

Title (en)
GRAIN-ORIENTED MAGNETIC STEEL SHEET

Title (de)
KORNORIENTIERTES MAGNETSTAHLBLECH

Title (fr)
TÔLE D'ACIER MAGNÉTIQUE À GRAINS ORIENTÉS

Publication
EP 2460902 B1 20160504 (EN)

Application
EP 10804595 A 20100730

Priority
• JP 2009179494 A 20090731
• JP 2010063343 W 20100730

Abstract (en)
[origin: EP2460902A1] An electrical steel sheet is provided that contains, as components, by mass%, 0.005% or less of C, 1.0% to 8.0% of Si, and 0.005% to 1.0% of Mn; one or more selected from Nb, Ta, V, and Zr such that a total content thereof is 10 to 50 ppm; and the balance being Fe and unavoidable impurities, wherein at least 10% of the content of Nb, Ta, V, and Zr is in the form of precipitates; the precipitates have an average diameter (equivalent circle diameter) of 0.02 to 3 μm ; and secondary recrystallized grains of the steel sheet have an average grain size of 5 mm or more. Thus, an electrical steel sheet is provided in which degradation of magnetic characteristics can be reduced in the case of the sheet being sheared, even when the sheet is used for a large transformer having a size of several meters.

IPC 8 full level
C22C 38/00 (2006.01); **B21B 3/02** (2006.01); **C21D 8/12** (2006.01); **C21D 9/46** (2006.01); **C22C 38/14** (2006.01); **C22C 38/60** (2006.01); **H01F 1/16** (2006.01)

CPC (source: EP KR US)
C21D 8/12 (2013.01 - EP KR US); **C21D 8/1272** (2013.01 - EP KR US); **C21D 8/1283** (2013.01 - EP KR US); **C21D 9/46** (2013.01 - EP KR US); **C22C 38/001** (2013.01 - EP KR US); **C22C 38/002** (2013.01 - EP KR US); **C22C 38/008** (2013.01 - EP KR US); **C22C 38/02** (2013.01 - EP KR US); **C22C 38/04** (2013.01 - EP KR US); **C22C 38/06** (2013.01 - EP KR US); **C22C 38/12** (2013.01 - EP KR US); **C22C 38/20** (2013.01 - EP KR US); **C22C 38/34** (2013.01 - EP KR US); **H01F 1/16** (2013.01 - EP KR US); **C21D 2201/05** (2013.01 - EP US)

Cited by
EP2933348A4; EP3309271A4; US10643770B2; US10844452B2

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 SE SI SK SM TR

DOCDB simple family (publication)
EP 2460902 A1 20120606; **EP 2460902 A4 20130220**; **EP 2460902 B1 20160504**; CN 102471850 A 20120523; CN 102471850 B 20150107; JP 2011047045 A 20110310; JP 4735766 B2 20110727; KR 101614593 B1 20160421; KR 20120035928 A 20120416; KR 20130126751 A 20131120; RU 2012107393 A 20130910; RU 2496905 C1 20131027; US 2012131982 A1 20120531; WO 2011013858 A1 20110203

DOCDB simple family (application)
EP 10804595 A 20100730; CN 201080034100 A 20100730; JP 2010063343 W 20100730; JP 2010171569 A 20100730; KR 20127002405 A 20100730; KR 20137028959 A 20100730; RU 2012107393 A 20100730; US 201013388082 A 20100730