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(71) Applicant(s):

ABLER, Jeffrey Alan [US/US]; 150 Treetop Court Georgetown, Kentucky 40324 (US) *(for all designated states)*

(72) Inventor(s):

ABLER, Jeffrey Alan; 150 Treetop Court Georgetown, Kentucky 40324 (US)

(74) Agent(s):

SERBIN, Gary; Koffsky Schwalb LLC 349 Fifth Avenue, Suite 733 New York, New York 10016 (US)

(54) Title (EN): Large Scale High Speed Precision Powder Bed Fusion Additive Manufacturing

(54) Title (FR): FABRICATION ADDITIVE PAR FUSION DE LIT DE POUDRE DE PRÉCISION À GRANDE VITESSE ET GRANDE ÉCHELLE

(57) Abstract:

(EN): A method and system are disclosed for powder bed fusion additive manufacturing that enables faster processing speeds, larger work volumes, and greater precision relative to the state of the art in that field. A two dimensional pattern of laser beams is scanned across each layer of a powder bed with the power of the beams independently controlled in a manner such that the three dimensional temperature distribution of the material being processed and the adjacent previously processed material maintain a maximum value between the points of complete melting and boiling for the given material, while simultaneously controlling the capillary flow of the molten material and thus the melt pool geometry by managing its surface tension through the induced thermal gradients on the surface of the molten material.

(FR): L'invention concerne un procédé et un système pour la fabrication additive par fusion de lit de poudre qui permet des vitesses de traitement plus rapides, des volumes de travail plus grands et une plus grande précision par rapport à l'état de la technique dans ce domaine. Un motif bidimensionnel de faisceaux laser est balayé à travers chaque couche d'un lit de poudre, la puissance des faisceaux étant commandée indépendamment de telle sorte que la distribution de température en trois dimensions du matériau en cours de traitement et du matériau adjacent précédemment traité maintienne une valeur maximale entre les points de fusion complète et d'ébullition pour le matériau donné, tout en commandant simultanément le flux capillaire du matériau fondu et donc la géométrie du bain de fusion en gérant sa tension de surface à travers les gradients thermiques induits sur la surface du matériau fondu.

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