NICKEL-RICH WEAR RESISTANT ALLOY AND METHOD OF MAKING AND USE THEREOF

Abstract: A nickel-rich wear resistant alloy comprises in weight % 0.5 to 2.5% C, 0.5 to 2% Si, up to 1% Mn, 20 to 30% Cr, 5 to 15% Mo, 5 to 15% W, 15 to 30% Fe, balance Ni. The alloy can include further alloying constituents such as up to 1.5% each of Ti, Al, Zr, Hf, Ta, V, Nb, Co, Cu, up to 0.5% B and up to 0.5% Mg plus Y. The alloy preferably has a microstructure containing predominantly eutectic reaction phases, fine intermetallic phases and precipitation carbides. For instance, the microstructure may contain Cr, Ni, W rich intermetallic phases and/or the microstructure may contain uniform lamellar type eutectic solidification structures. The alloy is useful as a valve seat insert for internal combustion engines such as diesel engines. For a valve seat insert containing up to 1.8% C the microstructure preferably is free of primary dendritic carbides. For a valve seat insert alloy containing over 1.8% C the microstructure preferably contains non-dendritic type primary carbides. For a valve seat insert containing up to 1.5% C the microstructure preferably includes solid solution phases encompassed by eutectic reaction products.
A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C22C 19/03; C22C 19/05 (2007.10)
USPC - 420/441; 420/442; 420/450; 420/459; 420/458
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)
USPC - 420/441; 420/442; 420/450; 420/459; 420/458

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

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)
GOOGLE PATENT, GOOGLE WEB and WEST (PGPB,USPT,EPAB,JPAB): nickel, nickel based, nickel rich, alloy, valve seat, wear resistant, resistant, intermetallic, lamellar, eutectic, C, Si, Mn, Cr, Mo, W, Fe, diesel engine, precipitation, precipitation carbide, compressive yield strength, hardness, dimensional stability

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>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 6,200,688 B1 (Liang et al.) 13 March 2001 (13.03.2001), col. 2, In 31-50; col. 4, In 40-60; col. 5, In 29-45; col. 5, In 63 - col. 6, In 15; col. 6, In 20-27; col. 6, In 55-67</td>
<td>1-22</td>
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<tr>
<td>Y</td>
<td>US 4,911,768 A (Dong et al.) 27 March 1990 (27.03.1990), col. 1, In 30-47; col. 1, In 50-66; col. 2, In 13-50; col. 3, In 7-35; col. 3, In 60 - col. 4, In 4</td>
<td>6-9</td>
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<tr>
<td>Y</td>
<td>US 6,702,905 B1 (Qiao et al.) 09 March 2004 (09.03.2004), col. 10, In 28 - col. 11, In 10; col. 11, In 59 - col. 12, In 15</td>
<td>18</td>
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</table>

* Special categories of cited documents:
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   "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
27 October 2007 (27.10.2007)

Date of mailing of the international search report
06 DEC 2007

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