

Title (en)

ROLLED STEEL MATERIAL FOR HIGH-STRENGTH SPRING AND WIRE FOR HIGH-STRENGTH SPRING USING SAME

Title (de)

GEWALZTES STAHLMATERIAL FÜR HOCHFESTE FEDER UND DRAHT FÜR HOCHFESTE FEDER DAMIT

Title (fr)

MATIÉRIAU D'ACIER LAMINÉ POUR RESSORT À HAUTE RÉSISTANCE ET CÂBLE POUR RESSORT À HAUTE RÉSISTANCE L'UTILISANT

Publication

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Application

EP 14875039 A 20141210

Priority

- JP 2013272569 A 20131227
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Abstract (en)

[origin: EP3088551A1] An object of the present invention is to provide a rolled material for high strength spring, which has excellent wire drawability even when suppressing the addition amount of an alloying element, and which can exhibit corrosion fatigue properties after quenching and tempering. The present invention provides a rolled material for high strength spring, including C, Si, Mn, P, S, Al, Cu and Ni, wherein an amount of nondiffusible hydrogen is 0.40 ppm by mass or less, and an area ratio of ferrite expressed as a percentage satisfies an inequality expression (1) below, and a total area ratio of bainite and martensite is 2% or less: Ferrite area ratio $< 0.77 \frac{C}{0.77 \frac{C}{3} + 0.08} \times 100$ where [name of element] in the above inequality expression (1) means a content expressed in % by mass of each element.

IPC 8 full level

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Citation (search report)

- [X] EP 2017358 A2 20090121 - KOBE STEEL LTD [JP]
- [X] EP 1985721 A1 20081029 - KOBE STEEL LTD [JP]
- [E] EP 3112491 A1 20170104 - KOBE STEEL LTD [JP]
- [X] US 5776267 A 19980707 - NANBA SHIGENOBU [JP], et al
- [X] US 2007125456 A1 20070607 - KOCHI TAKUYA [JP], et al
- [X] EP 2096184 A1 20090902 - KOBE STEEL LTD [JP]
- [A] JP 2012172247 A 20120910 - NIPPON STEEL CORP
- [A] JP 2005023404 A 20050127 - KOBE STEEL LTD
- See references of WO 2015098531A1

Cited by

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