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(54) **Dry powder metal compositions and methods of making and using the same**

(57) The present invention provides powder metal compositions and methods of making and using the same. Powder metal compositions according to the invention are substantially dry and include a blend of base metal particles and a pressing aid. The pressing aid includes a micronized deformable solid material and a high melt point lubricating material, which have been pre-

mixed or co-ground with each other. Powder metal compositions according to the present invention are particularly useful in applications where the pre-sintered density of the pressed metal part is less than or equal to about 6.9 g/cm<sup>3</sup>.

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## EUROPEAN SEARCH REPORT

Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                             |                                                          |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                               | Relevant to claim                                        | CLASSIFICATION OF THE APPLICATION (IPC) |
| X,D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | WO 2007/024487 A (APEX ADVANCED TECHNOLOGIES LLC [US]; HAMMOND DENNIS L [US]) 1 March 2007 (2007-03-01)<br>* claims 1-6,9,17; examples 1-3; tables 1-4 *<br>-& US 2007/048166 A1 (HAMMOND DENNIS L [US]) 1 March 2007 (2007-03-01)<br>----- | 1-14                                                     | INV.<br>B22F1/00                        |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP 1 364 731 A (JFE STEEL CORP [JP])<br>26 November 2003 (2003-11-26)<br>* claims 1-21; example 5; tables 1-5,9-11<br>*                                                                                                                     | 1-10,<br>12-14                                           |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2004/079192 A1 (POSZMIK GEORGE [US] ET AL) 29 April 2004 (2004-04-29)<br>* claims 1-29; example 1 *<br>-----                                                                                                                             | 1-14                                                     |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                             |                                                          | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                             |                                                          | B22F                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                             |                                                          |                                         |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                             | Date of completion of the search<br><b>25 March 2009</b> | Examiner<br><b>Liu, Yonghe</b>          |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                                                                                             |                                                          |                                         |

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

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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  
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25-03-2009

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| WO 2007024487 A                           | 01-03-2007          | US 2007048166 A1           | 01-03-2007          |
| US 2007048166 A1                          | 01-03-2007          | WO 2007024487 A2           | 01-03-2007          |
| EP 1364731 A                              | 26-11-2003          | CA 2429093 A1              | 21-11-2003          |
|                                           |                     | CN 1481956 A               | 17-03-2004          |
|                                           |                     | US 2003219617 A1           | 27-11-2003          |
|                                           |                     | US 2004038067 A1           | 26-02-2004          |
| US 2004079192 A1                          | 29-04-2004          | AU 2003259156 A1           | 25-05-2004          |
|                                           |                     | EP 1556182 A2              | 27-07-2005          |
|                                           |                     | WO 2004039519 A2           | 13-05-2004          |