Title: METALLIC MAGNETIC MATERIAL WITH CONTROLLED CURIE TEMPERATURE AND PROCESSES FOR PREPARING THE SAME

Fig. 2

Abstract: The invention relates to a metallic magnetic material with biocompatible elements (Ti, Ta or Mn), with glassy quasi-amorphous structure and controlled Curie temperature, and the processes for preparing the same. The hereby material has its composition expressed in atomic percent: Fe = 59...67%, Nb = 0.1...1%, B = 20%, biocompatible material (Ti, Ta or Mn) = 12...20%. Curie temperature within the interval 0...70°C, saturation magnetic induction of 0.05...1.1 T and strong magnetic response when introduced in a high frequency magnetic field. The processes used to obtain this material directly under the form of ribbons, glass-coated micro/nanowires or nano/micropowders consist in rapid quenching of the mixtures with previously mentioned compositions under extremely rigorous controlled conditions, in high vacuum of minimum 10⁻⁶ mbars or in controlled helium or argon atmosphere in order to avoid oxidation.
before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report: 14 April 2016
### INTERNATIONAL SEARCH REPORT

**PCT/R02014/000032**

**A. CLASSIFICATION OF SUBJECT MATTER**
- INV. H01F1/057
- H01F1/153

**ADD:**
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)
  - H01F

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)
- EPO-Internal, WPI Data, INSPEC

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>DE 28 55 858 Al (TOKYO SHIBAURA ELECTRIC CO) 5 July 1979 (1979-07-05) page 13, paragraph 1; cl aims 1,4-6</td>
<td>1,2</td>
</tr>
</tbody>
</table>

*Further documents are listed in the continuation of Box C.*

*Special categories of cited documents:*
- **"A"** document defining the general state of the art which is not considered to be of particular relevance
- **"B"** earlier application or patent but published on or after the international filing date
- **"L"** document which may throw doubts on priority claim(s) one or more of 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

**X** See patent family annex.

**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

**"A"** document member of the same patent family

**Date of the actual completion of the international search:**
3 November 2015

**Date of mailing of the international search report:**
22/02/2016

**Name and mailing address of the ISA:**
European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016

**Authorized officer:**
Primus, Jean-Louis
<table>
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<th>Box No. II</th>
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<td>This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:</td>
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<td>1.</td>
<td>☐ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:</td>
</tr>
<tr>
<td>2.</td>
<td>☐ 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:</td>
</tr>
<tr>
<td>3.</td>
<td>☐ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).</td>
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<th>Observations where unity of invention is lacking (Continuation of item 3 of first sheet)</th>
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<td>This International Searching Authority found multiple inventions in this international application, as follows:</td>
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<tr>
<td></td>
<td>see additional sheet</td>
</tr>
<tr>
<td>1.</td>
<td>☑ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.</td>
</tr>
<tr>
<td>2.</td>
<td>☑ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.</td>
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<tr>
<td>3.</td>
<td>☐ 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.:</td>
</tr>
<tr>
<td>4.</td>
<td>☑ 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.: 2 (completely) ; 1(partially)</td>
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</table>

**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.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)
<table>
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<tr>
<td>A</td>
<td>DE 198 02 349 AI (INOE AKIHISA [JP]) 30 July 1998 (1998-07-30) cl aims 1-22 -----</td>
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<td>A</td>
<td>DATABASE INSPEC [Online] THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; April 1 1988 (1988-04) LIN S T ET AL: &quot;Formaton and properti es of amorphous (Fel-xNbx) IB100-I &quot;, XP002748215 , Database accessi on no. 3183230 abstract -----</td>
<td>1,2</td>
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<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
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<td>DE 2855858 Al</td>
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<td>US 4225339 A</td>
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<td>US 5976274 A</td>
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<td></td>
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<td>US 6284061 B1</td>
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</table>
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 2 (completely); 1 (partially)
   known Fe-Nb-B compound containing Ta, Ti or Mn in the form of a ribbon and its corresponding known manufacturing method

2. claims: 3 (completely); 1 (partially)
   known Fe-Nb-B compound containing Ta, Ti or Mn in the form of glass-coated micro/nanowires and its corresponding manufacturing method

3. claims: 4 (completely); 1 (partially)
   known Fe-Nb-B compound containing Ta, Ti or Mn in the form of nano/micropowders and its corresponding manufacturing method

4. claims: 5 (completely); 1 (partially)
   known Fe-Nb-B compound containing Ta, Ti or Mn in the form of nanopowders and its corresponding manufacturing method