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(54) **Method for producing brass**

(57) A method is disclosed for producing brass, which comprises the step of producing brass extrusions by hot extrusion of brass on the conditions: (1) that apparent Zn content (AZC) in the material composition is 37-46% by wt. wherein  $AZC = [B + t \cdot Q] / (A + B + t \cdot Q) \times 100$  in which: A=Cu content in wt%, B=Zn content in wt%, T=Zn equivalent (wt%) of an added third element, Q=third element content in wt%; (2) that the temperature at the time of extrusion is in the range of 480-650°C; and (3) that the sectional reduction ratio at the time of extrusion is 90% or more. The extrusion temperature is lower than the temperatures usually employed. The resulting brass extrusions exhibit useful improvements in the balance of corrosion resistance, machinability, ductility and strength.

| Type                                | Production                                                                                                                                                                |                                                                                                      |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
|                                     | Casting                                                                                                                                                                   | (1) For Obtainment of Final Structure by Hot Extrusion                                               |
| $\alpha + \gamma$                   | • Solidification rate<br>$5 \times 10^1 - 10^3 \text{K/sec}$<br>( $10^2 - 10^3 \text{K/sec}$ )<br><br>• Cooling rate in solidification<br>5K/sec or more<br>down to 400°C | Hot Extrusion<br>• Cooling rate<br>0.4 - 5K/sec down to 400°C                                        |
| $\alpha + \beta + \gamma$           |                                                                                                                                                                           | • Temperature<br>480 - 650°C<br>(600°C or below)<br>• Cooling rate<br>0.4 - 10K/sec down to 400°C    |
| $\alpha + \text{Normal } \beta$     |                                                                                                                                                                           | • Cooling rate<br>0.4K/sec or more down to 400°C                                                     |
| $\alpha + \text{Reinforced } \beta$ |                                                                                                                                                                           | • Reduction of area<br>90% or more<br>(95% or more)<br>• Cooling rate<br>5 - 1000K/sec down to 400°C |

Fig. 31



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                           |                                                      |                                              |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                           |                                                      | C22F<br>C22C                                 |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                           |                                                      |                                              |
| Place of search<br>MUNICH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                           | Date of completion of the search<br>25 November 2002 | Examiner<br>Ashley, G                        |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                           |                                                      |                                              |

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

EP 02 01 9881

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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25-11-2002

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