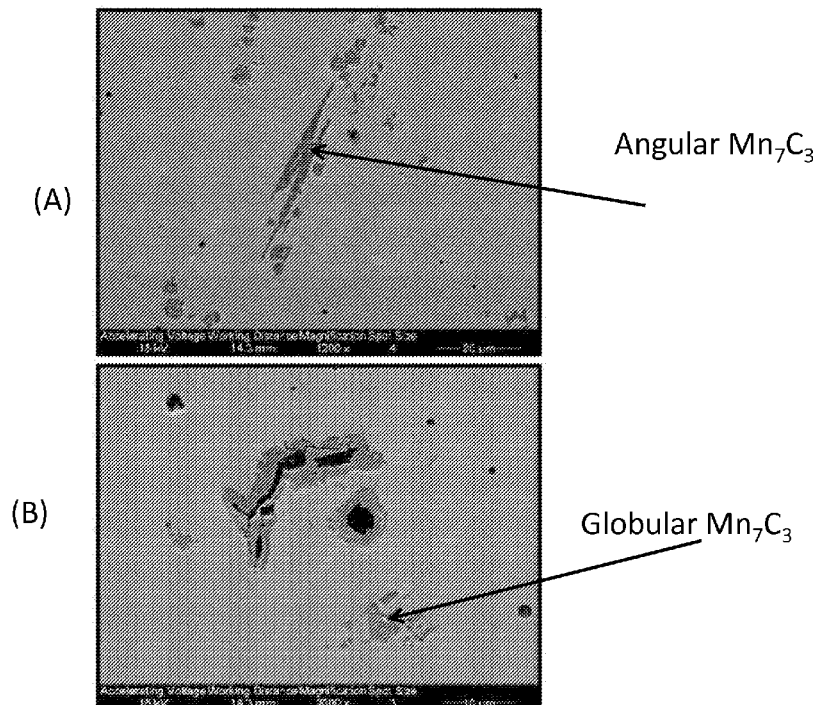




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- (81) Designated States (unless otherwise indicated, for every  
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DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,  
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KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,  
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,  
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[Continued on next page]

(54) Title: COPPER BASED CASTING PRODUCTS AND PROCESSES



FIGs. 5 (A) and 5(B)

[Continued on next page]



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**(57) Abstract:** A method of casting an article includes forming a melt comprising copper, introducing manganese into the melt to produce a copper-manganese alloy, and casting the copper-manganese alloy in a mold to form the article. The carbon and oxygen contents of the copper-manganese alloy are controlled in order to control the formation of graphite, manganese carbide, and/or manganese oxide particles within the article. Copper-manganese alloys containing carbon are also provided, as well as articles made therefrom in cast or wrought form.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/71793

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C22C 1/02, 9/05 (2015.01)

CPC - C22C 1/02, 9/05

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: C22C 1/02, 9/05 (2015.01)

CPC: C22C 1/02, 9/05

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

UPC: 420/493; 75/638

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (USPT,PGPB,JPAB,EPAB); Google

Search Terms: Manganese carbide alloy copper article casting melt vessel crucible SiC silicon carbide carbon oxygen clay graphite alumina magnesia congruent melting point dendritic growth

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2013/0094989 A1 (Trumble) 18 April 2013 (18.04.2013), entire document especially abstract, para [0020], [0021], [0023] and [0026], claim 14	1-38
Y	US 2013/0037179 A1 (Dolman) 14 February 2013 (14.02.2013), entire document especially abstract, para [0017], [0034] and [0036]	1-38
Y	US 3,764,306 A (Blythe et al.) 09 October 1973 (09.10.1973), entire document especially col 5, ln 60-64	8
Y	CA 1071833 A1 (Brandstatter) 19 February 1980 (19.02.1980), entire document especially abstract, page 4, ln 28-30 and page 7, ln 5-10	17-18, 25 and 31

 Further documents are listed in the continuation of Box C.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

04 March 2015 (04.03.2015)

Date of mailing of the international search report

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