

Title (en)
COIL SPRING, AND METHOD FOR MANUFACTURING SAME

Title (de)
SPIRALFEDER UND VERFAHREN ZUR HERSTELLUNG DAVON

Title (fr)
RESSORT HÉLICOÏDAL ET PROCÉDÉ DE FABRICATION DE CE DERNIER

Publication
EP 3020841 A1 20160518 (EN)

Application
EP 14823237 A 20140708

Priority

- JP 2013143514 A 20130709
- JP 2014068123 W 20140708

Abstract (en)
To provide a coil spring having excellent fatigue resistance. Disclosed is a coil spring made of steel, including (in % by mass, the same shall apply for a chemical composition): C: 0.40 to 0.70%; Si: 1.50 to 3.50%; Mn: 0.30 to 1.50%; Cr: 0.10 to 1.50%; V: 0.50 to 1.00%, and Al: 0.01% or less (excluding 0%), with the balance being iron and inevitable impurities, wherein an average crystal grain size number of prior austenite crystals in a depth of 0.3 mm from a surface is 11.0 or more, while a difference in grain size number between the respective prior austenite crystals is in a range of less than 3 from a grain size number observed at the maximum frequency, and wherein a carburized layer is provided in a depth of 0.30 to 1.00 mm from the surface, while an average Vickers hardness is 600 or higher at a position in a depth of (1/4) × diameter in the depth direction from the surface.

IPC 8 full level
C22C 38/00 (2006.01); **C21D 1/06** (2006.01); **C21D 1/773** (2006.01); **C21D 6/00** (2006.01); **C21D 9/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/06** (2006.01); **C22C 38/24** (2006.01); **C22C 38/26** (2006.01); **C22C 38/34** (2006.01); **C22C 38/46** (2006.01); **C22C 38/48** (2006.01); **C23C 8/22** (2006.01)

CPC (source: EP US)
C21D 1/06 (2013.01 - EP US); **C21D 1/773** (2013.01 - EP US); **C21D 6/004** (2013.01 - EP US); **C21D 6/005** (2013.01 - EP US); **C21D 6/008** (2013.01 - EP US); **C21D 9/02** (2013.01 - EP US); **C22C 38/00** (2013.01 - EP US); **C22C 38/002** (2013.01 - EP US); **C22C 38/04** (2013.01 - EP US); **C22C 38/06** (2013.01 - EP US); **C22C 38/24** (2013.01 - EP US); **C22C 38/26** (2013.01 - EP US); **C22C 38/34** (2013.01 - EP US); **C22C 38/46** (2013.01 - EP US); **C22C 38/48** (2013.01 - EP US); **C23C 8/22** (2013.01 - EP US)

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

DOCDB simple family (publication)
EP 3020841 A1 20160518; EP 3020841 A4 20170329; EP 3020841 B1 20180822; CN 105358726 A 20160224; CN 105358726 B 20170609; JP 2015017288 A 20150129; JP 5941439 B2 20160629; KR 101789944 B1 20171025; KR 20160018720 A 20160217; US 2016160306 A1 20160609; WO 2015005311 A1 20150115

DOCDB simple family (application)
EP 14823237 A 20140708; CN 201480039266 A 20140708; JP 2013143514 A 20130709; JP 2014068123 W 20140708; KR 20167000388 A 20140708; US 201414903975 A 20140708