

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIGN TECHNOLOGY, INC.
Petitioner

v.

3SHAPE A/S
Patent Owner

Case Nos. PGR2018-00104
Patent No. 9,962,244

**DECLARATION OF DR. CHANDRAJIT L. BAJAJ, PH.D.
IN SUPPORT OF POST-GRANT REVIEW OF U.S. PATENT NO. 9,962,244**

Mail Stop "PATENT BOARD"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

I.	Introduction	1
II.	Qualifications and Expertise	5
III.	Legal Understanding	10
	A. My Understanding of Claim Construction.....	10
	B. A Person of Ordinary Skill in the Art	11
	C. My Understanding of Obviousness	12
	D. My Understanding of Written Description	14
IV.	Background of the Technologies Disclosed in the '244 Patent.....	15
	A. Technical Overview of Intraoral Scanners.....	15
	1. Early Medical Imaging	15
	2. Image Stitching and Blending.....	17
	3. Image Processing	18
	4. 3D Modeling	19
	5. Color 3D Modeling using Intraoral Scanners	21
	B. Overview of the '244 Patent.....	27
V.	Claims 19, 25, and 32 lack support in the Provisional Application requiring PGR eligibility for the '244 Patent.	30
	A. Claims 19 and 32.....	30
	B. Claim 25	32
VI.	Claim Construction	34
VII.	The combinations of (a) Fisker and Szeliski and (b) Fisker and Matsumoto render claims 1-5, 7-10, 15, 16, 18, 21, 22, 24, 26, and 28 obvious.....	34
	A. Overview of Fisker.....	34
	B. Overview of Szeliski	36
	C. Overview of Matsumoto.....	38
	D. Claim 1	39
	1. [1.P]: “A focus scanner for recording surface geometry and surface color of an object”	39

2.	[1.1]: “a multichromatic light source configured for providing a multichromatic probe light for illumination of the object.”	40
3.	[1.2]: “a color image sensor comprising an array of image sensor pixels for capturing one or more 2D images of light received from said object”	40
4.	[1.3.a]: “wherein the focus scanner is configured to operate by translating a focus plane along an optical axis of the focus scanner”	41
5.	[1.3.b]: “wherein the focus scanner is configured to operate by...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”	42
6.	[1.4.a]: “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”	43
7.	[1.4.b]: “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”	46
8.	[1.5.a]: “wherein the data processing system further is configured to combining [sic] a number of sub-scans to generate a digital 3D representation of the object”	48
9.	[1.5.b]: “determining [sic] 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”	51
10.	[1.5.c]: “such that the digital 3D representation expresses both geometry and color profile of the object”	53
11.	[1.6]: “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.”	54
	a) Fisker	54

b)	Szeliski.....	57
c)	Matsumoto	59
d)	Motivation to Combine.....	62
E.	Claim 2: “The focus scanner according to claim 1, wherein the data processing system is configured for generating a sub-scan of a part of the object surface based on surface geometry information and surface color information derived from a plurality of blocks of image sensor pixels.”	70
F.	Claim 3: “The focus scanner according to claim 1, where the scanner system comprises a pattern generating element configured for incorporating a spatial pattern in said probe light.”	71
G.	Claim 4: “The focus scanner according to claim 1, where deriving the surface geometry information and surface color information comprises calculating for several 2D images a correlation measure between the portion of the 2D image captured by said block of image sensor pixels and a weight function, where the weight function is determined based on information of the configuration of the spatial pattern.”	72
H.	Claim 5: “The focus scanner according to claim 4, wherein deriving the surface geometry information and the surface color information for a block of image sensor pixels comprises identifying the position along the optical axis at which the corresponding correlation measure has a maximum value.”	75
I.	Claim 7: “The focus scanner according to claim 6, where the maximum correlation measure value is the highest calculated correlation measure value for the block of image sensor pixels and/or the highest maximum value of the correlation measure function for the block of image sensor pixels.”	76
J.	Claim 8: “The focus scanner according to claim 5, wherein the data processing system is configured for determining a sub-scan color for a point on a generated sub-scan based on the surface color information of the 2D image in the series in which the correlation measure has its maximum value for the corresponding block of image sensor pixels.”	77

K.	Claim 9: “The focus scanner according to claim 8, wherein the data processing system is configured for deriving the sub-scan color for a point on a generated sub-scan based on the surface color information of the 2D images in the series in which the correlation measure has its maximum value for the corresponding block of image sensor pixels and on at least one additional 2D image.”	80
L.	Claim 10: “The focus scanner according to claim 9, where the data processing system is configured for interpolating surface color information of at least two 2D images in a series when determining the sub-scan color.”	82
M.	Claim 15: “The focus scanner according to claim 1, where the color image sensor comprises a color filter array comprising at least three types of colors filters, each allowing light in a known wavelength range, W1, W2, and W3 respectively, to propagate through the color filter.”	83
N.	Claim 16: “The focus scanner according to claim 15, where the surface geometry information is derived from light in a selected wavelength range of the spectrum provided by the multichromatic light source.”	84
O.	Claim 18: “The focus scanner according to claim 16, wherein the selected wavelength range matches the W2 wavelength range.”	85
P.	Claim 21: “The focus scanner according to claim 15, where the surface geometry information is derived from light in a selected wavelength range of the spectrum provided by the multichromatic light source.”	85
Q.	Claim 22	86
	1. [22.P]: “A method of recording surface geometry and surface color of an object”	86
	2. [22.1]: “obtaining a focus scanner according to claim 1.”	87
	3. [22.2]: “illuminating the surface of said object with multichromatic probe light from said multichromatic light source”	88
	4. [22.3]: “capturing a series of 2D images of said object using said color image sensor.”	89

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.