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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/217,943	12/12/2018	Rune FISKER	0079124-000233	1097
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Please find below and/or attached an Office communication concerning this application or proceeding.

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3SHAPE EXHIBIT 2001
Medit v. 3Shape
IPR2023-01316

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, 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. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 2, 3, 4, 10, 11 and 12 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff), and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz).

Re claim 2, Babayoff discloses a scanner for determining the 3D geometry and color of at least a part of the surface of an object, said scanner comprising: at least one camera accommodating an array of sensor elements (**see fig.1 ¶s 107, 118 for at least one camera (i.e. CCD camera 68 as shown in fig. 4A) accommodating an array of sensor elements (i.e. array of sensing elements)**), a light source for generating a

probe light (**see ¶ 116 for a light source (i.e. endoscope 46 as shown in fig. 4A) for generating a probe light**), an optical system for transmitting the probe light towards the object along an optical path thereby illuminating at least a part of the object in a plurality of configurations (**see ¶ 116 for an optical system (i.e. optical device 22 as shown in fig. 4A) for transmitting the probe light towards the object along an optical path thereby illuminating at least a part of the object in a plurality of configurations (i.e. the endoscope 46 thus emits a plurality of incident light beams 48 impinging on to the surface of the teeth section as shown in fig. 4A))** and for transmitting at least a part of the light returned from the object to the at least one camera (**see ¶ 118 for transmitting at least a part of the light returned from the object to the at least one camera (i.e. the returned light beams are reflected in the direction of the detection optics 60 which includes the CCD camera 68 as shown in fig. 4A))**), and a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times, record different images by the at least one camera at the different times, thereby recording images of the object with the different colors, and combine the different colors from the different images, thereby obtaining the color of the surface of the object (**see ¶ 108 for a hardware processor (i.e. processor 24 as shown in fig. 4B) configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times, record different images by the at least one camera at the different times, thereby recording images of the object with the different colors, and combine the different colors from the different images, thereby obtaining the color of the surface of the object (i.e. selectively illuminating the object 26 with**

suitable colors, typically Green, Red and Blue, and for each such monochromatic illumination, a two dimensional image of the object 26 is captured by the detection optics 60, and the processor 24 then processes the three differently colored monochromatic images and combines the same to provide a full color 2D image of the object). Thus, it would have obvious to one of ordinary skills in the art to use a buffer to record different images captured by the detection optics 60 at the different times, thereby recording images of the object 26 with the different colors)

Babayoff fails to explicitly teach wherein the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern. However, the reference of Heinz explicitly teaches wherein the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern **(see fig. 3 ¶ 66 for the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern (i.e. the multimode interference pattern that illuminates detector 805 is time-varying in accordance with the movement of surface 804 (or end 814 or d)) as described in fig. 8 paragraph 69)**

Therefore, taking the combined teachings of Babayoff and Heinz as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (time-varying) into the system of Babayoff at the time the invention was made as taught by Heinz.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Heinz for the benefit of having illumination arrangement 800 that uses a multimode optical fiber 802 to monitor a surface 804 with a detector 805 (e.g., detector 104 of FIG. 1, detector 302 of FIG. 3A, or detector A of FIG. 7, 7A), so optical radiation 806 that reflects from surface 804 will exhibit time-varying changes if surface 804 vibrates, if fiber 802 moves across surface 804, or if distance d changes (e.g., through tilt or movement of surface 804) in order to ease the processing time and improve efficiency when detecting time-varying changes when surface 804 vibrates (see fig. 8 ¶ 69)

Re claim 3, the combination of Babayoff and Heinz as discussed in claim 2 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the different colors are provided by at least three monochromatic light sources (**see ¶ 126 for the different colors are provided by at least three monochromatic light sources (i.e. a plurality of tri-color LEDs 77 as shown in fig. 5))**)

Re claim 4, the combination of Babayoff and Heinz as discussed in claim 3 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the at least three monochromatic light sources are LEDs (**see ¶ 126 for the at least three monochromatic light sources are LEDs (i.e. a plurality of tri-color LEDs 77 as shown in fig. 5))**)

Re claim 10, Babayoff discloses a method for determining the 3D geometry and color of at least a part of the surface of an object, said method comprising: generating a probe light with a light source (**see ¶ 116 for generating a probe light with a light**

source (i.e. endoscope 46 as shown in fig. 4A)); transmitting the probe light towards the object along an optical path thereby illuminating at least a part of the object in a plurality of configurations (see ¶ 116 for transmitting the probe light towards the object along an optical path thereby illuminating at least a part of the object in a plurality of configurations (i.e. the endoscope 46 thus emits a plurality of incident light beams 48 impinging on to the surface of the teeth section as shown in fig. 4A)) and for transmitting at least a part of the light returned from the object to at least one camera accommodating an array of sensor elements (see ¶ 118 for transmitting at least a part of the light returned from the object to at least one camera (i.e. the returned light beams are reflected in the direction of the detection optics 60 which includes the CCD camera 68 as shown in fig. 4A) accommodating an array of sensor elements (i.e. array of sensing elements)); selectively switching a color of the probe light, thereby illuminating the object with different colors at different times; recording different images by the at least one camera at the different times, thereby recording images of the object with the different colors; and combining the different colors from the different images to obtain the color of the surface of the object (see ¶ 108 for selectively switch a color of the probe light, thereby illuminating the object with different colors at different times; recording different images by the at least one camera at the different times, thereby recording images of the object with the different colors; and combining the different colors from the different images to obtain the color of the surface of the object (i.e. selectively illuminating the object 26 with suitable colors, typically Green, Red and Blue, and for each such monochromatic illumination, a two dimensional image of the object 26 is

captured by the detection optics 60, and the processor 24 then processes the three differently colored monochromatic images and combines the same to provide a full color 2D image of the object). Thus, it would have obvious to one of ordinary skills in the art to use a buffer to record different images captured by the detection optics 60 at the different times, thereby recording images of the object 26 with the different colors)

Babayoff fails to explicitly teach wherein the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern. However, the reference of Heinz explicitly teaches wherein the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern **(see fig. 3 ¶ 66 for the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern (i.e. the multimode interference pattern that illuminates detector 805 is time-varying in accordance with the movement of surface 804 (or end 814 or d)) as described in fig. 8 paragraph 69)**

Therefore, taking the combined teachings of Babayoff and Heinz as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (time-varying) into the system of Babayoff at the time the invention was made as taught by Heinz.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Heinz for the benefit of having illumination arrangement 800 that uses a multimode optical fiber 802 to monitor a surface 804 with a detector 805 (e.g.,

detector 104 of FIG. 1, detector 302 of FIG. 3A, or detector A of FIG. 7, 7A), so optical radiation 806 that reflects from surface 804 will exhibit time-varying changes if surface 804 vibrates, if fiber 802 moves across surface 804, or if distance d changes (e.g., through tilt or movement of surface 804) in order to ease the processing time and improve efficiency when detecting time-varying changes when surface 804 vibrates (see fig. 8 ¶ 69)

Re claim 11, the combination of Babayoff and Heinz as discussed in claim 3 above discloses all the claimed limitations of claim 11.

Re claim 12, the combination of Babayoff and Heinz as discussed in claim 4 above discloses all the claimed limitations of claim 12.

2. Claims 5 and 13 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff) as applied to claims 2, 3, 4, 10, 11 and 12 above, and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz), and further in view of Goto et al. (US 5,737,339) (hereinafter Goto).

Re claim 5, the combination of Babayoff and Heinz as discussed in claim 3 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the at least three monochromatic light sources (**see ¶ 126 for the at least three monochromatic light sources are LEDs (i.e. a plurality of tri-color LEDs 77 as shown in fig. 5))**

Babayoff fails to explicitly teach are in the form of a segmented LED. However, the reference of Goto explicitly teaches are in the form of a segmented LED (**see col. 11 lines 16-18 for a segmented LED (i.e. 7 segment LED 40 as shown in fig. 19))**

Therefore, taking the combined teachings of Babayoff, Heinz and Goto as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (segmented LED) into the system of Babayoff at the time the invention was made as taught by Goto.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Goto for the benefit of having 7 segment LED that comprises seven segments 41a-41g, wherein each of the segments consists of, for example, a diode, and the numbers from 0 to 9 in decimal are indicated by activating or non-activating each of the segments in order to ease the processing time and have a user friendly interaction (see fig. 19 col. 11 lines 16-50)

Re claim 13, the combination of Babayoff, Heinz and Goto as discussed in claim 5 above discloses all the claimed limitations of claim 13.

3. Claims 6 and 14 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff) as applied to claims 2, 3, 4, 10, 11 and 12 above, and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz), and further in view of Konno et al. (US 2006/0251408 A1) (hereinafter Konno).

Re claim 6, the combination of Babayoff and Heinz as discussed in claim 3 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the hardware processor (**see ¶ 108 for the hardware processor (i.e. processor 24 as shown in fig. 4B)**)

Babayoff fails to explicitly teach selectively switches the color of the probe light by switching on and off the at least three monochromatic light sources. However, the

reference of Konno explicitly teaches selectively switches the color of the probe light by switching on and off the at least three monochromatic light sources **(see figs. 7-10 ¶s 247, 252, 262 for selectively switches the color of the probe light by switching on and off the at least three monochromatic light sources)**

Therefore, taking the combined teachings of Babayoff, Heinz and Konno as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (switching on and off) into the system of Babayoff at the time the invention was made as taught by Konno.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Konno for the benefit of having operation of a monitor mode that is a mode that acquires an RGB image as a moving image by means of the frame sequential method by sequentially obtaining: from the illumination light of six primary colors of the first to sixth LEDs 6a to 6f, a state in which the first LED 6a and second LED 6b that correspond to a blue (B) category are turned on, a state in which the third LED 6c and fourth LED 6d that correspond to a green (G) category are turned on, and a state where a fifth LED 6e and sixth LED 6f that correspond to a red (R) category are turned on, and the first LED 6a and second LED 6b are turned off once image pickup by the CCD 8 has ended in order to ease the processing time when illuminating light of six primary colors of the first to sixth LEDs 6a to 6f (see figs. 7-9 ¶s 246-247, 252)

Re claim 14, the combination of Babayoff and Heinz as discussed in claim 11 above discloses all the claimed limitations but fails to explicitly teach wherein the selective switching of the color of the probe light includes switching on and off the at least three monochromatic light sources. However, the reference of Konno explicitly

teaches wherein the selective switching of the color of the probe light includes switching on and off the at least three monochromatic light sources (**see figs. 7-10 ¶s 247, 252, 262 for the selective switching of the color of the probe light includes switching on and off the at least three monochromatic light sources**)

Therefore, taking the combined teachings of Babayoff, Heinz and Konno as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (switching on and off) into the system of Babayoff at the time the invention was made as taught by Konno.

Per claim 14, Babayoff, Heinz and Konno are combined for the same motivation as set forth in claim 6 above.

4. Claims 7 and 15 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff) as applied to claims 2, 3, 4, 10, 11 and 12 above, and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz), and further in view of Vieillefosse et al. (US 5,428,450) (hereinafter Vieillefosse).

Re claim 7, the combination of Babayoff and Heinz as discussed in claim 2 above discloses all the claimed limitations but fails to explicitly teach wherein the optical system is substantially achromatic. However, the reference of Vieillefosse explicitly teaches wherein the optical system is substantially achromatic (**see fig. 1 col. 4 lines 35-50 for the optical system is substantially achromatic**)

Therefore, taking the combined teachings of Babayoff, Heinz and Vieillefosse as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this

feature (achromatic) into the system of Babayoff at the time the invention was made as taught by Vieillefosse.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Vieillefosse for the benefit of having an optical system that comprises two achromatic doublets 24, wherein light backscattered by an object is picked up by the optical system of the measurement assembly 16, with the diameters and the focal lengths of the lenses in the first achromatic doublet 24 being such that the optical system picks up backscattered light, and the image of the surface of the object is re-formed on the diaphragm 28 by the achromatic doublet 24 with a magnification equal to 1, and the central orifice of the diaphragm 28 is of small diameter, about 1 mm when determining the color of a tooth in order to improve efficiency when determining the color of a tooth (see fig. 1 col. 5 lines 38-51)

Re claim 15, the combination of Babayoff and Heinz as discussed in claim 11 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the probe light is transmitted through an optical system **(see ¶ 116 for the probe light is transmitted through (i.e. the endoscope 46 thus emits a plurality of incident light beams 48 impinging on to the surface of the teeth section as shown in fig. 4A) an optical system (i.e. optical device 22 as shown in fig. 4A))**

Babayoff fails to explicitly teach an optical system that is substantially achromatic. However, the reference of Vieillefosse explicitly teaches an optical system that is substantially achromatic **(see fig. 1 col. 4 lines 35-50 for the optical system is substantially achromatic)**

Therefore, taking the combined teachings of Babayoff, Heinz and Vieillefosse as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (achromatic) into the system of Babayoff at the time the invention was made as taught by Vieillefosse.

Per claim 15, Babayoff, Heinz and Vieillefosse are combined for the same motivation as set forth in claim 7 above.

5. Claims 8 and 16 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff) as applied to claims 2, 3, 4, 10, 11 and 12 above, and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz), and further in view of Sirat (US 2009/0231649 A1) (hereinafter Sirat).

Re claim 8, the combination of Babayoff and Heinz as discussed in claim 2 above discloses all the claimed limitations but fails to explicitly teach wherein the time-varying illumination pattern is a line pattern. However, the reference of Sirat explicitly teaches wherein the time-varying illumination pattern is a line pattern **(see figs. 2-3 ¶s 8, 35-36 for the time-varying illumination pattern is a line pattern)**

Therefore, taking the combined teachings of Babayoff, Heinz and Sirat as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (line pattern) into the system of Babayoff at the time the invention was made as taught by Sirat.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Sirat for the benefit of having an illumination module 8 that includes a laser 14 equipped with appropriate imaging optics and an adequate optical or

holographic component 16 (array generator, or beam shaper, in FIG. 3) adapted to create a line array pattern 10 in the far field, varying in time to produce successive elementary objects in order to improve efficiency when creating a line array pattern 10 (see figs. 2-3 ¶s 8, 35)

Re claim 16, the combination of Babayoff, Heinz and Sirat as discussed in claim 8 above discloses all the claimed limitations of claim 16.

6. Claims 9 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Babayoff (US 2005/0283065 A1)(hereinafter Babayoff) as applied to claims 2, 3, 4, 10, 11 and 12 above, and further in view of Heinz et al. (US 2007/0041729 A1) (hereinafter Heinz), and further in view of Lovely (US 2007/0134615 A1) (hereinafter Lovely).

Re claim 9, the combination of Babayoff and Heinz as discussed in claim 2 above discloses all the claim limitations with additional claimed feature taught by Babayoff wherein the at least one camera is **(i.e. CCD camera 68 as shown in fig. 4A)** Babayoff fails to explicitly teach two cameras. However, the reference of Lovely explicitly teaches two cameras **(see ¶ 66 for two cameras)**

Therefore, taking the combined teachings of Babayoff, Heinz and Lovely as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature (two cameras) into the system of Babayoff at the time the invention was made as taught by Lovely.

One will be motivated to incorporate the above feature into the system of Babayoff as taught by Lovely for the benefit of having a camera-based system, a tooth can be illuminated at two or more wavelengths using one or more light sources, and

images at two wavelengths obtained simultaneously with two cameras using fixed or sequentially switched optical filters, dichroic mirrors or other wavelength selective devices in order to ease the processing time and have a user friendly interaction (see ¶ 66)

Re claim 17, the combination of Babayoff, Heinz and Lovely as discussed in claim 9 above discloses all the claimed limitations of claim 17.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSE M MESA whose telephone number is (571)270-1706. The examiner can normally be reached on Monday-Friday 8:30AM-6:00PM ET.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thai Tran can be reached on 571-272-7382. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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JOSE M. MESA
Examiner
Art Unit 2484
2/1/2019

/THAI Q TRAN/
Supervisory Patent Examiner, Art Unit 2484

<i>Notice of References Cited</i>	Application/Control No. 16/217,943		Applicant(s)/Patent Under Reexamination FISKER et al.	
	Examiner JOSE M MESA		Art Unit 2484	Page 1 of 1

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*	B	US-20070041729-A1	02-2007	Heinz; Philip	G01B11/303	398/25
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*	D	US-5428450-A	06-1995	Vieillefosse; Michel	A61C13/082	356/405
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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PTO/SB/08a (02-18)

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	16217943
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First Named Inventor	Rune FISKER et al.
Art Unit	2852
Examiner Name	
Attorney Docket Number	0079124-000233-T1

U.S.PATENTS

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Examiner Name	
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Application Number	16217943
Filing Date	2018-12-12
First Named Inventor	Rune FISKER et al.
Art Unit	2852
Examiner Name	
Attorney Docket Number	0079124-000233-T1

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	International Search Report (PCT/ISA/210) issued on October 6, 2010, by Denmark Patent Office as the International Searching Authority for International Application No. PCT/DK2010/050148.	
	2	Written Opinion (PCT/ISA/237) issued on October 6, 2010, by Denmark Patent Office as the International Searching Authority for International Application No. PCT/DK2010/050148.	
	3	Notification Concerning Transmittal of Copy of International Preliminary Report on Patentability (Forms PCT/1B/326 and PCT/1B/373) and the Written Opinion of the International Searching Authority (Form PCT/ISA237) issued on January 5, 2012, in the corresponding International Application No. PCT /DK2010/050148.	
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