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**Sanderson**

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(54) **MICROWAVE CURING OF COMPOSITE MATERIAL**  
(71) Applicant: **AIRBUS OPERATIONS LIMITED**, Bristol (GB)  
(72) Inventor: **Timothy Sanderson**, Bristol (GB)  
(73) Assignee: **Airbus Operations Limited**, Bristol (GB)  
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See application file for complete search history.

(56) **References Cited**  
U.S. PATENT DOCUMENTS  
2004/0222554 A1\* 11/2004 Akopyan ..... 264/227  
2010/0289188 A1 11/2010 Graeber et al.  
2011/0031433 A1\* 2/2011 Burchell ..... B29C 70/025 252/62.56  
2011/0163480 A1 7/2011 Herkner  
FOREIGN PATENT DOCUMENTS  
DE 10 2009 052 835 5/2011  
JP 2-6107 1/1990

OTHER PUBLICATIONS  
Search Report for GB 1207230.2 mailed Aug. 10, 2012.  
Jeff Sloan, "Composites—Microwave: An Alternative to the Autoclave?", www.compositesworld.com/articles/microwave-an-alternative-to-the-autoclave, May 2011.  
\* cited by examiner  
*Primary Examiner* — Christina Johnson  
*Assistant Examiner* — Xue Liu  
(74) *Attorney, Agent, or Firm* — Nixon & Vanderhye P.C.

(57) **ABSTRACT**  
A method of curing a composite material. A tool is heated using microwaves. At least a part of the composite material is shielded by reflecting microwaves away from the composite material with a shield. Heat is transferred from the tool through the shield to the composite material. The tool comprises a material which is sensitive to microwaves so that, when microwaves are incident upon the tool, some of the microwaves are absorbed by the microwave-sensitive material, thereby heating the tool.

**13 Claims, 3 Drawing Sheets**

