

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 A1 20080813 (EN)

Application

EP 06833094 A 20061121

Priority

- JP 2006323248 W 20061121
- JP 2005336331 A 20051121

Abstract (en)

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 7×10^{-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): $H = (5.2 - 1.2 \times 10^{-4} \times t) \times 10^2$... (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 τ expressed by the following equation (1): $\tau = T(\log t + 20)$ (T; temperature (K), t; time (hr)) ... (1) is 1.4×10^4 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

C21D 8/06 (2006.01); **C21D 8/02** (2006.01); **C21D 8/04** (2006.01); **C21D 8/10** (2006.01); **C21D 9/00** (2006.01); **C21D 9/46** (2006.01); **C21D 9/52** (2006.01); **C22C 38/00** (2006.01); **C22C 38/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/18** (2006.01)

CPC (source: EP US)

C21D 8/0205 (2013.01 - EP US); **C21D 8/0231** (2013.01 - EP US); **C21D 8/0431** (2013.01 - EP US); **C21D 8/065** (2013.01 - EP US); **C21D 8/105** (2013.01 - EP US); **C21D 9/0075** (2013.01 - EP US); **C21D 9/0093** (2013.01 - EP US); **C21D 9/46** (2013.01 - EP US); **C21D 9/525** (2013.01 - EP US); **C22C 38/02** (2013.01 - EP US); **C22C 38/04** (2013.01 - EP US); **C22C 38/18** (2013.01 - EP US)

Cited by

CN107138660A; CN102597543A; US2010247368A1; US11053562B2; CN108176954A; CN104011250A; EP2799585A4; DE102015113058A1; EP3187610A4; US8876451B2

Designated contracting state (EPC)

DE

DOCDB simple family (publication)

EP 1956100 A1 20080813; **EP 1956100 A4 20111109**; **EP 1956100 B1 20190424**; JP 5344454 B2 20131120; JP WO2007058364 A1 20090507; US 2009277539 A1 20091112; WO 2007058364 A1 20070524

DOCDB simple family (application)

EP 06833094 A 20061121; JP 2006323248 W 20061121; JP 2007545344 A 20061121; US 8530406 A 20061121