



(11)

EP 2 886 672 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
12.08.2015 Bulletin 2015/33

(43) Date of publication A2:
24.06.2015 Bulletin 2015/26

(21) Application number: **14197223.2**

(22) Date of filing: **10.12.2014**

(51) Int Cl.:
C22C 32/00 ^(2006.01) **B22F 3/15** ^(2006.01)
B22F 5/00 ^(2006.01) **B22F 5/10** ^(2006.01)
B22F 7/06 ^(2006.01) **C22C 1/10** ^(2006.01)
C22C 33/02 ^(2006.01)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(30) Priority: **12.12.2013 US 201314103895**

(71) Applicant: **General Electric Company
Schenectady, New York 12345 (US)**

(72) Inventors:
• **Didomizio, Richard**
Niskayuna, NY 12309 (US)
• **Dial, Laura Cerully**
Niskayuna, NY 12309 (US)

(74) Representative: **Szary, Anne Catherine**
GPO Europe
GE International Inc.
The Ark
201 Talgarth Road
Hammersmith
London W6 8BJ (GB)

(54) **PARTICULATE STRENGTHENED ALLOY ARTICLES AND METHODS OF FORMING**

(57) An article and a method for forming the article are presented. The article includes a material comprising a metal matrix and a first population of particulate phases disposed macroscopically non-uniformly within the ma-

trix. The particulate phases include an oxide phase. Further embodiments include articles, such as turbomachinery components, fasteners, and pipes, for example, and methods for forming the articles.

EP 2 886 672 A3



EUROPEAN SEARCH REPORT

 Application Number
 EP 14 19 7223

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 390 374 A1 (GEN ELECTRIC [US]) 30 November 2011 (2011-11-30) * the whole document *	1-15	INV. C22C32/00 B22F3/15 B22F5/00
X	EP 2 335 849 A1 (GEN ELECTRIC [US]) 22 June 2011 (2011-06-22) * claims 1-15; example 1 *	1-15	B22F5/10 B22F7/06 C22C1/10 C22C33/02
X	US 2012/107603 A1 (DIDOMIZIO RICHARD [US]) ET AL) 3 May 2012 (2012-05-03) * claims 1-29 *	1-12	
A		13-15	
A	EP 2 090 752 A2 (UNITED TECHNOLOGIES CORP [US]) 19 August 2009 (2009-08-19) * claims 1-15; figures 1-4 *	1-15	
X	YOSHIFUMI INAGUMA, HISASHI SATO, AND YOSHIMI WATANABE: "Fabrication of Al-based FGM Containing TiO ₂ Nano-Particles by a Centrifugal Mixed-Powder Method", MATERIALS SCIENCE FORUM, vol. 631-632, 8 October 2009 (2009-10-08), pages 441-447, XP002741264, * figures 1-8 *	1,2,14	
A		3-13,15	TECHNICAL FIELDS SEARCHED (IPC) B22F C22C
X	NAVNEET SINGH, HITESH UPPAL, RETAISH UPPAL AND KARAMJEET SINGH: "FGM ROTATING DISC FABRICATE BY Al/Al ₂ O ₃ ", INTERNATIONAL JOURNAL OF IT, ENGINEERING AND APPLIED SCIENCES RESEARCH (IJIEASR), vol. 1, no. 3, December 2012 (2012-12), pages 33-37, XP002741265, * figures 1-5 *	1,2,14	
A		3-13,15	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2015	Examiner Liu, Yonghe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 19 7223

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-06-2015

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2390374	A1	30-11-2011	CN 102220884 A	19-10-2011
			EP 2390374 A1	30-11-2011
			JP 2011219863 A	04-11-2011
			US 2011250074 A1	13-10-2011

EP 2335849	A1	22-06-2011	CN 102134689 A	27-07-2011
			EP 2335849 A1	22-06-2011
			JP 2011122246 A	23-06-2011
			US 2011142708 A1	16-06-2011
			US 2013129556 A1	23-05-2013

US 2012107603	A1	03-05-2012	CN 102570634 A	11-07-2012
			DE 102011054857 A1	16-08-2012
			GB 2490754 A	14-11-2012
			JP 2012132095 A	12-07-2012
			US 2012107603 A1	03-05-2012

EP 2090752	A2	19-08-2009	EP 2090752 A2	19-08-2009
			US 2009208752 A1	20-08-2009
			US 2012007286 A1	12-01-2012

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82