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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAVID H. DONOVAN

Appeal 2019-005784
Application 15/111,949
Technology Center 1700

Before MAHSHID D. SAADAT, DONNA M. PRAISS, and
BRIAN D. RANGE, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner's decision to reject claims 1–16. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM IN PART.

¹ In this Decision, we refer to the Specification filed July 15, 2016 (“Spec.”), the Final Office Action dated Sept. 7, 2018 (“Final Act.”), the Appeal Brief filed Feb. 7, 2019 (“Appeal Br.”), the Examiner's Answer dated May 29, 2019 (“Ans.”), and the Reply Brief filed July 23, 2019 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Hewlett-Packard Development Company, L.P. as the real party in interest. Appeal Br. 1.

STATEMENT OF THE CASE

The invention relates to an additive manufacturing system in which three-dimensional objects are produced on a layer-by-layer basis and in small quantities. Spec. ¶ 2. Claim 1, reproduced below, is illustrative of the subject matter on appeal (disputed limitations are italicized).

1. An apparatus for generating a three-dimensional object, the apparatus comprising:

a radiation sensor to measure absorbance or gloss of build material; and

a controller to:

control an energy source to apply energy to a layer of the build material to cause a portion of the layer to coalesce and solidify to form a slice of the three-dimensional object;

receive, from the radiation sensor, data representing measured absorbance or measured gloss of the portion of the layer;

determine whether the measured absorbance or measured gloss of the portion of the layer is indicative of an incorrect degree of solidification of a part of the layer;
and

control the apparatus to modify a process parameter in response to determining the measured absorbance or measured gloss is indicative of the incorrect degree of solidification of the part of the layer.

Appeal Br. 14 (Claims Appendix). Independent claim 14 is similar to claim 1, but recites for the controller's receive action:

receive, from the radiation sensor, data representing measured absorbance of the portion of the layer, the measured absorbance based on detection by the radiation sensor of an amount of the unfocused radiation that is reflected by the build material.

Id. at 18.

ANALYSIS

We review the appealed rejections for error based upon the issues Appellant identifies, and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”). After considering the argued claims and each of Appellant’s arguments, we are not persuaded of reversible error in the appealed rejections except where otherwise indicated below.

The Examiner’s rejections rely on the following prior art references:

Name	Reference	Date
Tochimoto	US 6,799,959 B1	Oct. 5, 2004
Coe	US 2002/0086247 A1	July 4, 2002
Toyserkani	US 2004/0133298 A1	July 8, 2004
Philippi	US 2009/0152771 A1	June 18, 2009

The Examiner maintains the following rejections:

Claims Rejected	35 U.S.C. §	References/Basis
1, 4–10, 12, 13, 15	103(a)	Philippi, Toyserkani
2, 3, 11	103(a)	Philippi, Toyserkani, Tochimoto

Claims Rejected	35 U.S.C. §	References/Basis
14, 16	103(a)	Philippi, Toyserkani, Coe

Appellant argues claims 1, 4–10, 12, 13, and 15 subject to the first rejection as a group and relies on those same arguments for claims 2, 3, and 11³ subject to the second rejection. Appeal Br. 8–10. Therefore, in view of the lack of separate arguments directed to the rejected claim group and the subsidiary rejection of claims 2, 3, and 11, claims 2–13, and 15 stand or fall with independent claim 1. 37 C.F.R. § 41.37(c)(1)(iv). We separately address claims 1, 14, and 16 below.

Claim 1

Appellant contends Toyserkani is silent regarding gloss, therefore there is no disclosure of either “receive . . . data representing . . . measured gloss of the portion of the layer” nor “determine whether the measured absorbance or measured gloss . . . is indicative of an incorrect degree of solidification” as required by claim 1. Appeal Br. 9. Appellant argues Toyserkani instead uses “preprocessed images fed into a complex algorithm are used to determine dimensions and rate of solidification.” *Id.* at 10 (citing Toyserkani ¶¶ 42, 44–47).

Appellant’s arguments do not persuade us that the Examiner reversibly erred in rejecting claim 1 as obvious over the teachings of Philippi in view of Toyserkani.

³ We understand Appellant’s omission of claim 11 on page 10 of the Appeal Brief to be a typographical error in the restatement of the Examiner’s rejection of claims 2, 3, and 11.

Appellant’s argument that Toyserkani does not teach determining a degree of solidification from measured gloss is not persuasive of error because the rejection is over the combined teachings of Toyserkani and Philippi. As the Examiner correctly finds, Appellant’s Specification broadly defines gloss as “an optical property of a surface to reflect radiation in a specular direction.” Ans. 4; Spec. ¶ 16. The record supports the Examiner’s finding that Philippi teaches detecting defects and/or irregularities in a newly applied powder layer based on measuring reflected radiation with an IR-infrared camera, which the Examiner equates with the claimed “radiation sensor.” Ans. 4; Final Act. 3; Philippi ¶¶ 18, 19, 29. The record also supports the Examiner’s finding that Toyserkani teaches detecting degrees of solidification of a newly applied layer to minimize distortion and improve surface quality. Ans. 4; Toyserkani ¶¶ 3, 11, 15. Based on these teachings, the Examiner reasonably determines (Ans. 4) it would have been obvious to a person having ordinary skill in the art to use Philippi’s reflected radiation measurement to detect degrees of solidification as taught by Toyserkani.

Appellant raises a new argument in the Reply Brief (Reply Br. 5–6) that Philippi does not disclose measuring gloss because “specular reflection,” as used in the Specification’s definition of gloss, requires measuring radiation reflected at an opposite and equal angle from the radiation emission is not persuasive of error. This argument was not presented in the Appeal Brief, and Appellant has not proffered a showing of good cause explaining why the argument could not have been presented in the Appeal Brief. Therefore, we will not consider this new and untimely argument in our assessment of the Examiner’s § 103 rejections. 37 C.F.R. §§ 41.37, 41.41.

Even if we were to consider Appellant's new argument, Appellant's assertion that the Specification requires "gloss" to be measured by measuring radiation reflected at an opposite and equal angle from the radiation emission as described in the Specification's paragraph 72 is not supported by the preponderance of the evidence in this record. Paragraph 72 itself indicates that the radiation sensor "*may* measure any of the radiation . . . that exhibits specular reflection at the opposite and equal angle . . . from the surface of the un-solidified portion. Spec. ¶ 72 (emphasis added). The Specification also describes only measuring the post-energy specular reflection where a reference specular reflection may be a known quantity based on known properties of the build material and system. *Id.* ¶ 75. We also note that paragraph 76 describes using a radiation sensor at a non-specular angle and that the degree of non-specular reflection may negatively correlate with gloss of the portion. *Id.* ¶ 76. Thus, Appellant's distinctions over how Philippi's radiation sensor measures an optical property of the build material surface do not sufficiently distinguish the claimed apparatus.

The preponderance of the evidence in this appeal record therefore supports the Examiner's conclusion that the claimed subject matter would have been obvious in view of Philippi's apparatus as modified by Toyserkani's teaching to monitor solidification rate in real time to create a product with minimal distortion and improved surface quality. Accordingly, we affirm the Examiner's rejection of claim 1 under 35 U.S.C. § 103(a) for the above reasons and those provided by the Examiner.

Because we find Appellant’s arguments unpersuasive of error in the Examiner’s rejection of claim 1 for the reasons discussed above, we likewise affirm the Examiner’s rejection of claims 2–13, and 15 for the same reasons.

Claims 14 and 16

Claim 14 is independent⁴ and claim 16, which depends from claim 1, recites “wherein the data received from the radiation sensor comprises data representing the measured absorbance, and the controller is to control the apparatus to modify the process parameter if the measured absorbance indicates an incorrect degree of solidification of a part of the layer.” Appeal Br. 18, 19 (Claims Appendix). Appellant contends the Examiner erred in rejecting claims 14 and 16 over the combination of Philippi, Toyserkani, and Coe because (1) Coe does not disclose measuring “absorbance based on detection by the radiation sensor of an amount of the unfocused radiation that is reflected by the build material” as recited in claim 14 and (2) the combination of Philippi and Toyserkani does not disclose the disputed limitation discussed above in connection with claim 1. Appeal Br. 11; Reply Br. 10.

Appellant’s arguments are persuasive of error by the Examiner because, unlike claim 1 which requires “a radiation sensor to measure absorbance or gloss of build material,” claim 14 requires “a radiation sensor to measure absorbance of build material.” The Examiner finds that Philippi and Toyserkani do not explicitly mention measuring absorbance of the layer, which the Examiner equates with optical density. Final Act. 10. The

⁴ Should prosecution continue, the Examiner might consider whether claim 14’s recitation “or measured gloss” has an antecedent basis in claim 14.

Examiner also finds that Coe does not disclose measuring optical density. Ans. 11. The Examiner does not adequately explain why a person having ordinary skill in the art would have modified Philippi and Toyserkani such that absorbance or optical density is measured to determine whether the measured absorbance is indicative of an incorrect degree of solidification as required by claims 14 and 16. Even if a skilled artisan would understand from Coe's method for providing color to a 3D object that optical density should be measured to determine how heat affects the optical density as the Examiner determines (Ans. 5), the Examiner does not adequately explain why one skilled in the art would have used optical density rather than Philippi's measured reflected radiation to detect defects and/or irregularities in a newly applied powder layer. Absent such reasoning for combining the prior art references, we are persuaded by Appellant that the Examiner reversibly erred in rejecting claims 14 and 16 over the combination of Philippi, Toyserkani, and Coe.

CONCLUSION

For these reasons and those the Examiner provides, we uphold the Examiner's rejection of claims 1–13 and 15 under 35 U.S.C. § 103(a) as obvious over the combination of Philippi and Toyserkani alone or in further view of Tochimoto.

For the reasons provided by Appellant and above, we reverse the Examiner's rejection of claims 14 and 16 under 35 U.S.C. § 103(a) as obvious over Philippi, Toyserkani, and Coe.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed
1, 4–10, 12, 13, 15	103(a)	Philippi, Toyserkani	1, 4–10, 12, 13, 15	
2, 3, 11	103(a)	Philippi, Toyserkani, Tochimoto	2, 3, 11	
14, 16	103(a)	Philippi, Toyserkani, Coe		14, 16
Overall Outcome			1–13, 15	14, 16

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED IN PART