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**EXAMINER**
MAYY, MOHAMMAD

**ART UNIT**

**PAPER NUMBER**

**NOTIFICATION DATE**
09/27/2018

**DELIVERY MODE**
ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARTIN SPARKES, WILLIAM O’NEILL, ANDREW COCKBURN, ROCCO LUPOI, and MATTHEW BRAY
(Applicant: Laser Fusion Technologies, Ltd.)

Appeal 2018–000273
Application 14/350,714
Technology Center 1700


Franklin, Administrative Patent Judge.

DECISION ON APPEAL

1 Appellants identify the real party in interest as Laser Fusion Technologies, Ltd.
Appellants request our review under 35 U.S.C. § 134 of the Examiner’s decision rejecting claims 1–14. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

STATEMENT OF THE CASE

Claim 1 is illustrative of Appellants’ subject matter on appeal and is set forth below (with text in bold for emphasis):

1. A coating process for the deposition of a layer of a first material onto a substrate of a second material, the second material optionally being different from the first material, the process including the steps:

   entraining powder particles of the first material into a carrier gas flow to form a powder beam directed to impinge on the substrate, thereby defining a powder beam footprint region at the substrate;

   causing relative movement of the powder beam and the substrate in a movement direction to move the powder beam footprint relative to the substrate to deposit the layer of the first material; and

   operating a laser source to direct a laser beam along a laser beam principal axis direction to provide a laser beam footprint to cause direct, local heating of at least one of the forward substrate region and the powder beam footprint region, without macroscopic melting of the first material, the laser beam principal axis direction being defined with reference to a plane coincident with or tangential to a surface of the substrate at the centre of the laser beam footprint in terms of an elevation angle from the plane to the laser beam principal axis direction and in terms of an acute azimuthal angle from the movement direction to the laser beam principal axis direction, wherein the elevation angle is 80° or less and the azimuthal angle is ±60° or less.
The Examiner relies on the following prior art references as evidence of unpatentability:

Kar, US 6,203,861 B1, Mar. 20, 2001


THE REJECTIONS

1. Claims 1–2, 5–7, and 10–13 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Kulmala in view of DeBiccare.

2. Claims 3–4 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Kulmala in view of DeBiccare, and in further view of Kar.

3. Claims 8–9 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Kulmala in view of DeBiccare, and further in view of Christoulis.

4. Claim 14 is rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Kulmala in view of DeBiccare, and further in view of Beyer.
ANALYSIS

Upon consideration of the evidence on this record and each of the respective positions set forth in the record, we find that the preponderance of evidence on this record supports Appellants’ position, and we thus reverse each of the rejections essentially for the reasons provide by Appellants in the record, with the following emphasis.

The dispositive issue in this case is whether the Examiner’s interpretation of the secondary reference of DeBicarro is in error. The Examiner relies upon DeBicarro in an effort to supply the missing elements of Kulmala (these missing elements are the claimed elevation angle and azimuthal angle, with particular emphasis on the azimuthal angle). Ans. 2–6. The Examiner acknowledges that Kulmala does not teach the claimed elevation angle and azimuthal angle. Ans. 4. The Examiner relies on DeBiccar to allegedly show the missing angles.

Appellants argue that DeBiccar does not teach the claimed azimuthal angle of ±60° or less for the reasons presented on pages 22–28 of the Appeal Brief. Appellants buttress their position in the Reply Brief.

The recited azimuthal angle is illustrated by, for example, Figure 20 of the Specification (not reproduced here). The Specification explains that the azimuthal angle is “the acute angle suspended between the movement direction A and a projection of the laser beam direction onto the surface of the substrate 100.” Spec. 25:21–23.

Appellants submit that DeBiccar is silent concerning any azimuthal angle, and DeBiccar has no plan view figure showing the laser beam principal axis direction relative to the movement direction. Reply Br. 8. For this reason alone, Appellants submit that the combination of Kulmala
and DeBiccari fails to support an obviousness rejection of claim 1 since neither of these references shows the claimed acute azimuthal angle of ±60°. *Id.*

Appellants argue that, nonetheless, the Examiner speculates that as the substrate of DeBiccari is held stationary in a first mode, the azimuthal angle would be 0°. *Ans. 13. Reply Br. 8.*

Appellants argue that the Examiner further speculates that if the substrate is rotated in a second mode, the azimuthal angle within one cycle would range from ±360°. *Ans. 13. Reply Br. 8–9.*

Appellants submit that this is not a reasonable interpretation of DeBiccari. *Reply Br. 9.* Appellants state that DeBiccari discloses that the laser is positioned to heat the coating after the coating is deposited on the substrate. See, e.g., DeBiccari, ¶¶ 9 and 29. Appellants state that this fundamental aspect of the positioning of the DeBiccari laser beam does not change whether the substrate is stationary, articulated, rotated, or translated. *Reply Br. 9.*

Appellants further argue that, as shown in DeBiccari’s Figure 1 (reproduced on page 10 of the Reply Brief), the laser is not positioned to project through the powder beam from a zone opposite the growing deposited layer.

On the contrary, Appellants states that DeBiccari’s Figure 1 illustrates the laser being projected to the side of the powder beam over the not-shown deposited layer, since the laser is expressly positioned to heat and modify the deposited layer itself. *Reply Br. 9.* DeBiccari discloses:

> With proper settings, a laser could be passed directly over a deposited layer to improve density (sintering) and/or raise the
coating temperature high enough, for a short duration, to recover ductility without significant heat input to the substrate material or underlying prior cold sprayed layer (small thermal gradient). To this end, the system 8 includes a laser 60 which maybe movable to allow the laser beam to apply heat to the entire powder metal material deposit.

DeBiccari, ¶ 29. Reply Br. 9.

Thus, Appellants submit that if one skilled in the art were to speculate regarding the possible range of azimuthal angles consistent with the fundamental DeBiccari requirement that the deposited coating be heated after deposition, and consistent with DeBiccari’s Figure 1 (showing that the laser does not cross the powder beam), the only possible range of DeBiccari azimuthal angles are somewhere between -90° to -180° and/or 90° to 180°. Appellants set forth an illustration of this point on page 11 of the Reply Brief.

Appellants state that, in summary, DeBiccari can at best only suggest an azimuthal angle of -90° to -180° and/or 90° to 180° to ensure that the laser beam is positioned to heat the coating after the coating is deposited on the substrate and to avoid passing through the powder beam itself. Reply Br. 11.

Appellants state that resulting “opposite” laser orientation of DeBiccari when compared to claim 1 is illustrated by a side-by-side comparison of the position of the deposited coating relative to the laser as shown in DeBiccari’s Figure 1 with Appellants’ Figure 19. This comparison is set forth on page 12 of the Reply Brief.

Appellants submit that, as shown in the side-by-side comparison (see again page 12 of the Reply Brief), the laser beam 106 of the present
application has an azimuthal angle of ±60° from the direction of movement to the laser beam principal axis direction causing the laser beam 106 to heat at least one of the forward substrate region or the powder beam footprint region before or as the first material is deposited. Reply Br. 12. Appellants submit that this configuration avoids laser shading by the growing thickness of the deposited material. Appellants states that, on the other hand, DeBiccari at best suggests an azimuthal angle of -90° to -180° and/or 90° to 180° from the direction of movement because the DeBiccari laser 60 must heat the deposited material after the material is deposited on the substrate. Reply Br. 12.

Appellants therefore submit that the combination of Kulmala and DeBiccari does not teach or suggest “operating a laser source to direct a laser beam along a laser beam principal axis . . . to cause direct, local heating of at least one of the forward substrate region and the powder beam footprint region . . . wherein the . . . the azimuthal angle is ±60° or less” as required by claim 1. Reply Br. 12.

We are persuaded by the aforementioned arguments made by Appellants as supported by the preponderance of evidence in the record as discussed by Appellants. As such, we are likewise persuaded that the Examiner’s position made on page 4 of the Answer is not adequately supported by a preponderance of the evidence in the record and note that the Examiner does not adequately point to evidence in the record in support of any reasoned analysis related to findings made pertaining to the azimuthal angle values with regard to the teachings of DeBiccari. It is well settled that the Examiner bears the initial burden of presenting a prima facie case of unpatentability. In re Oetiker, 977 F.2d 1443, 1445 (Fed. Cir. 1992).
In view of the above, we thus reverse Rejection 1. Because the Examiner does not rely upon the other additional references applied in the other rejections to cure the stated deficiencies of the combination of Kulmala in view of DeBiccari, we also reverse Rejections 2–4.

DECISION
Each rejection is REVERSED.

ORDER
REVERSED