

Title (en)  
METHOD OF WARM WORKING OF A STEEL MATERIAL AND STEEL MATERIAL OBTAINED BY THE SAME

Title (de)  
VERFAHREN ZUM WARMUMFORMEN EINES STAHLMATERIALS UND DADURCH ERHALTENES STAHLMATERIAL

Title (fr)  
PROCEDE D'ÉCROUISSAGE A CHAUD D'UN ACIER ET MATERIAU D'ACIER OBTENU AVEC LE PROCEDE

Publication  
**EP 1956100 B1 20190424 (EN)**

Application  
**EP 06833094 A 20061121**

Priority  
• JP 2006323248 W 20061121  
• JP 2005336331 A 20051121

Abstract (en)  
[origin: EP1956100A1] There are provided a steel for warm working, to be subjected to warm working as various structures, components of cars, and the like, a warm working method thereof, and a steel material and a steel component obtainable from the warm working method. [Solving Means] A steel is to have a particle dispersion type fiber structure formed in the matrix by warm working. The steel is characterized in that the total amount of the dispersed second-phase particles at room temperature is  $7 \times 10^{-3}$  or more in terms of volume fraction, and the Vickers hardness (HV) is equal to or larger than the hardness H of the following equation (2):  $H = (5.2 - 1.2 \times 10^{-4} \times t) \times 10^2 \dots (2)$  when the steel is subjected to any of annealing, tempering, and aging treatments in the as-unworked state under conditions such that a parameter  $\log t$  expressed by the following equation (1):  $\log t = T(\log t + 20)$  (T; temperature (K), t; time (hr)) ... (1) is  $1.4 \times 10^4$  or more in a prescribed temperature range of 350°C or more and Ac1 point or less. This steel is taken as the steel for warm working.

IPC 8 full level  
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CPC (source: EP US)  
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Citation (examination)  
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• US 6338763 B1 20020115 - HASHIMURA MASAYUKI [JP], et al  
• YUJI KIMURA ET AL: "Influence of Warm Tempforming on Microstructure and Mechanical Properties in an Ultrahigh-Strength Medium-Carbon Low-Alloy Steel", METALLURGICAL AND MATERIALS TRANSACTIONS A, SPRINGER-VERLAG, NEW YORK, vol. 44, no. 1, 7 September 2012 (2012-09-07), pages 560 - 576, XP035152734, ISSN: 1543-1940, DOI: 10.1007/S11661-012-1391-2

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