

Title (en)

STEEL MATERIAL HAVING EXCELLENT ROLLING FATIGUE CHARACTERISTICS

Title (de)

STAHLMATERIAL MIT HERVORRAGENDEN WALZERMÜDUNGSEIGENSCHAFTEN

Title (fr)

MATÉRIAU EN ACIER DOTÉ D'EXCELLENTE CARACTÉRISTIQUES DE FATIGUE DE ROULEMENT

Publication

EP 3647451 A4 20201104 (EN)

Application

EP 18857159 A 20180913

Priority

- JP 2017176163 A 20170913
- JP 2017176165 A 20170913
- JP 2017176161 A 20170913
- JP 2018034008 W 20180913

Abstract (en)

[origin: EP3647451A1] A steel material excellent in rolling fatigue property, the steel material including, in mass%: C: 0.10% to 1.50%, Si: 0.01% to 0.80%, Mn: 0.10% to 1.50%, Cr: 0.02% to 2.50%, Al: 0.002% to less than 0.010%, Ce + La + Nd: 0.0001% to 0.0025%, Mg: 0.0005% to 0.0050%, O: 0.0001% to 0.0020%, Ti: 0.000% to less than 0.005%, N: 0.0180% or less, P: 0.030% or less, S: 0.005% or less, Ca: 0.0000% to 0.0010%, V: 0.00 to 0.40%, Mo: 0.00 to 0.60%, Cu: 0.00 to 0.50%, Nb: 0.000 to less than 0.050%, Ni: 0.00 to 2.50%, Pb: 0.00 to 0.10%, Bi: 0.00 to 0.10%, B: 0.0000 to 0.0050%, and the balance being Fe and an impurity, wherein a fatigue-initiating inclusion detected by an ultrasonic fatigue test contains one or more of Ce, La, and Nd, and Mg, Al, and O, and a composition ratio in the fatigue-initiating inclusion satisfies Formula (1).

IPC 8 full level

C22C 38/00 (2006.01); **C22C 38/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/06** (2006.01); **C22C 38/18** (2006.01); **C22C 38/20** (2006.01); **C22C 38/22** (2006.01); **C22C 38/24** (2006.01); **C22C 38/26** (2006.01); **C22C 38/28** (2006.01); **C22C 38/32** (2006.01); **C22C 38/40** (2006.01); **C22C 38/60** (2006.01); **C21C 7/06** (2006.01); **C21D 9/40** (2006.01)

CPC (source: EP KR US)

C21C 7/06 (2013.01 - KR); **C22C 38/001** (2013.01 - EP KR US); **C22C 38/002** (2013.01 - EP US); **C22C 38/005** (2013.01 - EP US); **C22C 38/02** (2013.01 - EP US); **C22C 38/04** (2013.01 - EP US); **C22C 38/06** (2013.01 - EP US); **C22C 38/08** (2013.01 - US); **C22C 38/18** (2013.01 - EP); **C22C 38/20** (2013.01 - EP US); **C22C 38/22** (2013.01 - EP US); **C22C 38/24** (2013.01 - EP US); **C22C 38/26** (2013.01 - EP US); **C22C 38/28** (2013.01 - EP US); **C22C 38/32** (2013.01 - EP US); **C22C 38/40** (2013.01 - EP); **C22C 38/42** (2013.01 - KR); **C22C 38/44** (2013.01 - KR); **C22C 38/50** (2013.01 - KR); **C22C 38/60** (2013.01 - EP KR US); **C21C 7/06** (2013.01 - EP US); **C21D 1/42** (2013.01 - US); **C21D 6/002** (2013.01 - US); **C21D 6/005** (2013.01 - US); **C21D 6/008** (2013.01 - US); **C21D 9/40** (2013.01 - EP)

Citation (search report)

- [A] EP 3072987 A1 20160928 - NIPPON STEEL & SUMITOMO METAL CORP [JP]
- [A] JP 2005002420 A 20050106 - NIPPON STEEL CORP
- [A] EP 0829546 A1 19980318 - KAWASAKI STEEL CO [JP]
- [A] US 2015191808 A1 20150709 - HASHIMURA MASAYUKI [JP], et al
- See references of WO 2019054448A1

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

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EP 3647451 A1 20200506; **EP 3647451 A4 20201104**; CN 111065755 A 20200424; JP 6652226 B2 20200219; JP WO2019054448 A1 20200326; KR 20200044866 A 20200429; US 2020216937 A1 20200709; WO 2019054448 A1 20190321

DOCDB simple family (application)

EP 18857159 A 20180913; CN 201880057744 A 20180913; JP 2018034008 W 20180913; JP 2019542288 A 20180913; KR 20207008332 A 20180913; US 201816642700 A 20180913