

	References	Claim(s)
2	Babayoff, Okamoto, Engelhardt, and Sachdeva[4]	7, 18

Pet. 7. Petitioner asserts that Babayoff, Okamoto, and Engelhardt are prior art to the '207 patent under 35 U.S.C. § 102(b). *Id.* at 8–9. Petitioner asserts that Sachdeva is prior art to the '207 patent under 35 U.S.C. § 102(e). *Id.* at 9, 24. At this stage of the proceeding, Patent Owner does not contest the prior art status of Petitioner's asserted references.

Petitioner supports its challenges with a Declaration of Sohail Dianat, Ph.D. Ex. 1024 ("Dianat Declaration").

C. The '207 Patent (Ex. 1001)

The title of the '207 patent is "Method and apparatus for colour imaging a three-dimensional structure." Ex. 1001, (54). The patent discloses a device for determining the surface topology and associated color of a three-dimensional structure, such as a teeth segment. *Id.* at (57), 2:54–60. The resulting data can be used for design and manufacture of a dental prosthesis, such as a crown, bridge, restoration, or filling. *Id.* at 2:60–64. The device includes a scanner for providing depth data and a color imager for providing color data. *Id.* at (57), 4:61–5:3. A processor combines the color data and depth data to provide a three-dimensional color virtual model of the surface of the structure. *Id.* at (57), 5:23–25.

[4] U.S. Patent Publication No. 2004/0197727, published October 7, 2004, Ex. 1006 ("Sachdeva").

Figure 1 of the '207 patent is reproduced below:

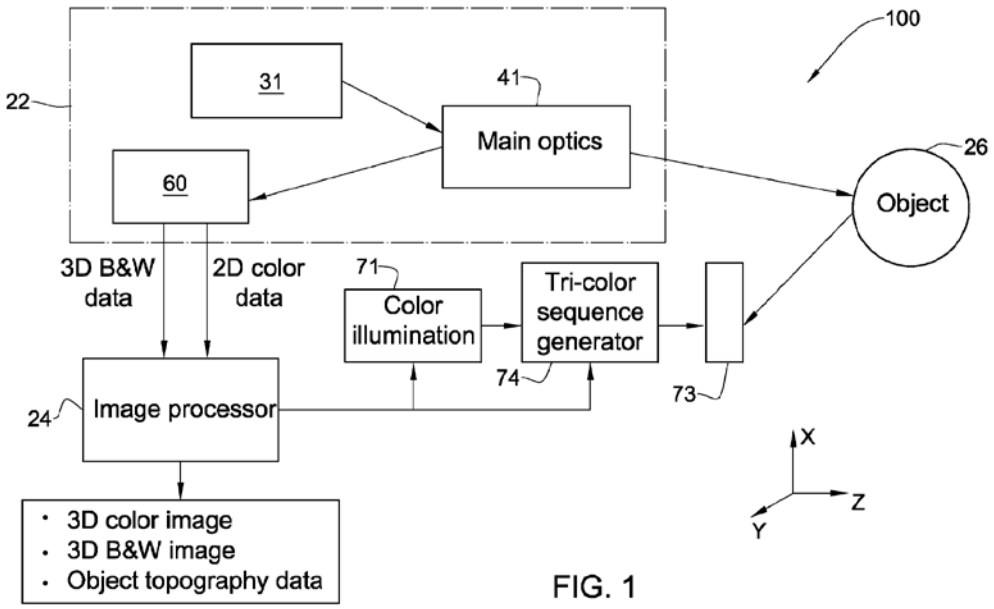


FIG. 1

Figure 1 is a block diagram illustrating the relationship among various elements of the imaging device according to the '207 patent. Ex. 1001, 12:33–34, 13:10–13. As shown in Figure 1, device 100 includes optical device 22, which in turn includes main illumination source 31, main optics 41, and detection optics 60, which together provide a three-dimensional ("3D") numerical entity comprising the surface coordinates of object 26. *Id.* at 13:14–28, Fig. 1. Device 100 also includes tri-color light sources 71, tri-color sequence generator 74, and delivery optics 73, which together illuminate object 26 with suitable colors, typically green, red and blue, allowing a two-dimensional ("2D") color image of object 26 to be captured by detection optics 60. *Id.* at 13:29–34, 16:61–67. Device 100 further includes processor 24, which aligns the 2D color image with the 3D entity and maps color values to the 3D entity at aligned X-Y points. *Id.* at 13:41–44, 14:47–56, Fig. 1. According to the '207 patent, "[s]uch alignment is straightforward because both the 3D data and the 2D color data are

referenced to the same X-Y frame of reference." *Id.* at 13:44–46; *see also id.* at 4:37–39 ("the present invention provides a relatively simple and effective way for mapping 2D color information onto a 3D surface model").

The '207 patent describes the mapping procedure as follows:

> [E]ach X-Y point on the 2D image substantially corresponds to a similar point on the 3D scan having the same relative X-Y values. Accordingly, the same point of the structure being scanned has substantially the same X-Y coordinates in both the 2D image and the 3D scan, and thus the color value at each X, Y coordinate of the 2D color scan may be mapped directly to the spatial coordinates in the 3D scan having the same X, Y coordinates wherein to create a numerical entity I representing the color and surface topology of the structure being scanned.

Ex. 1001, at 4:12–21. A more detailed description of the mapping procedure is provided with reference to Figures 2A–2C. *Id.* at 13:46–14:16. According to the '207 patent, the 3D numerical entity E comprises an array of (X, Y, Z) points obtained by determining depth Z-values for a grid of X-Y points. *Id.* at 13:47–52, Fig. 2A. The 2D color image corresponds to another numerical entity N comprised of the location and color value of each pixel forming this image, (X', Y', C). *Id.* at 13:63–66, Fig. 2B.

The '207 patent discloses that both the 3D entity E and the 2D color entity N are obtained using the same detection optics 60 at substantially the same relative spatial disposition between detection optics 60 and object 26. Ex. 1001, 13:55–59; *see also id.* at 4:4–6 (3D scan and 2D color image are taken "at substantially the same angle and orientation"). According to the '207 patent, the X'-Y' coordinates of the pixels of the entity N are on a plane substantially parallel to the X-Y plane of the entity E, and the two sets of coordinates represent substantially the same part of object 26. *Id.* at 13:66–14:3; 14:9–11; *see also id.* at 4:7–11 (3D scan and 2D color image

have "substantially parallel" X-Y planes and comprise "substantially the same portion of the structure").

The '207 patent explains that the optical information for creating both of these entities is obtained almost simultaneously so there is insufficient time for significant relative movement between the image plane of detection optics 60 and object 26 to occur between the two scans. Ex. 1001, 14:3–9; *see also id.* at 4:1–4 (3D scan and 2D color image are obtained "within a short time interval"). The '207 patent discloses that the color value C of each pixel of entity N can be mapped to the data point of entity E having X-Y coordinates that are the same as the X'-Y' coordinates of the pixel, thereby creating another numerical entity I comprising surface coordinate and color data, (X, Y, Z, C). *Id.* at 14:11–16, Fig. 2C.

For the case where a small translation or rotation of detection optics 60 relative to object 26 occurs between the 2D and 3D scans, the '207 patent discloses that entity E can be aligned with entity N using known optical character recognition ("OCR") techniques to translate or rotate one entity relative to the other until a best fit between the optical shapes is obtained. Ex. 1001, 14:24–47, Fig. 3; *see also id.* at 4:28–36 (to correct for any slight misalignment between the 2D color image and the 3D scan, "procedures such as optical recognition" can be used to "manipulate the color 2D image to best fit over" the 3D scan before mapping the color values of the 2D image onto "the adjusted X-Y coordinates of the 3D scan").

Figures 4A and 4B of the '207 patent are reproduced below:

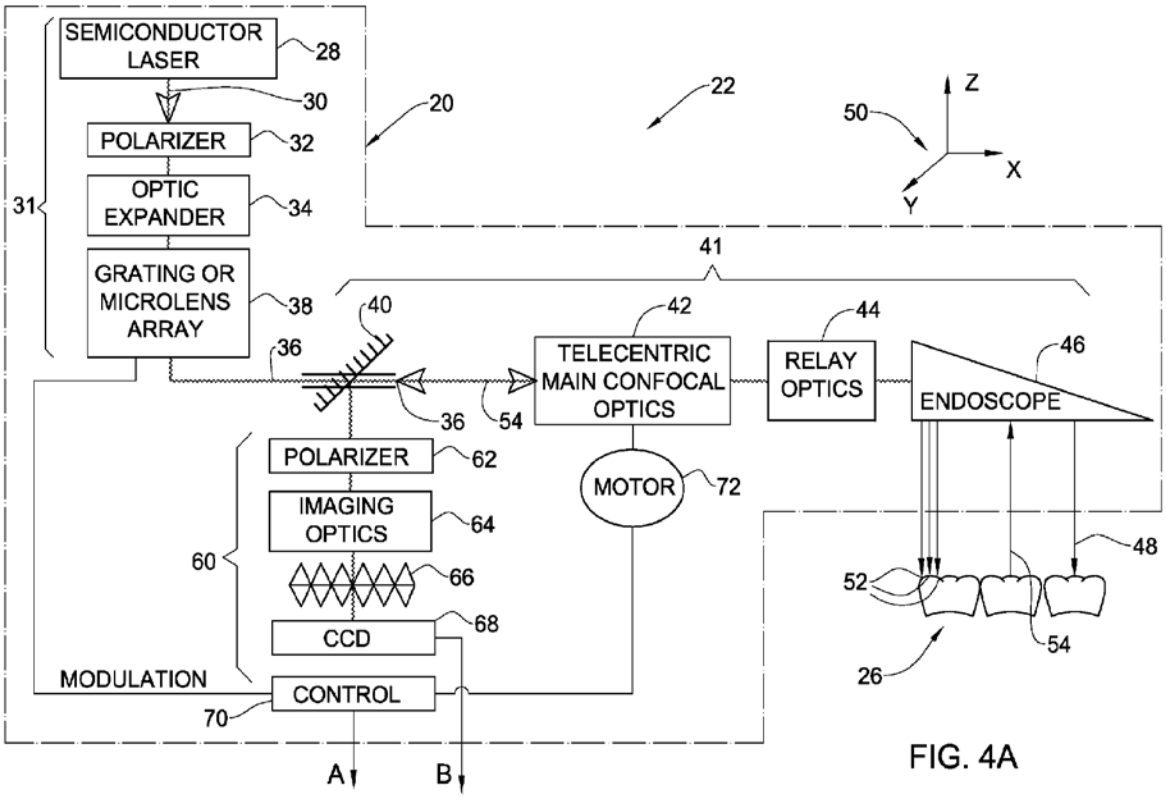


FIG. 4A

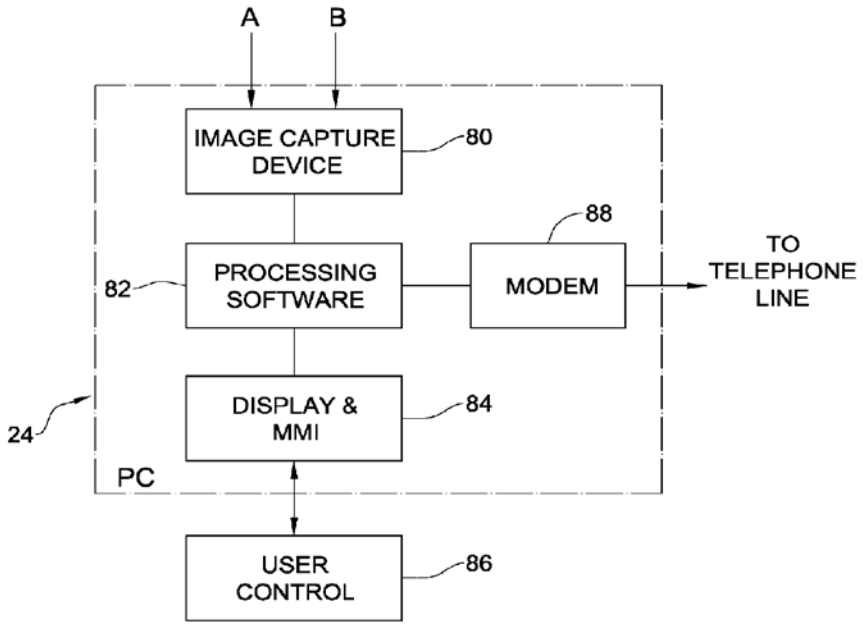


FIG. 4B

Figures 4A and 4B are block diagrams illustrating system 20 for confocal imaging of a 3D structure and providing a 3D monochrome entity. Ex. 1001, 12:42–44, 14:59–61. As shown in Figures 4A and 4B, system 20 comprises optical device 22 coupled to processor 24. *Id.* at 14:66–67. Optical device 22 comprises main illumination source 31, main optics 41, detection optics 60, control module 70, and motor 72. *Id.* at 14:57–59, 16:24–26, Fig. 4A. Main illumination source 31 includes semiconductor laser unit 28, polarizer 32, optic expander 34, and module 38, e.g., a grating or micro lens array. *Id.* at 14:67–15:8, Fig. 4A. Main optics 41 includes punctured mirror 40, confocal optics 42, relay optics 44, and endoscope 46. *Id.* at 15:13–14, 15:31–33, 15:66, Fig. 4A. Detection optics 60 comprises polarizer 62, imaging optic 64, array of pinholes 66, and charge coupled device ("CCD") 68. *Id.* at 16:11–18, 16:60, Fig. 4A. Processor 24 includes image capturing module 80, a central processing unit ("CPU") with processing software 82, and display 84. *Id.* at 16:19–20, 16:39, 16:49–50, 17:5, Fig. 4B. Processor 24 is connected to user control module 86, typically a computer keyboard. *Id.* at 16:50–52, Fig. 4B.

According to the '207 patent, light from laser unit 28 travels as light beam 30, incident light beams 36, and incident light beams 48 and impinges on teeth segment 26 as light spots 52 on the surface of the teeth. Ex. 1001, 14:67–15:10, 15:45–15:55, Fig. 4A. Light scattered from the light spots includes returned light beams 54 travelling in the opposite direction from incident light beams 36. *Id.* at 16:4–8. Returned light beams 54 are received by detection optics 60 where CCD 68 measures the light intensity at each pixel. *Id.* at 16:8–19. Light intensity data from CCD 68 is grabbed by image capturing module 80 and analyzed by CPU 82 to determine the

relative intensity at each pixel over a range of focal planes of optics 42, 44. *Id.* at 16:19–23, 16:33–38. Before each light pulse from laser 18, the focal plane is changed by displacing optical element 42 along the Z-axis by the action of motor 72 under the control of module 70. *Id.* at 16:24–33. The relative position of each light spot along the Z-axis is determined from the maximal light intensity or maximum displacement derivative of the light intensity for each pixel. *Id.* at 15:55–16:3, 16:41–47; *see also id.* at 3:1–65 (describing confocal focusing method). In this manner, data representative of the three-dimensional structure of the surface of the teeth segment is obtained and displayed on display 84. *Id.* at 16:47–50.

The '207 patent discloses four techniques for obtaining a 2D color image of object 26. Ex. 1001, 16:53–61, 23:64–67, 24:45–25:2. These techniques involve illuminating object 26 either sequentially with red, green, and blue light or with white light and using either a monochromatic CCD or a color CCD to capture the light reflected from the object. *Id.*; *see also id.* at 13:56–63 (describing method for obtaining 2D color image of object 26). According to a first technique, processing software 82 combines the red, green, and blue images to provide a 2D color image comprising an array of data points having location (X, Y) and color (C) information for each pixel of the 2D color image. *Id.* at 17:5–8.

The '207 patent discloses and illustrates seven embodiments of device 100, each of which has a different configuration for obtaining a 2D color image. Ex. 1001, 12:45–13:6, 17:9–24:44, Figs. 5A–13. In a first embodiment, delivery optics 73 is integral with endoscope 46, which is in the form of probing member 90, as illustrated in Figures 5A–5C. *Id.* at 17:9-12.

D. Illustrative Claim

The '207 patent includes 26 claims. Petitioner challenges claims 1–7 and 12–21. Claim 1 is the sole independent claim and is reproduced below, with paragraphs adjusted and bracketed identifiers added to correspond with Petitioner's identification of claim elements:

> 1. [Preamble] A method for determining the surface topology and associated color of at least a portion of a three-dimensional dental structure, the method comprising:
>
> [1.1] providing a hand-held device comprising:
>
> [1.2] (a) a scanning system configured to provide depth data of the portion, the depth data corresponding to a plurality of data points defined on a plane substantially orthogonal to a depth direction;
>
> [1.3] (b) an imaging system configured to provide color image data of the portion associated with said plurality of data points; and
>
> [1.4] (c) a processor configured to associate the depth data with the color image data,
>
> [1.5] wherein the depth data and the color image data represent the surface topology and the color of the portion of the three-dimensional dental structure; and
>
> [1.6] operating the hand-held device.

Ex. 1001, 26:19–35; *see* Pet. 34–46 (headings identify elements of claim 1).

II. DISCUSSION

A. Claim Construction

Because the Petition was filed before November 13, 2018, and the '207 patent has not yet expired, claim terms are to be given their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b)

(2018).[5] Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes constructions for a number of claim terms, including "a scanning system configured to provide depth data," "imaging system configured to provide color image data," and "a processor configured to associate the depth data with the color image data," all of which appear in claim 1. Pet. 25–33. Consistent with its position in the ITC investigation, Petitioner contends these phrases should be construed as means-plus-function ("MPF") terms pursuant to 35 U.S.C. § 112 ¶ 6. *Id.* at 26–29. Patent Owner opposes that contention. Prelim. Resp. 10–15. Neither party relies exclusively on its claim construction position in the context of arguing patentability or unpatentability of the challenged claims. Petitioner asserts that the challenged claims would have been obvious over the asserted prior art under either Petitioner's proposed constructions or the constructions proposed by Patent Owner in the ITC investigation. Pet. 27–29. Patent Owner relies on Petitioner's MPF constructions to argue insufficiency of Petitioner's obviousness contentions. Prelim. Resp. 16–19.

After considering the Petition and the Preliminary Response, we determine that no claim term requires express construction for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor*

---

[5] A recent amendment to this rule does not apply here. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018).

Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'") (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and, when introduced, (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The parties' contentions regarding these factors are addressed in Sections C-F below.

C. Level of Ordinary Skill in the Art

Relying on the Dianat Declaration, Petitioner asserts that a person of ordinary skill in the art ("POSITA") would have at least (1) a bachelor's degree in electrical engineering, optical engineering, or physics (or equivalent course work) and three to four years of work experience in the areas of optical imaging systems and image processing or (2) a master's degree in electrical engineering or physics (or equivalent course work) with a focus in the area of optical imaging systems and image processing. Pet. 14

(citing Ex. 1024 ¶ 27). Patent Owner does not dispute Petitioner's definition of a POSITA.

For purposes of determining whether to institute review, we accept Petitioner's definition of a POSITA.

D. Prior Art References

Below we provide an overview of the prior art references relied upon by Petitioner.

1. Babayoff (Ex. 1003)

Babayoff discloses a method and an apparatus for imaging of a three-dimensional structure by confocal focusing an array of light beams. Ex. 1003, 1 (title). According to Babayoff, the method is particularly useful for surveying of teeth in the oral cavity of a patient and imaging of a three-dimensional topology of a teeth segment. *Id.* at 1:2–4, 1:8–9, 2:25–27.

Babayoff discloses an apparatus for determining surface topology of a portion of a three-dimensional structure. *Id.* at 3:23–4:14. The apparatus comprises a probing member, an illumination unit, a light focusing optics defining one or more focal planes, a translation mechanism for displacing the focal plane, a detector, and a processor. *Id.* According to Babayoff, the probing member, illumination unit, focusing optics, translation mechanism, and detector are preferably included together in a hand-held device. *Id.* at 4:15–17.

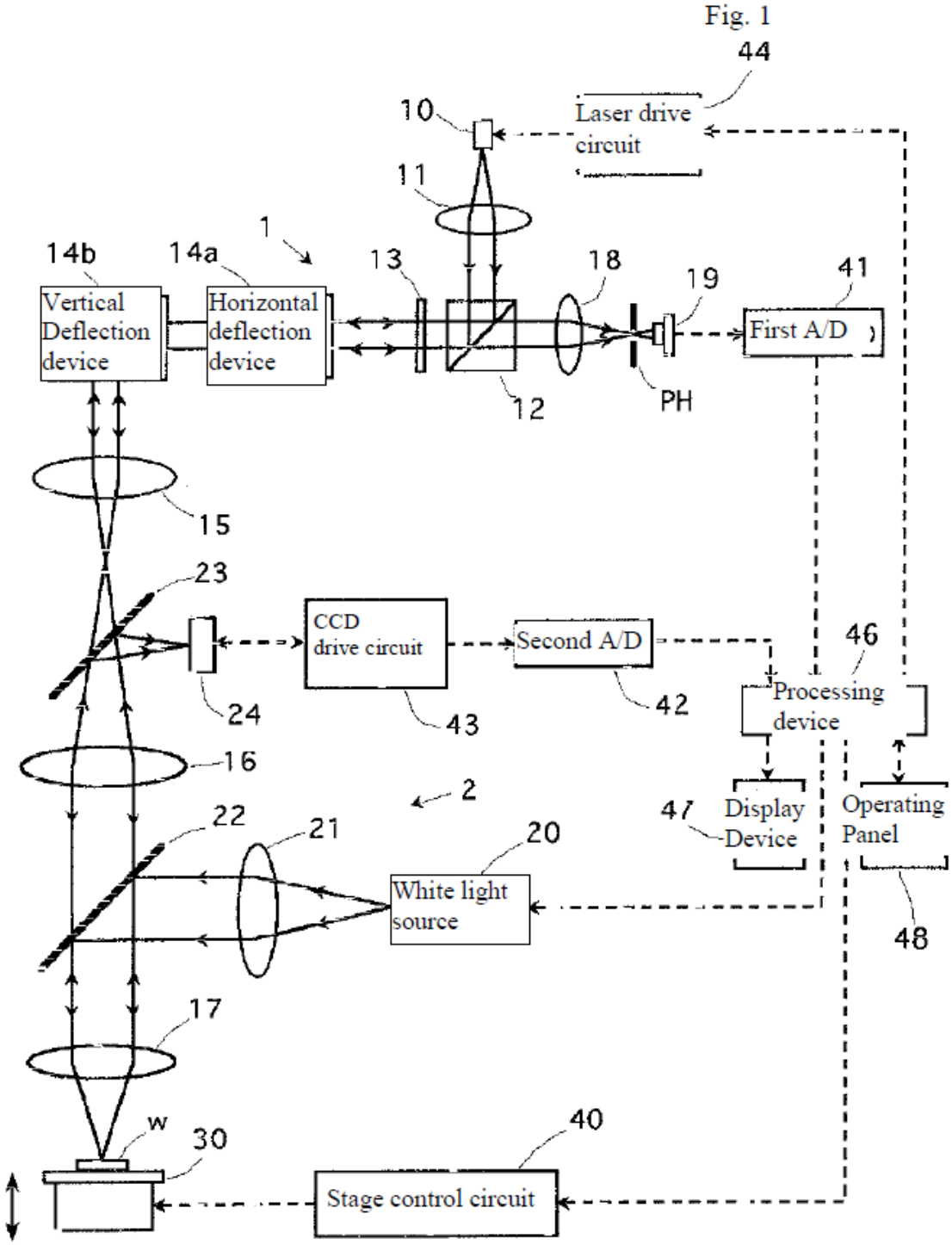
Babayoff is incorporated by reference in the '207 patent. Ex. 1001, 14:61–63. In addition, large portions of Babayoff are incorporated with little modification into the disclosure of the '207 patent. For example, Babayoff's disclosure of a method for determining the surface topology of a portion of a three-dimensional structure is essentially the same as the '207 patent's

description of a confocal focusing method. *Compare* Ex. 1003, 3:3–22, 4:18-5:21, *with* Ex. 1001, 3:1–60. Babayoff's summary of an apparatus for determining surface topology of a portion of a three-dimensional structure is essentially the same as the '207 patent's summary of a scanning apparatus that uses confocal imaging techniques. *Compare* Ex. 1003, 3:23–4:14, *with* Ex. 1001, 5:27–51. Babayoff's detailed description and illustration of an apparatus for determining the three-dimensional structure of a teeth segment are essentially the same as the '207 patent's detailed description and illustration of a system for confocal imaging of a three-dimensional structure. *Compare* Ex. 1003, 8:10–12, 8:24–12:15, Figs. 1A, 1B, *with* Ex. 1001, 14:59–60, 14:66–16:52, 25:16–29, Figs. 4A, 4B. Babayoff and the '207 patent contain essentially the same detailed description and illustration of a probing member. *Compare* Ex. 1003, 12:21–13:5, Figs. 2A, 2B, *with* Ex. 1001, 17:12–26, Figs. 5A, 5B.

2. Okamoto (Ex. 1004)

Okamoto discloses a three-dimensional shape measurement device that measures both the three-dimensional shape of a target object and the color of the target object and displays the three-dimensional shape with the color close to the actual color of the target object. Ex. 1004 ¶¶ 1, 8, 9. Okamoto's measurement device provides both "height information" and "color information" for the target object. *Id.* ¶¶ 8, 9.

Figure 1 of Okamoto is reproduced below.



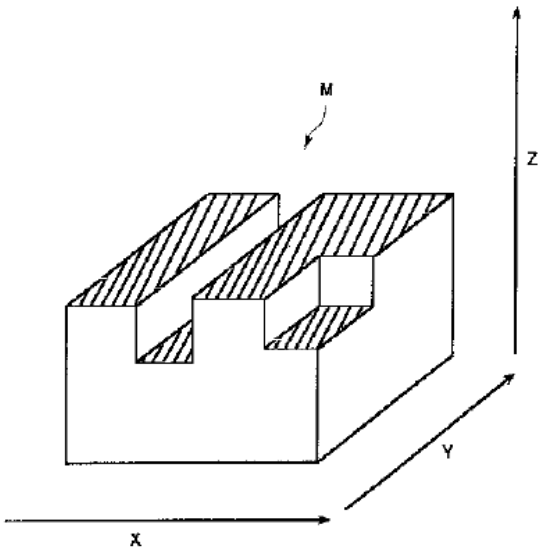
Okamoto Figure 1 is a block diagram showing the schematic configuration of a confocal microscope, i.e., a three-dimensional measurement device.

Ex. 1004 ¶ 15, p. 8 (brief description of the drawings). Okamoto's confocal microscope includes "confocal optical system 1 to obtain the 3-dimensional surface shape information that includes sample height and non-confocal optical system 2 to obtain the sample color image." *Id.* ¶ 15.

Okamoto describes confocal optical system 1. Ex. 1004 ¶¶ 16–27. According to Okamoto, the confocal optical system obtains information concerning the three-dimensional surface profile, including information regarding the height of the sample. *Id.* ¶ 21. More specifically, the distribution of surface heights of the sample in the XY plane is obtained. *Id.* ¶ 24. Okamoto discloses that the height distribution (surface profile) of the sample can be displayed three-dimensionally. *Id.* ¶ 25.

Figure 3 of Okamoto is reproduced below.

Fig. 3



Okamoto Figure 3 shows an example of a three-dimensional display of a simple solid model M. Ex. 1004 ¶ 26, p. 8 (brief description of the drawings).

Okamoto describes non-confocal optical system 2. Ex. 1004 ¶¶ 28–30. The non-confocal system uses a color CCD as a color information capture sensor. *Id.* ¶ 28. According to Okamoto, the CCD "is provided at a position that is conjugate or nearly conjugate to the pinhole . . . of the confocal optical system 1." *Id.* ¶ 30. The non-confocal system obtains a color image that is "converted to digital values" and displayed on a screen "as an enlarged color image for observing the sample." *Id.*

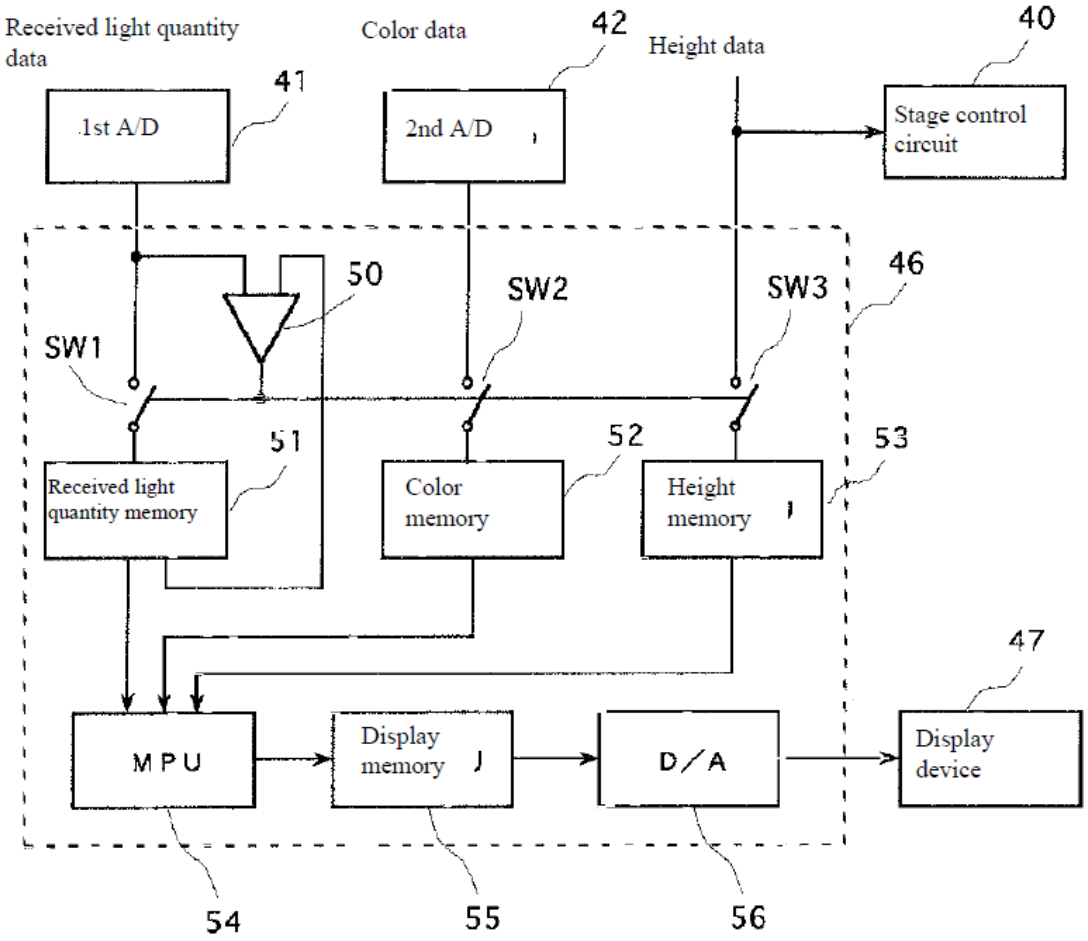
Okamoto describes how the information from the confocal and non-confocal optical systems are combined and displayed. Ex. 1004 ¶¶ 31–37. Okamoto discloses:

> Color images obtained with the non-confocal optical system 2 are combined in a three-dimensional display of the surface profile of the sample obtained by the confocal optical system 1 described above, and color three-dimensional display is carried out. As a result, portions represented by hatching viewed from above in the Z-axis direction are colored with the colors of a color image in the display model shown in Fig. 3. Picture elements of the hatched portions are imaged in the XY plane and are associated with picture elements of the color image.

Ex. 1004 ¶ 31. According to Okamoto, processing for carrying out color three-dimensional display is executed "in accordance with software by a microprocessor contained in processing device 46," which is indicated in Figure 1 and shown in more detail in Figure 4. *Id.* ¶¶ 24, 33, 34.

Figure 4 of Okamoto is reproduced below.

Fig. 4



Okamoto Figure 4 is a block diagram showing a configuration that focuses on the processing device 46 for carrying out color three-dimensional display. Ex. 1004 ¶ 34, p. 8 (brief description of the drawings). Okamoto discloses that color data and height data for the corresponding picture elements are stored in color memory 52 and height memory 53. *Id.* ¶ 35. According to Okamoto, the color data is input from the color CCD 24 to processing device 46. *Id.* Microprocessor 54 then uses the stored color data and the stored height data to generate color three-dimensional display data of the surface profile of the sample, which is input to display memory 55 and

provided to display device 47. *Id.* ¶ 36. Okamoto discloses that "[t]he color three-dimensional display data . . . is generated from the height data and color data for each picture element in the XY plane." *Id.* ¶ 37.

According to Okamoto, the effect of the disclosed three-dimensional measurement device is that "three-dimensional display of the surface profile is colored with colors that are close to the actual colors of the object to be measured." Ex. 1004 ¶ 46.

3. Engelhardt (Ex. 1005)

Engelhardt discloses a confocal surface-measuring device for measuring the surface profile of teeth. Ex. 1005, (54), (57), 1:5–7, 2:20–24. Engelhardt's device includes a probe that is small enough to be introduced into the oral cavity of a patient and a processor that digitizes the detected signal and processes it. *Id.* at 1:7–11, 2:24–25.

Figure 1 of Engelhardt is reproduced below.

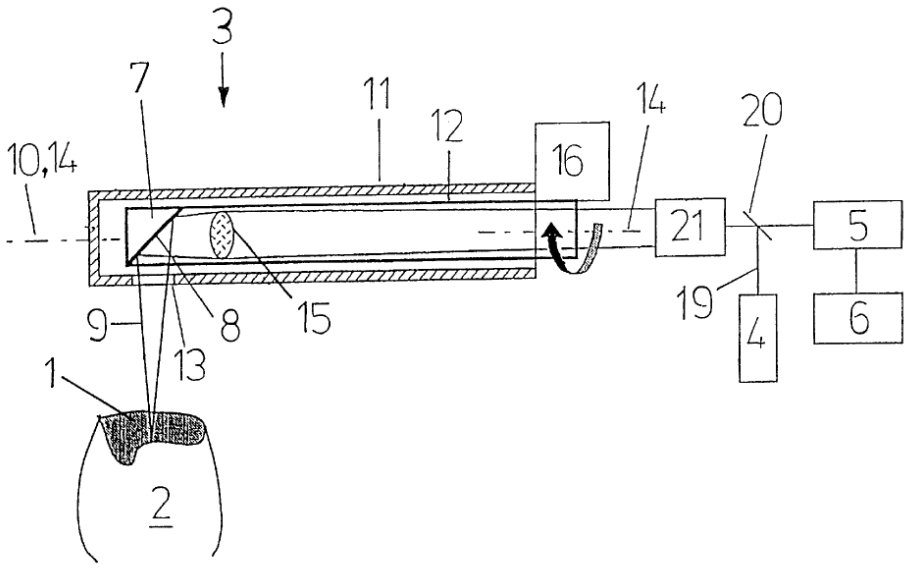


Fig. 1

Engelhardt Figure 1 shows a system for confocal surface measurement of surface profile 1 of teeth 2 in an oral cavity. Ex. 1005, 6:41–44. The system includes, among other things, probe 3, light source 4, detector 5, processor 6, housing 11, and illumination and detection window 13. *Id.* at 6:45–48, 7:1-6. According to Engelhardt, processor 6 digitizes the detected signal and processes it into a three-dimensional representation. *Id.* at 6:47–49.

Although Figure 1 shows light source 4, detector 5, and processor 6 outside of housing 11 of probe 3, Engelhardt discloses that the light source, detector, and processor may be placed within the housing that spatially defines the probe. Ex. 1005, 5:56–57, 5:62–6:3. Specifically, Engelhardt discloses:

> It would also be conceivable to integrate other functional units which are outside the housing . . . into the housing or to place them within the housing. For instance, the light source and/or the beam splitter and/or--if necessary--the focusing control and/or the detector and/or the processor could be arranged within the housing by miniaturizing all the functional units. That, correspondingly, would be a compact system needing only connection to the proper power supply.

Id. at 5:62–6:3; *see also id.* at 10:34–39, 10:66–11:4 (claims 30 and 39–41). In addition, Engelhardt discloses that the processor can "take over several functions, such as control, transformation or geometric correction, and digitizing of the signal, serving to compute the three-dimensional surface profile or for storing the data." *Id.* at 6:8–12.

4. Sachdeva (Ex. 1006)

Sachdeva discloses an orthodontic treatment planning workstation and method. Ex. 1006, (57), ¶¶ 14, 17. The workstation comprises a computing platform having a graphical user interface, a processor, and a computer

storage medium containing digitized records pertaining to a patient, including 3D image data and/or 2D image data. *Id.*; *see also* Fig. 1 (block diagram of a system for creating a three-dimensional virtual patient model).

Sachdeva discloses computer software for performing various functions, including "superimposing" a first set of digital data and a second set of digital data "so as to provide a composite, combined digital representation of the craniofacial anatomical structures in a common coordinate system." Ex. 1006 ¶ 53. Sachdeva refers to the composite as a "virtual patient model." *Id.* Sachdeva discloses that one of the sets of data includes photographic image data obtained with a color digital camera. *Id.* According to Sachdeva, the other set of data could be "intra-oral 3D scan data" obtained from a "hand-held scanner," which may incorporate a "color CCD camera." *Id.* Sachdeva discloses that the virtual patient model can be created by a "superposition" of various data sets, including "intra-oral scan of the patient's teeth, gums, and associated tissues" and "intra-oral color photographs of the teeth to add true color (texture) to the 3D teeth models." *Id.* According to Sachdeva, "[t]hese data sets are superimposed with each other, with appropriate scaling as necessary to place them in registry with each other and at the same scale." *Id.*

Sachdeva discloses a method for creating a 3D model of the face. Ex. 1006 ¶ 79, Fig. 3. According to Sachdeva's method, three data sets—a 3D color face model, a 3D color model of the teeth, and a model of the skull using a CT scanner—undergo an aligning transformation which "provides the necessary X, Y and Z translations and rotations to place the data sets into a common coordinate system such that common anatomical structures overlap each other." *Id.* The aligning transformation results in a complete

3D face model. *Id.* Next, two more data sets—a set of 2D color face photographs and X-Rays—undergo an overlay transformation with the 3D face model. *Id.* This overlay transformation results "in a combined, composite model of the face, skull, teeth, and associated tooth roots, bone and other anatomical data." *Id.*

Sachdeva also discloses a process that can be used to combine 3D scan data with 2D color photographs to create a 3D color model of the teeth. Ex. 1006 ¶¶ 80, 81, Fig. 4. According to Sachdeva's process, the teeth are scanned using a hand-held intra-oral scanner, and the resulting data represent a 3D model of the dentition. *Id.* ¶ 80. Next, 2D color photographs of the teeth are obtained with a color digital camera. *Id.* Sachdeva discloses that the color photographs may be obtained with a hand-held scanner that includes "a video camera that obtains a continuous stream of color video frames separate and apart from the acquisition of 3D image data." *Id.* Next, a 3D textured model of the teeth is created using a cylindrical projection technique, which Sachdeva describes as follows:

> Basically, in this technique, the color data from the color photographs is projected onto the tooth data. The tooth data can be represented as triangular surfaces, with the vertices of each triangle being adjacent points in a point cloud defining the surface of the tooth. The color is projected on the surfaces, and each surface is assigned a value associated with a particular color. The result is a 3D color model of the teeth . . . .

Id. ¶ 81.

Sachdeva discloses a user interface for executing the process of texture mapping a 3D virtual model by projection of color data from a 2D

photograph. Ex. 1006 ¶¶ 82, 83, Figs. 5A–5E.[6] First, a 2D digital photograph is displayed alongside a 3D virtual model of the teeth, which permits the user to change the size of the 2D image so that it matches the size of the 3D model. *Id.* ¶ 82, Fig. 5A. Next, the 3D virtual model is displayed with the surface represented by interconnecting triangular surfaces. *Id.* ¶ 82, Fig. 5B. Next, a manual or automatic superposition (translation) is performed so that the 3D model overlaps the 2D photograph. *Id.* ¶ 83, Fig. 5C. According to Sachdeva, "[t]he color information in the 2D photograph . . . is projected and mapped to the individual triangle surfaces forming the lower jaw and upper jaw of the 3D model 75 using, for example, a projection algorithm." *Id.* ¶ 83, Fig. 5D.

E. Challenge Based on Babayoff, Okamoto, and Engelhardt

Petitioner contends that claims 1–7, 12–17, and 19–21 of the '207 patent are unpatentable as obvious under 35 U.S.C. § 103(a) in view of Babayoff, Okamoto, and Engelhardt. Pet. 34–67. Patent Owner opposes. Prelim. Resp. 16–57. We address the parties' arguments below.

1. Petitioner's Contentions

Petitioner presents its obviousness contentions for claims 1–7, 12–17, and 19–21 in two main parts. First, it provides an element-by-element analysis, identifying disclosures in Babayoff, Okamoto, and Engelhardt that Petitioner relies upon to teach each claim element. Pet. 34–59. Second, Petitioner provides an explanation of why the claims would have been

[6] In the text of Sachdeva, Figures 5A–5E are erroneously referred to as Figures 4A–4E. Ex. 1006 ¶¶ 23, 82, 83. The error is corrected in U.S. Patent No. 7,156,655, which issued from the published application.

obvious. *Id.* at 59–67. In this section, Petitioner identifies differences between the challenged claims and the asserted prior art references (*id.* at 60) and provides its contentions regarding motivation to combine and a reasonable expectation of success (*id.* at 60–67).

Petitioner relies on the combination of Babayoff and Okamoto to disclose the preamble of claim 1, which recites a method for determining the surface topology and associated color of at least a portion of a three dimensional dental structure. Pet. 34–35. Regarding claim element 1.1, Petitioner contends that Babayoff discloses a hand-held device and that Engelhardt discloses a hand-held device comprising a processor configured as recited in claim element 1.4. *Id.* at 36–37. Regarding claim element 1.2, Petitioner contends that Babayoff discloses a "scanning system" under both parties' claim constructions (*id.* at 37–41) and that Okamoto discloses a "scanning system" under Patent Owner's ITC claim construction (*id.* at 41-42).[7] Petitioner relies on Babayoff to teach a "scanning system" as part of a hand-held device. *Id.* at 41. Regarding claim elements 1.3 and 1.4, Petitioner contends that Okamoto discloses an "imaging system" and a "processor" under both parties' claim constructions. *Id.* at 42–45. Petitioner relies on Engelhardt's disclosure that various functional units can be incorporated into a hand-held device. *Id.* at 44, 45. Petitioner relies on Babayoff and Okamoto to teach claim element 1.5 as it pertains to the depth data and the color image data, respectively. *Id.* at 45–46. Petitioner

[7] As discussed in Section II.A. above, Petitioner addresses the claim constructions proposed by Patent Owner in the ITC investigation. In the Preliminary Response, Patent Owner does not propose any express claim constructions for purposes of this proceeding.

contends that Babayoff teaches claim element 1.6, operating the hand-held device. *Id.* at 46.

Petitioner contends that Babayoff and/or Okamoto disclose the features of claims 2–7, 12–17, and 19–21 and that Babayoff discloses the features of claim 12. Pet. 46–59.

Petitioner acknowledges that Babayoff does not disclose a system or method for associating color with depth data of a dental structure. Pet. 60. For the aspects of claim 1 relating to color imaging and color image data, Petitioner relies on Okamoto. *Id.*; *see also id.* at 42–46 (addressing imaging system, processor, and color image data limitations of claim 1). Petitioner contends that the combination of Babayoff and Okamoto disclose all features of claim 1, except for locating a processor for associating depth data with color imaging data in a hand-held device. *Id.* at 60. Petitioner contends that Engelhardt discloses this missing limitation. *Id.*

Petitioner contends that a POSITA would have been motivated to modify Babayoff to include a color imaging system and to associate depth data with color image data, as taught by Okamoto. Pet. 60–62. As motivation, Petitioner identifies a known desire to match a patient's tooth color when preparing dental prostheses. *Id.* (citing Babayoff and Okamoto, as well as Ex. 1007,[8] 1:32–38, 2:18–20; Ex. 1008,[9] 1:10–19, 2:29–30; Ex. 1024 ¶¶ 173, 174, 177; Ex. 1055,[10] 4:26–27). Petitioner contends a POSITA would have been motivated to place an imaging system and

[8] U.S. Patent No. 6,575,751, issued June 10, 2003.

[9] U.S Patent No. 5,766,006, issued June 16, 1998.

[10] U.S. Patent No. 7,099,732, filed Sept. 2, 2003, issued August 29, 2006.

processor inside the hand-held device of Babayoff in view of Engelhardt's teachings and the desirability of a single hand-held instrument that combines image capture and processing and communicates wirelessly. *Id.* at 62–63 (citing Engelhardt and Ex. 1006 ¶¶ 53, 80; Ex. 1024 ¶¶ 178–182; Ex. 1035,[11] 1:5–6, 2:12–3:2, Ex. 1055, 3:53–54, Fig. 1). Petitioner contends a "POSITA would have had a reasonable expectation of successfully arriving at the claimed invention because (i) Okamoto already disclosed a 3D measurement device that obtains and associates color information with depth data that could be readily deployed in Babayoff's probe; and (ii) Engelhardt discloses the interchangeability of including a processor either inside or outside of Babayoff's probe." *Id.* at 64 (citing Ex. 1005, 5:62–6:7; Ex. 1017,[12] 1:64-67, 2:8–13, 2:20–23, Figs. 1, 2a; Ex. 1024 ¶ 183); *see also id.* at 64–66 (asserting a reasonable expectation of success as to modifying Babayoff to associate depth data with color image data, as taught by Okamoto, and placing the imaging system and processor inside the hand-held device of Babayoff, citing Ex. 1006 ¶ 80, Fig. 4; Ex. 1024 ¶¶ 184–188; Ex. 1035, 3:3-10, 5:12–22, 11:12, 11:18).

2. Patent Owner's Arguments

Patent Owner presents its opposition to Petitioner's challenge in two main parts. First, Patent Owner argues that the Petition fails to meet minimum statutory and rule-based requirements. Prelim. Resp. 16–33. Second, Patent Owner challenges Petitioner's contentions regarding the

[11] PCT International Publication No. WO 02/056756, published July 25, 2002.

[12] U.S. Patent No. 6,525,828, issued February 25, 2003.

teachings of Okamoto and motivation to combine. *Id.* at 34–52, 55–56. We address these arguments below.

Patent Owner argues that Petitioner fails to apply any of its alleged MPF constructions to the asserted prior art. *Id.* at 16–19. At the same time, however, Patent Owner argues that Petitioner's MPF constructions are incorrect. *Id.* at 10–15. As discussed above, Petitioner presents obviousness contentions under both parties' ITC claim constructions, including Patent Owner's non-MPF constructions. Pet. 42, 43, 44–45. Patent Owner does not argue that Petitioner fails to apply Patent Owner's non-MPF claim constructions. Petitioner's contentions based on Patent Owner's non-MPF claim constructions provide a sufficient basis for institution.

Patent Owner argues "Petitioner does not state, with necessary particularity, whether Babayoff or Okamoto is relied on to allegedly disclose the 'scanning system.'" Prelim. Resp. 24. We disagree. The Petition states with sufficient particularity that Babayoff is relied upon under both parties' claim constructions (Pet. 37–41) and that Okamoto is relied upon under Patent Owner's ITC claim construction (*id.* at 41–42). In other words, Petitioner relies on both references, in the alternative, to teach a scanning system, as recited in claim element 1.2.

Patent Owner argues "Petitioner ignored known objective indicia evidence of nonobviousness." Prelim. Resp. 26. Patent Owner relies on non-binding Board precedent[13] to argue that "all known objective indicia evidence must be considered at the institution stage where (1) petitioner is

[13] *Robert Bosch Tool Corp. v. SD3, LLC*, IPR2016-01751, slip op. at 22-32 (PTAB March 22, 2017) (Paper 15) ("*Bosch*").

aware of the objective indicia evidence from having participated in a related ITC action, and (2) that evidence was fully developed in that action." *Id.* at 27. Unlike *Bosch*, however, Petitioner in this case addresses secondary considerations by asserting that "[a]ny purported evidence of secondary considerations that Patent Owner may present in this proceeding would be insufficient to overcome the strong evidence of obviousness." Pet. 73. Also unlike *Bosch*, Patent Owner in this case does not rely on the ITC's initial determination and has not submitted it as an exhibit. Patent Owner does not specify what evidence should have been addressed by Petitioner. Instead, Patent Owner cites its heavily redacted ITC briefs. Prelim. Resp. 27 (citing Exs. 2002, 2007). Briefs are not evidence. Under these circumstances, we determine that secondary considerations are adequately addressed in the Petition.

Patent Owner argues that Petitioner mischaracterizes the alleged Applicant Admitted Prior Art ("AAPA"). Prelim. Resp. 30–31 (citing Pet. 70; Ex. 1001, 14:32–33, 14:43–47). The portion of the Petition criticized by Patent Owner pertains to claim 7 of the '207 patent and motivation to combine. Pet. 70–71. Even if Petitioner's characterization of the AAPA is overbroad, as argued by Patent Owner, we are persuaded that Petitioner's arguments and evidence provide a sufficient basis on which to institute review without considering the alleged AAPA.

After considering Patent Owner's arguments (Prelim. Resp. 16–33), we are persuaded that the Petition meets the statutory and rule-based requirements identified by Patent Owner.

Next, Patent Owner argues that Petitioner's contentions and Okamoto's disclosure are deficient with respect to claim elements 1.3 and

1.4. Prelim. Resp. 34–40. As to claim element 1.3, Patent Owner argues "[t]he Petition fails to specify where the specific relationship between the 'color image data' and the 'plurality of data points' is found in Okamoto." *Id.* at 35. On this record, however, it is unclear whether claim element 1.3 requires such a specific relationship. Claim element 1.3 recites: "an imaging system configured to provide color image data of the portion associated with said plurality of data points." Ex. 1001, 26:27–29. Although Patent Owner assumes the phrase "associated with said plurality of data points" modifies "color image data," an equally, if not more, plausible interpretation is that it modifies "the portion."[14] On this record, it is undisputed that Okamoto's non-confocal optical system provides color information for the same portion of a three-dimensional structure for which Okamoto's confocal optical system provides height information (*see* Prelim. Resp. 38), which satisfies this plausible claim interpretation. Even under Patent Owner's reading of claim element 1.3, Okamoto discloses that the non-confocal optical system obtains a color image comprising color information for each pixel in an XY plane, where the confocal and non-confocal optical systems use the same XY frame of reference. Ex. 1004 ¶¶ 8, 12, 15, 24, 30, 31, Figs. 1, 3. Accordingly, after considering Patent Owner's argument, we are persuaded that Petitioner's arguments and evidence regarding claim element 1.3 and Okamoto provide a sufficient basis on which to institute review. Pet. 42–44 (citing Ex. 1004 ¶¶ 8, 12, 15, 28–31, Figs. 1, 3, 4; Ex. 1024 ¶¶ 104–106, 108).

---

[14] *See, e.g.*, Ex. 1001, 4:9–11 ("substantially the same portion of the structure should be comprised in both the 3D scan and the 2D image").

As to claim element 1.4, Patent Owner argues "Okamoto's superimposing two dimensional images on top of each other fails to disclose the claimed 'a processor configured to associate the depth data with the color image data.'" Prelim. Resp. 37. More particularly, Patent Owner argues that "Okamoto merely projects a two-dimensional representation of a three-dimensional object onto a screen and then superimposes the two-dimensional color data onto this two-dimensional representation." *Id.* at 39 (citing Ex. 1004 ¶¶ 31, 46). On this record, it is not clear whether Patent Owner's arguments correctly characterize Okamoto's disclosure. Nor is it clear whether Okamoto's disclosure differs from claim element 1.4, as argued by Patent Owner. In any event, Patent Owner does not address Okamoto paragraph 36, which is cited by Petitioner and discloses a microprocessor that uses color data and height data to generate color three-dimensional display data of the surface profile of the sample. Ex. 1004 ¶ 36, Fig. 4; *see* Pet. 44. After considering Patent Owner's argument, we are persuaded that Petitioner's arguments and evidence regarding claim element 1.4 and Okamoto provide a sufficient basis on which to institute review. Pet. 44–45 (citing Ex. 1004 ¶¶ 33, 36, 46, Figs. 1, 4; Ex. 1024 ¶¶ 113, 115).

Next, Patent Owner challenges the sufficiency of Petitioner's contentions regarding motivation to combine and reasonable expectation of success. Prelim. Resp. 41–52, 55–56. Patent Owner argues that "[n]o POSA would have combined color imaging system of Okamoto's confocal microscope with Babayoff's handheld device in view of Engelhardt's depth, measurement system." *Id.* at 41. Patent Owner relies on a U.S. patent publication listing Petitioner as the applicant and assignee to argue "Petitioner previously contended that a desktop microscope like Okamoto is

not suitable for handheld use." *Id.* at 41, 51, 56, 61 (citing Ex. 1004 ¶ 18; Ex. 2003[15] ¶ 7; Ex. 2005,[16] 20:20–25). At this stage, it is unclear: (1) whether the statement in Esbech can be attributed to Petitioner; (2) whether Esbech's statement about Okamoto '373 is applicable to Okamoto (Ex. 1004); and (3) whether the '207 patent's use of a confocal imaging in a handheld device is subject to the same criticism as stated in Esbech. Aside from these questions, it is unclear how Esbech impacts Petitioner's obviousness case to the extent it relies on Babayoff, rather than Okamoto, to teach a scanning system as part of a hand-held device. Pet. 37–41. Esbech's criticism of Okamoto '373 appears to be limited to the confocal scanning technique (Ex. 2003 ¶ 7) and says little or nothing about whether a POSITA would have integrated a non-confocal color imaging system and a processor for associating color image data with depth data into a handheld device such as Babayoff's.

In a similar vein, Patent Owner argues that "the distance between the image sensor and the patient's teeth may constantly change during a scan" and "neither Petitioner nor its Declarant offers any opinion as to how Okamoto could have been integrated into Babayoff to solve this concern." Prelim. Resp. 48. Patent Owner's argument identifies a potential problem with using a confocal measuring technique in a handheld device. Petitioner's burden, however, is to show that a POSITA would have been motivated to combine the teachings of the prior art and would have had a

---

[15] U.S. Patent Publication No. 2016/0022389 ("Esbech"). Esbech lists 3Shape A/S as the applicant and assignee. Ex. 2003.

[16] Japanese Publication No. JP 2004 029373 ("Okamoto '373").

reasonable expectation of successfully achieving the claimed invention. Petitioner does not need to show a reasonable expectation of solving every problem in the art, particularly not problems that are left unsolved by the claimed invention.

3. Secondary Considerations

Patent Owner argues that Petitioner ignores known objective indicia of nonobviousness, including evidence of a long felt and unresolved need and commercial success. Prelim. Resp. 53–55. At this stage, Patent Owner's evidence of objective indicia of nonobviousness is limited to three journal articles[17] discussing iTero intraoral scanners, which Patent Owner asserts embody the challenged claims of the '207 patent. *Id.* at 53.

Evidence of secondary considerations must always be considered when presented to rebut an allegation of obviousness. *See, e.g., In re Kao*, 639 F.3d 1057, 1067 (Fed. Cir. 2011) ("[W]hen secondary considerations are present, though they are not always dispositive, it is error not to consider them."). "For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention." *Kao*, 639 F.3d at 1068.

---

[17] Gary L. Henkel, *A Comparison of Fixed Prostheses Generated from Conventional vs. Digitally Scanned Dental Impressions*, Compendium of Continuing Education in Dentistry (August 2007), Ex. 2008;

Tim Mack, *Impressing Your Patients with Digital Technology*, Aesthetic Dentistry, Vol. 5, No. 4, pp. 18, 20 (2006), Ex. 2009;

Michael M. Mackay et al., *Acquisition of a Digital Intraoral Scanning Device: an Examination of Practice Volume Changes and the Economic Impact via an Interrupted Time Series Analysis*, J. of Clin. Dent., Vol. XXVIII (Supplement), pp. S1–S5 (2017), Ex. 2010.

There is a rebuttable presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product, and that product is the invention disclosed and claimed in the challenged patent. *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016). If a patentee shows "the marketed product embodies the claimed features, . . . then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1222 (Fed. Cir. 2016) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000)).

Before reaching a conclusion of obviousness or nonobviousness, we must consider and weigh the evidence relevant to all four *Graham* factors, including evidence of secondary considerations. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc) ("A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four *Graham* factors, and it is error to reach a conclusion of obviousness until all those factors are considered.").

At this stage, however, it is premature to determine how much weight to give to Patent Owner's evidence of objective indicia, particularly when there is no showing that the iTero intraoral scanners discussed in the journal articles (Exs. 2008–2010) embody the challenged claims. For example, Patent Owner has not shown that the iTero scanners comprise a hand-held device comprising a processor. *See* Ex. 2008, 2 (iTero device consists of a mobile cart that houses a personal computer optimized for the processing of video data with a handheld scanner attached to the cart by a data cable).

4. Conclusion

After considering the Petition and the Preliminary Response, we determine that Petitioner's arguments and evidence are sufficient to show a reasonable likelihood of prevailing on its contention that claims 1–7, 12–17, and 19–21 of the '207 patent are unpatentable as obvious in view of Babayoff, Okamoto, and Engelhardt.

F. Challenge Based on Babayoff, Okamoto, Engelhardt, and Sachdeva

Petitioner contends that claims 7 and 18 of the '207 patent are unpatentable as obvious under 35 U.S.C. § 103(a) in view of Babayoff, Okamoto, Engelhardt, and Sachdeva. Pet. 57–73.

Petitioner contends that Sachdeva discloses an alignment procedure comprising an optical character recognition ("OCR") technique, as recited in claim 6. Pet. 68 (citing Ex. 1006 ¶¶ 53, 79, 80, 81, Figs. 3, 4; Ex. 1024 ¶¶ 193–195). Petitioner contends "a POSITA would have been motivated to modify the combination of Babayoff in view of Okamoto and Engelhardt, to employ the routine and conventional translation and/or rotation techniques disclosed by Sachdeva to align the 3D scan data with the color image data." *Id.* at 70 (citing Ex. 1024 ¶ 203).

Petitioner contends that Sachdeva discloses obtaining both 3D scan data (depth data) and color image data of a 3D dental structure and further discloses that the 3D dental structure comprises at least a portion of a physical model representing a patient's teeth, as recited in claim 18. Pet. 68–69 (citing Ex. 1006 ¶¶ 80, 85, 228, Fig. 4; Ex. 1024 ¶ 198). Petitioner contends that

> a POSITA would have been motivated to utilize the system resulting from the combination of Babayoff, Okamoto, and Engelhardt, to obtain a 3D model of a 3D dental structure

> comprising at least a portion of a physical model representing a patient's teeth, because Sachdeva discloses the desirability of scanning a physical model of a patient's dentition to obtain a virtual 3D model in the course of treatment.

Id. at 71 (citing Ex. 1006 ¶¶ 85, 228; Ex. 1024 ¶ 205).

Except as discussed above, Patent Owner does not present arguments regarding dependent claims 7 and 18 separate from its arguments regarding independent claim 1.

After considering the Petition and the Preliminary Response, we determine that Petitioner's arguments and evidence are sufficient to show a reasonable likelihood of prevailing on its contention that claims 7 and 18 of the '207 patent are unpatentable as obvious in view of Babayoff, Okamoto, Engelhardt, and Sachdeva.

G. Discretion under §§ 314(a) and 325(d)

Patent Owner argues that we should deny institution pursuant to 35 U.S.C. §§ 314(a) and 325(d) because "[s]ubstantially the same art (namely, Babayoff and Okamoto) was both presented in the ITC action and was presented to and considered by the Office during the prosecution underlying the '207 Patent." Prelim. Resp. 57. Petitioner disagrees. Pet. 73–75.

1. Discretion under § 314(a)

Under § 314(a), we have discretion to deny a petition for *inter partes* review. *See* 35 U.S.C. § 314(a) (stating "[t]he Director may not authorize an *inter partes* review to be instituted unless . . . ."); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) ("First of all, the

PTO is permitted, but never compelled, to institute an IPR proceeding." (citing 35 U.S.C. § 314(a))).

As explained in the Board's *Trial Practice Guide Update*, our discretion is informed by considerations identified in 35 U.S.C. § 316(b), including the "effect . . . on the economy, the integrity of the patent system, the efficient administration of the Office, and the ability of the Office to timely complete proceedings instituted under this chapter." Trial Practice Guide Update,[18] 9. In addition to listing factors relevant when the same patent is challenged in multiple petitions,[19] the *Trial Practice Guide Update* states "[t]here may be other reasons" where § 316(b) considerations "favor[] denying a petition even though some claims meet the threshold standards for institution" under § 314(a). *Id.* at 10. "This includes, for example, events in other proceedings related to the same patent, either at the Office, in district courts, or the ITC." *Id.*

Here, the parties dispute whether a discretionary denial of institution is appropriate in view of the ITC investigation. Pet. 74; Prelim. Resp. 59–61. Patent Owner asserts that "the claims at issue in the ITC action are the same as the challenged claims in the present Petition." Prelim. Resp. 58. Patent Owner is wrong. Petitioner is correct that the Petition challenges a different set of claims than is at issue in the ITC investigation. Pet. 74 (citing Exs. 1058, 1059). As noted above, Petitioner challenges claims 1–7

---

[18] Available at: https://go.usa.gov/xU7GP. *See also* Office Patent Trial Practice Guide, August 2018 Update, 83 Fed. Reg. 39,989 (Aug. 13, 2018) (discussing and providing link to Trial Practice Guide Update).

[19] *See General Plastic Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, slip op. 16–17 (PTAB Sept. 6, 2017) (Paper 19) (precedential).

and 12–21 of the '207 patent in this proceeding. In contrast, the evidence shows that only claim 1 was asserted at the ITC hearing and addressed in the parties' post-hearing ITC briefs. Ex. 2001, 0067; Ex. 2006, 0044.

Patent Owner is correct that Petitioner asserted some of the same prior art references (Babayoff, Okamoto, and Engelhardt) in the ITC investigation as are asserted in the Petition. Prelim. Resp. 26, 58; Ex. 2006, 0022. Patent Owner accuses Petitioner of using Patent Owner's arguments in the ITC as a roadmap to fix a weakness in its invalidity arguments. Prelim. Resp. 58–59. Specifically, Patent Owner argues that Petitioner changes positions as to which Okamoto embodiment(s) it relies upon. *Id.* at 59 (citing Pet. 18–19; Ex. 2002, 0031–0032; Ex. 2006, 0027). The evidence, however, shows that Petitioner relies on the same Okamoto embodiment in both the Petition and the ITC, namely the embodiment in which the objective lens moves in the Z-direction, and the sample stage is fixed. Pet. 18 (citing Ex. 1004 ¶ 19); Ex. 2006, 0027 (citing ¶ 19 of Okamoto). Moreover, Patent Owner's tailoring argument is irrelevant to the extent Petitioner relies on Babayoff, rather than Okamoto, to teach a hand-held device comprising a scanning system. Pet. 37–41.

Patent Owner argues that Petitioner presents "virtually the same obviousness challenge it presented to the ITC" and "[i]t would be an inefficient use of the Board's resources to institute trial and revisit these same issues." Prelim. Resp. 59. Petitioner, on the other hand, asserts this proceeding and the ITC investigation involve different issues, including different claim sets and different claim construction standards. Pet. 74. Petitioner also notes that any decision of the ITC involving patent issues has no preclusive effect in other forums, including the Delaware litigation. *Id.*

We do not give significant weight to Petitioner's assertion of differing claim construction standards because that difference exists in many cases filed before the effective date of the amendment to 37 C.F.R. § 42.100(b)[20] and is not tied to the particular facts and circumstances of this case. We agree with Petitioner, however, that differing claim sets is a factor that weighs against exercise of our discretion under § 314(a) to deny institution based on the ITC investigation. As discussed above, only one out of the seventeen claims challenged in the Petition was litigated in the ITC. We also give some weight to the lack of preclusive effect of any ITC determination of invalidity, but it is not the sole factor influencing our discretion. After considering both parties' arguments, we are persuaded that institution of *inter partes* review would not be an inefficient use of the Board's resources under the facts and circumstances of this case.

2. Discretion under § 325(d)

Under § 325(d), we have discretion to deny a petition that presents the same or substantially the same prior art or arguments as previously presented to the Office. 35 U.S.C. § 325(d). In evaluating whether the factual predicate under § 325(d) is met, the Board has considered a number of non-exclusive factors, including, for example:

> (a) the similarities and material differences between the asserted art and the prior art involved during examination;
>
> (b) the cumulative nature of the asserted art and the prior art evaluated during examination;

[20] *See supra* pp. 11–12 n.5.

> (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
>
> (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguished the prior art;
>
> (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its consideration of the asserted prior art; and
>
> (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the asserted prior art or arguments.

Becton, Dickinson and Co. v. B. Braun Melsungen AG, IPR2017-01586, slip op. at 17–18 (PTAB Dec. 15, 2017) (Paper 8) (informative) ("the *Becton Dickinson* factors"). These factors were adopted and applied in *NHK Spring Co. v. Intri-Plex Technologies, Inc.*, Case IPR2018-00752, slip op. at 11–12 (PTAB Sept. 12, 2018) (Paper 8) (precedential).

Becton Dickinson factors (a)–(d) relate to whether—and to what extent—the Examiner considered and relied upon the prior art and arguments asserted in the Petition. Patent Owner argues that Babayoff is "described in the 'Background of the Invention' section of the '207 Patent and incorporated by reference." Prelim. Resp. 60. In addition, Patent Owner argues that "[b]oth Babayoff and Okamoto were presented to and considered by the Examiner during prosecution" of the '228 Patent and are "printed on the face of the patent." *Id.* Patent Owner argues that Engelhardt is cumulative to Babayoff and that Sachdeva is similar to another Sachdeva reference[21] that was considered during prosecution and printed on the face of the '228 patent. *Id.* at 61–63.

[21] U.S. Patent Publication No. 2004/0029068, Ex. 2013 ("Sachdeva '068").

Although Patent Owner asserts that Babayoff, Okamoto, and Sachdeva '068 were submitted to and considered by the Office during prosecution of the '228 patent (Prelim. Resp. 63, citing Ex. 2012, 137–138), Patent Owner concedes that the Office did not reject the claims based on the combination of Babayoff and Okamoto (*id.* at 61). Petitioner acknowledges that a reference corresponding to Babayoff was applied in combination with Mueller[22] during prosecution of another related application. Pet. 75 (citing Ex. 1021, 61–62, the file history for U.S. Patent No. 7,319,529). Patent Owner does not dispute Petitioner's assertion that this prosecution history does not warrant denial of institution. Prelim. Resp. 61; Pet. 75. Although Patent Owner faults Petitioner for failing to explain how the Office erred in evaluating Babayoff and Okamoto, the evidence fails to show that this combination of references was ever evaluated by the Office.

Becton Dickinson factors (e) and (f) look to the Petition and whether Petitioner has made a case for reconsidering the asserted prior art. Here, on the current record, there is no evidence that Babayoff and Okamoto were substantively considered by the Examiner during prosecution. Even if Babayoff and Okamoto were made of record during prosecution of the '228 patent as asserted by Patent Owner, for the reasons discussed in the section II.E. above, we determine Petitioner has demonstrated a reasonable likelihood that the Examiner erred in failing to reject the claims over the combination of Babayoff and Okamoto and that reconsideration of patentability over these references is warranted.

[22] U.S. Patent No. 7,098,435, issued August 29, 2006, Ex. 1054 ("Mueller").

Accordingly, for all of the foregoing reasons, we decline to exercise our discretion to deny review under §§ 314(a) or 325(d).

III. CONCLUSION

For the reasons stated above, we institute an *inter partes* review as set forth in the Order. At this stage of the proceeding, the Board has not made a final determination with respect to the patentability of any challenged claim or any underlying factual or legal issues.

IV. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–7 and 12–21 of the '207 patent is instituted with respect to the grounds of unpatentability asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '207 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of trial.

PETITIONER:

Todd R. Walters
Roger H. Lee
Andrew R. Cheslock
Mythili Markowski
Stephany G. Small
todd.walters@bipc.com
roger.lee@bipc.com
andrew.cheslock@bipc.com
mythili.markowski@bipc.com
stephany.small@bipc.com

PATENT OWNER:

Robert G. Sterne
Jason D. Eisenberg
Salvador M. Bezos
Jay L. Bird
Sean C. Flood
Michael R. Malek
rsterne-PTAB@sternekessler.com
jasone-PTAB@sternekessler.com
sbezos-PTAB@sternekessler.com
jbird-PTAB@sternekessler.com
sflood@sternekessler.com
mmalek-PTAB@sternekessler.com