



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
22.10.2003 Bulletin 2003/43

(51) Int Cl.7: **C22C 19/03**, C22C 19/05,
C22F 1/10

(43) Date of publication A2:
23.07.2003 Bulletin 2003/30

(21) Application number: **02258710.9**

(22) Date of filing: **18.12.2002**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(72) Inventors:
• **Cetel, Alan D.**
West Hartford, CT 06117 (US)
• **Shah, Dilip M.**
Glastonbury, CT 06033 (US)

(30) Priority: **18.12.2001 US 23565**

(74) Representative: **Hall, Matthew Benjamin**
Frank B. Dehn & Co.
179 Queen Victoria Street
London EC4V 4EL (GB)

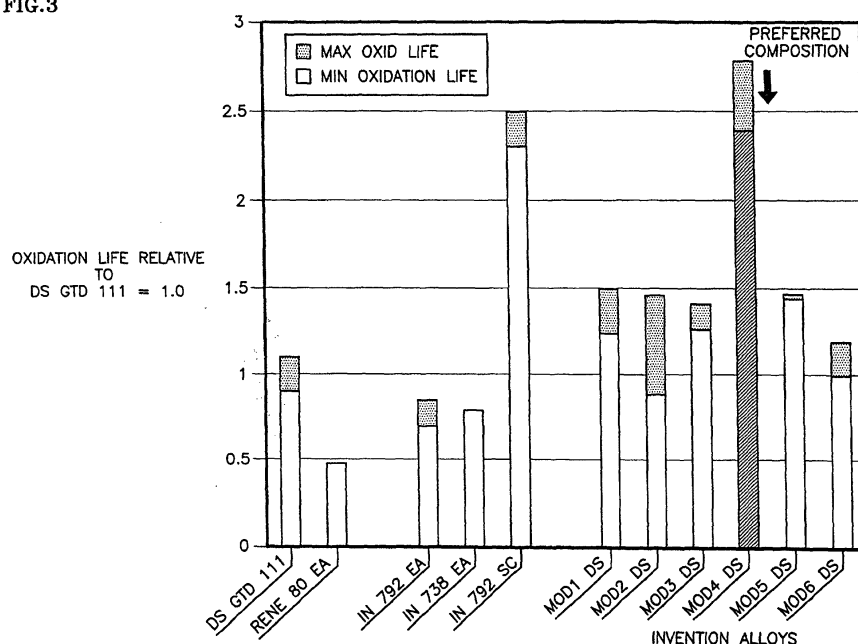
(71) Applicant: **UNITED TECHNOLOGIES**
CORPORATION
Hartford, CT 06101 (US)

(54) **High strength hot corrosion and oxidation resistant, directionally solidified nickel base superalloy and articles**

(57) Corrosion and oxidation resistant, high strength, directionally solidified superalloy alloys and articles are described. The articles have a nominal composition in weight percent of about 12% Cr, 9% Co, 1.9% Mo, 3.8% W, 5% Ta, 3.6% Al, 4.1% Ti, 0.015% B, 0.1 % C, up to about 0.02 Zr, balance essentially nickel, and

include no intentional additions of hafnium or zirconium, and also have a small amounts of tantalum carbide. The resultant articles have good hot corrosion resistance and superior oxidation resistance and creep properties. The articles are preferably columnar grain, but may also be single crystal.

FIG.3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 8710

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 99 67435 A (SIEMENS AG ;HOWMET RES CORP (US)) 29 December 1999 (1999-12-29) * abstract * * claims 5,7 * * page 6, line 2 - line 4 * * claims 1-3,8-12 *	1-14	C22C19/03 C22C19/05 C22F1/10
A,D	US 3 619 182 A (BIEBER CLARENCE G ET AL) 9 November 1971 (1971-11-09) * abstract * * column 3, line 19 - line 28 * * claims 1-9 *	1-14	
A,D	US 4 597 809 A (CHEN OTIS Y ET AL) 1 July 1986 (1986-07-01) * abstract * * column 2, line 45 - line 64 * * column 3, line 35 - line 37 * * claims 1-3 *	1-14	
A	EP 0 855 449 A (MITSUBISHI MATERIALS CORP) 29 July 1998 (1998-07-29) * abstract * * page 4, line 35 - line 50 * * examples 1,3-7; table 1 * * examples 9,10,12-15; table 2 * * examples 18-23; table 3 * * examples A,C,E,F; table 9 * * examples J,L,O; table 10 * * claims 1-15 *	1-14	TECHNICAL FIELDS SEARCHED (Int.Cl.7) C22C C22F
A	GB 2 268 937 A (ABB RESEARCH LTD) 26 January 1994 (1994-01-26) * page 6; examples F,G,I * * page 7, line 1 - line 3 * * claims 1-9 *	1-14	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 28 August 2003	Examiner Gavriliu, A
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)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 8710

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	GB 2 033 925 A (JOHNSON MATTHEY CO LTD) 29 May 1980 (1980-05-29) * page 3; examples F,J-P * * claims 1,2 *	1-14	
A	GB 1 409 628 A (AVCO CORP) 8 October 1975 (1975-10-08) * examples I,II,XIII,XIV,XIX-XXII,,XXVIII,XXVIII; table 1 * * page 5, line 5 - line 10 * * claims 1-8 *	1-14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
Place of search MUNICH		Date of completion of the search 28 August 2003	Examiner Gavriliu, A
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 02 25 8710

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.

28-08-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9967435	A	29-12-1999	WO 9967435 A1	29-12-1999
US 3619182	A	09-11-1971	AT 288040 B	25-02-1971
			CH 499624 A	30-11-1970
			DE 1927609 A1	04-12-1969
			FR 2009771 A5	06-02-1970
			GB 1210043 A	28-10-1970
			SE 342847 B	21-02-1972
US 4597809	A	01-07-1986	CA 1246903 A1	20-12-1988
			DE 3503110 A1	22-08-1985
			FR 2561259 A1	20-09-1985
			GB 2153847 A ,B	29-08-1985
			JP 1750240 C	08-04-1993
			JP 4029728 B	19-05-1992
			JP 60184657 A	20-09-1985
EP 0855449	A	29-07-1998	JP 3246376 B2	15-01-2002
			JP 10204562 A	04-08-1998
			JP 3246377 B2	15-01-2002
			JP 10204594 A	04-08-1998
			JP 10273747 A	13-10-1998
			DE 69800263 D1	28-09-2000
			DE 69800263 T2	08-02-2001
			EP 0855449 A1	29-07-1998
			US 6036791 A	14-03-2000
			US 6322643 B1	27-11-2001
GB 2268937	A	26-01-1994	DE 4323486 A1	27-01-1994
			JP 6184685 A	05-07-1994
GB 2033925	A	29-05-1980	AU 523660 B2	05-08-1982
			AU 5111879 A	03-04-1980
			CA 1148386 A1	21-06-1983
			CH 644401 A5	31-07-1984
			CS 218589 B2	25-02-1983
			DD 146305 A5	04-02-1981
			DE 2938589 A1	03-04-1980
			FR 2436823 A1	18-04-1980
			HU 184640 B	28-09-1984
			IT 1119170 B	03-03-1986
			JP 55047351 A	03-04-1980
			NL 7907079 A	27-03-1980
			PL 218500 A1	02-06-1980
			RO 78429 A1	12-04-1982
			SE 446886 B	13-10-1986

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

EP 02 25 8710

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.

28-08-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2033925 A		SE 7907757 A	26-03-1980
		US 4261742 A	14-04-1981

GB 1409628 A	08-10-1975	NONE	

EPO FORM P0459

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