

Title (en)  
Process for manufacturing steel forging

Title (de)  
Herstellungsverfahren eines Stahlschmiedestücks

Title (fr)  
Procédé de fabrication d'une pièce forgée en acier

Publication  
**EP 0787812 B1 20040317 (FR)**

Application  
**EP 97400025 A 19970108**

Priority  
FR 9601525 A 19960208

Abstract (en)  
[origin: EP0787812A1] Steel for forging comprises by weight 0.1-0.4% carbon, 1-1.8% manganese, 0.15-1.7% silicon and up to 1% nickel, 1.2% chromium, 0.3% molybdenum, 0.3% vanadium and 0.35% copper. Optional ingredients are 0.005-0.06% aluminium, 0.0005-0.01% boron, 0.005-0.03% titanium, 0.005-0.06% niobium, 0.005-0.1% sulphur and up to 0.006% calcium, 0.03% tellurium, 0.05% selenium, 0.05% bismuth and 0.1% lead, the remainder being iron and impurities. Also claimed is hot-forging a component from an ingot of the steel followed by heat treatment to produce a structure comprising at least 15% bainite and at least 20% ferrite perlite.

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IPC 8 full level  
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Citation (examination)  
• JP H0617188 A 19940125 - NIPPON KOKAN KK  
• JP S6096718 A 19850530 - KOBE STEEL LTD  
• FARGUES J.: "Traitement de trempe étagée bainitique des fontes", no. 106, June 1991 (1991-06-01), FONDERIE-FONDEUR D'AUJOURD'HUI, pages 31 - 39, XP000228780

Cited by  
WO2013117953A1; WO2011124851A2; RU2703085C1; FR2931166A1; EP1201774A3; FR2916371A1; EP2957643A1; WO2009138586A3;  
EP3168312A1; WO2017085072A1; WO2016151345A1; WO2016151390A1; FR3123659A1; WO2022253912A1

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DK 0787812 T3 20040726; ES 2217374 T3 20041101; FR 2744733 A1 19970814; FR 2744733 B1 19980424; HU 9700269 D0 19970328;  
HU P9700269 A2 19980428; HU P9700269 A3 19990428; JP 3915043 B2 20070516; JP H09209086 A 19970812; KR 970062058 A 19970912;  
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HU P9700269 A 19970128; JP 4166097 A 19970210; KR 19970003801 A 19970206; MX 9700924 A 19970206; NO 970548 A 19970206;  
PL 31836697 A 19970207; PT 97400025 T 19970108; SI 9700025 A 19970204; US 79713597 A 19970210