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3D Systems, Inc. Attn: Keith A. Roberson 333 Three D Systems Circle Rock Hill, SC 29730			MINSKEY, JACOB T	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GUTHRIE COOPER¹

Appeal 2015-002907
Application 13/327,119
Technology Center 1700

Before TERRY J. OWENS, WESLEY B. DERRICK, and
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

DERRICK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's maintained rejection² under 35 U.S.C. § 103 of claims 1 and 5 over Khalil ("Optical Advances Speed Rapid Prototyping")³ in view of Wang,⁴ Hunter,⁵

¹ The real party in interest is 3D Systems, Inc. Appeal Br. 2.

² Appellant errs in setting forth the grounds of rejection to be reviewed on appeal (Appeal Br. 10) as explained by the Examiner (Ans. 8; *see also* Final Act. 2–8).

³ Appellant submitted Khalil in an Information Disclosure Statement received May 4, 2012, and does not contest its prior art status.

⁴ US 6,931,035 B2, issued August 16, 2005.

⁵ Hunter et al., US 5,339,323, issued August 16, 1994.

and Kerekes,⁶ and of claims 2–4 and 6–12 in further view of Paoli.⁷ We have jurisdiction under 35 U.S.C. § 6.

We AFFIRM.

BACKGROUND

The subject matter on appeal relates to stereolithographic systems and methods that include use of a scanning system that directs a laser beam to a focus position on the surface of a build material in accordance with build instructions to form a three-dimensional object. Spec. Abstract. Independent claim 1 is directed to a method. Independent claims 6 and 9 are directed to stereolithography systems.

Claim 1, reproduced below from the Claims Appendix (Appeal Br. 17), is representative.

1. A method of forming a three-dimensional object from a build material using a diode-pumped frequency-multiplied solid state (DPFMSS) laser having a Q-switch and a laser diode assembly, the method comprising:

controlling the DPFMSS laser by internal modulation using either pulse-width modulation of the Q-switch or current modulation of the laser diode assembly, to generate a laser beam comprising laser pulses having select amounts of energy that define a laser beam power, wherein the select amounts of energy vary according to build instructions for building the three-dimensional object;

directing the laser beam from the laser to a scanning system over an external optical path without performing external modulation within the external optical path;

⁶ Kerekes et al., US 7,339,712 B2, issued March 4, 2008.

⁷ US 5,151,915, issued September 29, 1992.

using the scanning system, directing the laser beam to a focus position on the build material to form bullets therein to define a build layer based on the build instructions; and

repeating the build layer formation to form the three-dimensional object from the build material while adjusting the laser beam power and the focus position to correct for variations in the laser beam power and the focus position.

Claim 6—directed to a stereolithographic system—largely corresponds to claim 1 in that it recites the elements necessary to provide the steps of the method set forth in claim 1. Claim 6 differs, however, in that its recited controller is configured to cause the “DPFMSS laser to operate in current modulation mode” and in that it recites “a laser power meter configured to measure an amount of power in the laser beam and provide an electrical signal to the controller” allowing for adjustment of the current provided to the laser diode assembly. Claims 1, 6.

DISCUSSION⁸

Upon consideration of the evidence on this record and each of Appellant’s contentions that are properly before us, we find that a preponderance of the evidence supports the Examiner’s determination that one of ordinary skill in the art, armed with the knowledge provided in the applied prior art would have been led to the subject matter on appeal for reasons set forth by the Examiner in the Final Office Action and the Examiner’s Answer.

⁸ We refer to the Final Office Action mailed May 12, 2014, the Appeal Brief filed October 8, 2014, the Examiner’s Answer mailed November 7, 2014, and the Reply Brief filed November 25, 2014.

“[T]he Examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

To prevail in an appeal to this Board, Appellant must adequately explain or identify reversible error in the Examiner’s rejection. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2012); *see also In re Jung*, 637 F.3d 1356, 1365–66 (Fed. Cir. 2011) (explaining that even if the Examiner had failed to make a *prima facie* case, it has long been the Board’s practice to require an Appellant to identify the alleged error in the examiner’s rejection).

In considering the Appeal Brief and Reply Brief, we find many of Appellant’s arguments in the Reply Brief are arguments first raised in the Reply Brief which could have been presented in the Appeal Brief and are therefore waived for purposes of the present appeal. 37 C.F.R. § 41.41(b)(2); *see also Ex parte Nakashima*, 93 USPQ2d 1834, 1837 (BPAI 2010) (informative) (explaining that arguments and evidence not timely presented in the Principal Brief, will not be considered when filed in a Reply Brief, absent a showing of good cause explaining why the argument could not have been presented in the Principal Brief); *Ex parte Borden*, 93 USPQ2d 1473, 1477 (BPAI 2010) (informative) (“[p]roperly interpreted, the Rules do not require the Board to take up a belated argument that has not been addressed by the Examiner, absent a showing of good cause.”). “[A]n issue not raised by an appellant in its opening brief . . . is waived.” *Optivus Tech., Inc. v. Ion Beam Appl’ns S.A.*, 469 F.3d 978, 989 (Fed. Cir. 2006) (citation omitted) (internal quotations omitted).

In the Appeal Brief, Appellant addresses grounds of rejection that were earlier set forth during examination—the rejections of claims 1 and 5

as anticipated by Khalil, of claims 1 and 5 as obvious over Khalil in view of Wang and Hunter, and of claims 2–4 and 6–12 as obvious over Khalil in view of Khalil, Wang, Hunter, Paoli, and Kerekes—rather than those set forth in the Final Office Action. *Compare* Appeal Br. 10 *with* Final Act. 2, 5. We note further that the statement of the grounds in the Examiner’s Answer is the same as that in the Final Office Action. *Compare* Ans. 2–8 with Final Act. 2–8. Appellant provides no good cause, accordingly, why Appellant’s arguments not raised until the Reply Brief could not have been raised in the Appeal Brief. *Generally* Reply Br.

Claims 1 and 5

The Examiner relies on Khalil for its disclosure relating to forming a three-dimensional object from a build material using a diode pumped frequency multiplied solid state laser having a Q-switch. Ans. 2–4 (citing Khalil 2, ¶¶ 8–9).

The Examiner relies on Wang as evidencing that lasers, such as those described in Khalil, typically contain laser diode arrays (Ans. 2, citing Wang col. 4, ll. 6–19) and for teaching that “q-switching intervals may be varied to provide pulses of different peak power . . . [and] different energy” (Ans. 3., citing Wang Abstract, Figs. 4A, 4B).

The Examiner relies on Hunter as evidencing that modulation of the Q-switch is typical (well-known) in the art and can be used to generate a laser beam comprising pulses having select energy that defines a laser beam power. Ans. 2–3 (citing Hunter Abstract, col. 3, ll. 26–38).

The Examiner relies on Kerekes for its disclosure that it was known to vary the power of the laser in order to control exposure as needed to provide

the necessary exposure in a fabrication pattern. Ans. 3 (citing Kerekes col. 2, ll. 43–60).

The Examiner concludes in essence that one of ordinary skill in the art at the time of the invention would have found it obvious to modify the laser power of Khalil’s device by Q-switching as taught by Hunter and Wang over the course of building an object according to build instructions motivated by Kerekes’ teaching that the laser power required varies between different regions of the part being built. Ans. 2–4.

Appellant argues against the rejection of claims 1 and 5 as anticipated by Khalil and as unpatentable for obviousness over the combination of Khalil, Wang, and Hunter.⁹ Appeal Br. 11–13.

In addressing the no longer pending anticipation rejection, Appellant contends that Khalil discloses a system that utilizes conventional Q-switching to provide constant output power such that the select amounts of energy are not varied based on the build instructions. Appeal Br. 11–12.

Appellant also contends that Hunter is directed to controlling the Q-switch of a laser to ensure a constant output, that is, to stabilize the output pulse energy so that all of the laser pulses have the same amount of energy. Appeal Br. 13 (citing col. 1, ll. 41–42, col. 3, ll. 3–64, Figs. 2A, 2B, 3A, 3B). Appellant argues that Hunter teaches away from “providing select (different) amounts of energy in the pulses based on the build instructions.” (Appeal Br. 13; Reply Br. 5) and that the combination would be inoperable because “the combined references would force the laser pulses to have the

⁹ As discussed above, claims 1 and 5 stand rejected as obvious over Khalil in view of Wang, Hunter, and Kerekes.

same energy while the build instructions would be trying to force the laser to generate pulses of different energy” (Appeal Br. 14) (emphasis omitted).

Appellant further argues that Khalil, Wang, and Hunter do not teach “internally modulating the Q-switch so that the laser pulses have select amounts of energy, where the select amount vary according to the build instructions for building the three-dimensional object.” Appeal Br. 14.

Appellant’s argument that Khalil’s system provides constant output is without merit because it fails to address the combination of references as relied on by the Examiner. It is axiomatic that “one cannot show non-obviousness by attacking references individually where . . . the rejections are based on combinations of references.” *In re Keller*, 642 F.2d 413, 426 (CCPA 1981). Likewise, the arguments that the combination of Khalil, Wang, and Hunter does not provide for “laser pulses hav[ing] select amounts of energy, where the select amount vary according to the build instructions” is wholly unpersuasive where it does not address the Examiner’s reliance and reasoning grounded on Kerekes’ disclosure that it was known to vary the power of the laser as needed to provide the necessary exposure in a fabrication pattern.

Appellant’s argument that Hunter teaches away from providing pulses of laser energy that differ is unpersuasive because the teaching in Hunter is that the output pulse energy can be stabilized, or perhaps even that it is preferable, not that must be. *See, e.g., Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006) (“We will not read into a reference a teaching away from a process where no such language exists.”). Whether a reference teaches away from a claimed invention is a question of fact. *In re Harris*, 409 F.3d 1339, 1341 (Fed. Cir.

2005). Where Hunter discloses controlling the output pulse energy by modulation of the Q-switch, we discern no teaching that would lead a person of ordinary skill away from providing varied output pulse energies if that was desired, but rather find Hunter to reasonably convey to do so. *In re Preda*, 401 F.2d 825, 826 (CCPA 1968) (“[I]t is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.”).

Appellant’s argument that the combination would be inoperable because the combined references would force laser pulses to have the same energy while the build instructions would direct the laser to generate pulses of different energy is without persuasive merit both because it fails to address the relied on combination that includes Kerekes and what that combination would have suggested to one of ordinary skill in the art. *Cf. Keller*, 642 F.2d at 425 (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of a primary reference . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

In the Reply Brief, Appellant again argues Khalil teaches fixed output power (Reply Br. 4, 12) and that Hunter teaches away from varying the laser pulse energy (Reply Br. 4, 11, 12), which is not persuasive for the reasons set forth above.

Appellant proffers new arguments addressing the teachings of Kerekes and Wang that are untimely as these arguments address the grounds of rejection using these references as applied in the Final Office Action (Final Act. 3–4), as well as in the Answer (3–4). Even when ostensibly directed to the Examiner’s response to Appellant’s arguments (Reply Br.

10–12), we discern no basis for why these arguments could not have been raised in response to the rejection set forth in the Final Office Action, as they do no more than essentially address the ground of rejection set forth by the Examiner (*generally* Reply Br.).

Nor do we find these new arguments to be merely clarifications of any prior argument as implied, for example, by the statement that “Appellant per above has clarified its arguments with respect to Kerekes” (Reply Br. 11) where the only discussion of Kerekes in the Appeal Brief is that “[t]he citation of Kerekes as teaching the use of laser power meter does not make up for the shortcomings of Khalil, Wang and Hunter” and this was made in regard to the other ground of rejection. Appeal Br. 15. Likewise, the arguments as to Wang go far beyond the limited discussion in the Appeal Brief that “while Wang teaches the use of a diode laser or diode laser array, there is no teaching or suggestion of using current modulation.” Appeal Br. 14 (emphasis omitted).

Accordingly, we find the arguments in the Reply Brief grounded on Kerekes and Wang to be new arguments and deem them waived for purposes of the present appeal.

Taking into account the arguments properly before us, on this record, we are unpersuaded the Examiner erred in rejecting claims 1 and 5.

Claims 2–4 and 6–12

The Examiner relies on the combination of Khalil, Wang, Hunter, and Kerekes as applied to claim 1 above. Ans. 4, 6.

The Examiner relies on Paoli for its teaching that current modulation can be used to control laser output. Ans. 4 (citing Paoli col. 1, ll. 41–53). The Examiner determines where the current modulation is used to control

output, the Q-switch will be operated at a fixed frequency. Ans. 5. The Examiner further concludes that one of ordinary skill in the art would have found it obvious at the time of the invention to monitor and control the current, thus controlling the power, in order to control the heat generated. Ans. 5.

The Examiner further relies on Kerekes for its teaching “monitoring and controlling the power of the laser . . . [with the result] that the amount of laser energy directed to the working surface of the material is controlled.” Ans. 5 (citing Kerekes col. 1, ll. 6–10, 4, ll. 43–62), 7. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time of the invention to have monitored and adjusted the power supplied by the laser in order to achieve optimum exposure. Ans. 5 (citing Kerekes col. 2, ll. 46–51).

Appellant contends the patentability of claims 2–4 and 9–12 on the basis that these claims depend from claim 1 (claims 2–4) or on the basis of the arguments proffered for the patentability of claim 1 (claim 9, and dependent claims 10–12). Appeal Br. 14–15.

As to claim 6, Appellant proffers that “the laser is operated in current modulation mode rather than Q-switch modulation mode” and “that the cited references, taken alone or in combination, do not teach the feature . . . of operating in current modulation mode so that the laser pulses have select amounts of energy, where the select amounts vary according to the build instructions for building the three-dimensional object.” Appeal Br. 14–15. Appellant further contends that “[t]he citation of Kerekes as teaching the use of laser power meter does not make up for the shortcomings of Khalil,

Wang, and Hunter.” Appeal Br. 15. Appellant relies on the dependency of claims 7 and 8 from claim 6. Appeal Br. 15.

In simply restating the claim limitations of claim 6 and asserting that these are not taught, Appellant has failed to present any cogent argument sufficient to address the Examiner’s detailed position. *Cf. In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011) (“[W]e hold that the Board reasonably interpreted Rule 41.37 to require more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art. Because Lovin did not provide such arguments, the Board did not err in refusing to separately address claims 2–15, 17–24, and 31–34.”). Further, Appellant fails to even list Paoli in its argument (Appeal Br. 15) even though the ground of rejection identified by Appellant for claims 2–4 and 6–12 does include Paoli (Appeal Br. 10).

In the Reply Brief, Appellant proffers new arguments grounded on Paoli (Reply Br. 6–9), a reference that was never discussed in the Appeal Brief (*see generally* Appeal Br.), to address the ground of rejection set forth in the Final Office Action (Final Act. 5–8), as well as in the Examiner’s Answer (Ans. 4–8). Appellant also proffers additional arguments as to Kerekes and Hunter. Reply Br. 8–10.

As above, Appellant provides no good reason why these arguments could not have been made earlier and we, accordingly, deem them waived. Accordingly, the only separate argument for patentability before us as to the rejection of claims 2–4 and 6–12 is that for claim 6 discussed above. Appeal Br. 14–15.

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Taking into account the arguments properly before us, on this record, we are unpersuaded the Examiner erred in rejecting claim 6, and claims 7 and 8 depending therefrom. We also affirm the rejection of claims 2–4 and 9–12 as they fall with the rejection of claim 1, affirmed above.

CONCLUSION

We affirm the Examiner's obviousness rejections of claims 1–12.

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