



US012109585B2

(12) **United States Patent**
El-Wardany et al.

(10) **Patent No.:** **US 12,109,585 B2**
(45) **Date of Patent:** **Oct. 8, 2024**

(54) **HYBRID LASER SURFACE PROCESSING AND SPRAY COATING SYSTEM**

(58) **Field of Classification Search**
USPC 427/554, 555, 556
See application file for complete search history.

(71) Applicant: **RTX Corporation**, Farmington, CT (US)

(56) **References Cited**

(72) Inventors: **Tahany El-Wardany**, Vernon, CT (US); **Timothy C. Davenport**, South Windsor, CT (US); **Thomas P. Filburn**, Granby, CT (US); **Eric W. Stratton**, Mansfield, TX (US)

U.S. PATENT DOCUMENTS

5,688,564 A * 11/1997 Coddet C23C 4/02
427/427
5,916,625 A * 6/1999 Rosenberger B05D 3/0486
118/663

(73) Assignee: **RTX CORPORATION**, Farmington, CT (US)

9,592,541 B2 3/2017 Bruck et al.
(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

CN 108441854 A 8/2018
CN 110052714 A * 7/2019 B23K 26/00
(Continued)

(21) Appl. No.: **18/072,935**

OTHER PUBLICATIONS

(22) Filed: **Dec. 1, 2022**

Extended European Search Report for EP Application No. 23213131.8, dated May 3, 2024, pp. 1-9.

(65) **Prior Publication Data**

US 2024/0181492 A1 Jun. 6, 2024

Primary Examiner — Jose I Hernandez-Kenney

(51) **Int. Cl.**

B05D 3/06 (2006.01)
B05B 17/06 (2006.01)
B05D 5/00 (2006.01)
B05D 5/02 (2006.01)
B23K 26/352 (2014.01)
B23K 26/36 (2014.01)

(74) *Attorney, Agent, or Firm* — CANTOR COLBURN LLP

(Continued)

(57) **ABSTRACT**

(52) **U.S. Cl.**

CPC **B05D 3/06** (2013.01); **B05B 17/06** (2013.01); **B05D 3/062** (2013.01); **B05D 3/065** (2013.01); **B05D 5/005** (2013.01); **B05D 5/02** (2013.01); **B23K 26/355** (2018.08); **B23K 26/36** (2013.01); **B25J 15/0019** (2013.01); **F01D 5/005** (2013.01)

Methods and systems for treating components are described. The methods include using a system having a controller, a laser applicator, a coating applicator, and a sensor array. The laser applicator, the coating applicator, and the sensor array are arranged on a treatment arm that is controlled by the controller. The method includes scanning a surface to be treated of the component using the sensor array, cleaning the surface to be treated using the laser applicator, defining surface texture patterns, applying laser texturing, and applying a new coating to the surface to be treated using the coating applicator.

20 Claims, 6 Drawing Sheets

