

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 September 2007 (13.09.2007)

PCT

(10) International Publication Number
WO 2007/103193 A3

(51) International Patent Classification:
B22F 9/00 (2006.01) **B22F 7/00** (2006.01)

(21) International Application Number:
PCT/US2007/005402

(22) International Filing Date:
28 February 2007 (28.02.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/778,814 2 March 2006 (02.03.2006) US
60/835,262 3 August 2006 (03.08.2006) US
11/710,688 26 February 2007 (26.02.2007) US

(71) Applicant (for all designated States except US): **SCM METAL PRODUCTS, INC.** [US/US]; 2601 Weck Drive, Research Triangle Park, NC 27709-2166 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **VELOFF, Nicola** [US/US]; 4900 Holly Ridge Drive, Raleigh, NC 27612 (US). **NADKARNI, Anil, Vasant** [US/US]; 105 Thetford Court, Chapel Hill, NC 27516 (US). **MURPHY, Thomas, Matthew** [US/US]; 1304 Chimney Hill Drive, Cary, NC 27502 (US).

(74) Agents: **KALOW, David** et al.; Kalow & Springut LLP, 488 Madison Avenue, 19th Floor, New York, NY 10022 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
9 October 2008

(54) Title: LOW COST BRONZE POWDER FOR HIGH PERFORMANCE BEARINGS

(57) Abstract: The present invention provides a new process for making a low cost powder for the manufacture of high performance bearings. Improved powders and sintered parts (e.g., bearings) are also provided. The powders of the present invention are formed by blending iron powder with fine cuprous oxide powder and elemental tin powder. The blended powders are then thermally treated under a reducing atmosphere to form a sintered cake, which is milled to a powder.



WO 2007/103193 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/05402

A. CLASSIFICATION OF SUBJECT MATTER

IPC: B22F 9/00(2006.01),7/00(2006.01)

USPC: 75/255,247

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)

U.S. : 75/255,247

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

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

EAST -Terms: bronze and powder and cuprous adj20 oxide and tin and iron and sinter\$3

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,888,657 (Klar et al.) 10 June 1975 (10.06.1975), whole document.	1-13
---		-----
Y	US 4,604,259 (Whitman) 05 August 1986 (05.08.1986), column 1, line 51 to column 2, line 66.	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

"&"

document member of the same patent family

Date of the actual completion of the international search

21 July 2008 (21.07.2008)

Date of mailing of the international search report

04 AUG 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Roy King

Telephone No. 571-272-1201

DEBORAH A. THOMAS
PARALEGAL SPECIALIST

DWA

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/05402

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/05402

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I. Claims 1-13 drawn to a method for making a bronze powder;

Group II. Claims 14-22 drawn to a bronze powder;

Group III. Claims 23-25 drawn to a sintered part comprising a powder made by the process of claim 1;

Group IV. Claims 26 and 27 drawn to a composite powder; and

Group V. Claim 28 drawn to a sintered part .

The inventions listed as Groups I-V do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the common technical feature in all the groups is the bronze powder. This element cannot be a special technical feature under PCT Rules 13.2 because the element is shown in the prior art. Klar et al. (US 3,888,657) teaches a bronze powder, which anticipates the bronze powder as claimed. Inventions I-V lack the same or corresponding special technical feature. Therefore unity of invention is lacking and a restriction is appropriate.