

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIGN TECHNOLOGY, INC.
Petitioner

v.

3SHAPE A/S
Patent Owner

Case No. PGR2018-00103
Patent 9,962,244

**CORRECTED PETITION FOR POST-GRANT REVIEW
OF U.S. PATENT NO. 9,962,244**

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different focus plane position such that the series of captured 2D images forms a stack of 2D images”24

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”25

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”26

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, and”28

9. [1.5.b]: “determining [sic] object color of at 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”29

10. [1.5.c]: “such that the digital 3D representation expresses both geometry and color profile of the object”30

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.”31

 a) Fisker.....31

 b) Szeliski (Ground 1)32

 c) Matsumoto (Ground 2).....34

 d) Motivation to Combine: Fisker and Szeliski (Ground 1) and Fisker and Matsumoto (Ground 2)37

B. 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.”44

C. 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.”44

D. 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.”45

E. 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.”47

F. 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.”48

G. 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.”48

H. 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.”50

I. 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.”51

J. 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.”51

K. 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.”52

L. Claim 18: “The focus scanner according to claim 16, wherein the selected wavelength range matches the W2 wavelength range.”53

M. Claim 21: “The focus scanner according to claim 3, where the information of the saturated pixel in the computing of the pattern generating element is

configured to provide that the spatial pattern comprises alternating dark and bright regions arranged in a checkerboard pattern.”54

N. Claim 2255

1. [22.P]: “A method of recording surface geometry and surface color of an object”55

2. [22.1]: “obtaining a focus scanner according to claim 1”55

3. Limitations [22.2]-[22.4].....56

O. Claim 24: “The focus scanner according to claim 1, wherein the multichromatic light source, the color image sensor, and at least a portion of the data processing system are included in a hand held unit.”56

P. Claim 26: “The focus scanner according to claim 9, wherein said at least one additional 2D image comprises a neighboring 2D image from the series of captured 2D images.”57

Q. Claim 28: “The focus scanner according to claim 10, where the interpolation is of surface color information of neighboring 2D images in a series.”58

VIII. Grounds 3 and 4: The combinations of Fisker and Yamada (Ground 3) and Fisker and Suzuki (Ground 4) render claim 29 obvious. 58

A. Claim 2958

1. Limitations [29.P]-[29.4.b]:58

2. [29.5]: “where the data processing system further is configured to detecting (sic) saturated pixels in the captured 2D images and for mitigating or removing the error in the derived surface color information or the sub-scan color caused by the pixel saturation.”59

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b) Yamada (Ground 3)60

c) Suzuki (Ground 4).....61

d) Motivation to Combine: Fisker and Yamada (Ground 3) and Fisker and Suzuki (Ground 4)62

IX. Grounds 5-8: The combinations of Fisker, Szeliski, and Yamada (Ground 5), Fisker, Szeliski, Suzuki (Ground 6), Fisker, Matsumoto, and Yamada (Ground 7), and Fisker, Matsumoto, and Suzuki (Ground 8) render claim 12 obvious..... 66

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