

Title (en)

Method for producing a magnetic grain oriented steel strip

Title (de)

Verfahren zur Herstellung von kornorientiertem Elektroband

Title (fr)

Procédé de fabrication de bande en acier magnétique à grains orientés

Publication

EP 1752548 B1 20160203 (DE)

Application

EP 05016834 A 20050803

Priority

EP 05016834 A 20050803

Abstract (en)

[origin: EP1752548A1] Production of grain-oriented electric steel strip by continuous thin-slab casting, involves a continuous hot-rolling stage on a line-mounted multiple-stand milling train at 900-1200[deg]C, with reductions of more than 40% in the first pass, more than 30% in the second pass and not more than 30% in the last pass. Production of grain-oriented electric steel strip based on a continuous thin-slab casting process, involves (a) melting steel containing (apart from iron and unavoidable impurities) 2.5-4.0 weight % silicon, 0.01-0.10 weight % carbon, 0.02-0.50 weight % manganese, 0.005-0.04 weight % sulfur and selenium (total), and optionally up to 0.07 weight % aluminum, up to 0.015 weight % nitrogen, up to 0.035 weight % titanium, up to 0.3 weight % phosphorus, up to 0.2 weight % (each) of one or more of the elements arsenic, tin, antimony, tellurium or bismuth, up to 0.3 weight % (each) of one or more of the elements copper, nickel, chromium, cobalt or molybdenum and up to 0.012 weight % (each) of one or more of the elements boron, vanadium or niobium, (b) secondary metallurgical processing of the melt in a vacuum unit and/or a pan furnace, (c) continuous casting to form a strip, (d) cutting the strip into thin slabs, (e) heating to 1050-1300[deg]C for not more than 60 minutes in an in-line furnace, (f) continuous hot-rolling in a line-mounted multiple stand mill train to give rolled strip with a thickness of 0.5-4.0 mm, using a temperature of 900-1200[deg]C for the first pass with a reduction of more than 40%, a reduction of more than 30% in the second pass and a reduction of not more than 30% in the last pass, (g) cooling the strip, (h) rolling the strip into a coil, (i) optionally annealing the strip after coiling or before cold-rolling, (j) cold-rolling to cold-rolled strip with a final thickness of 0.15-0.50 mm, (k) annealing with recrystallisation and decarbonisation, (l) treating the strip surface with a scale separator, (m) final annealing to develop a Goss structure, (n) optional coating with electrical insulation followed by stress-relieving annealing and (o) optional domain refinement.

IPC 8 full level

C21D 8/12 (2006.01); **C22C 38/02** (2006.01)

CPC (source: EP KR US)

B21B 1/46 (2013.01 - KR); **B22D 11/12** (2013.01 - KR); **C21D 8/12** (2013.01 - KR); **C21D 8/1222** (2013.01 - EP US); **C21D 8/1261** (2013.01 - EP US); **C22C 38/02** (2013.01 - EP KR US)

Citation (examination)

- "I materiali magnetici impiegati nelle macchine elettriche: proprietà dei prodotti attuali e tendenze di sviluppo", LA METALLURGICA ITALIANA, 19 September 1991 (1991-09-19), IT, pages 905 - 914
- "Grain-oriented Silicon Electrical Steel From Italy and Japan", US INTERNATIONAL TRADE COMMISSION, 1 May 1994 (1994-05-01), US, pages II-3 - II-8

Cited by

DE102017220721A1; DE102017220718A1; DE102017220714B3; DE102014104106A1; EP2942417A1; DE102008029581A1; WO2009012963A1; WO2019096735A1; DE102013208618A1; US10597539B2; WO2019096734A1; WO2019096736A1; EP3693496A1; WO2020161094A1; EP3495430A1; WO2019110777A1; US11873408B2

Designated contracting state (EPC)

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

DOCDB simple family (publication)

EP 1752548 A1 20070214; **EP 1752548 B1 20160203**; AU 2006274900 A1 20070208; AU 2006274900 B2 20110728; BR PI0614374 A2 20110322; BR PI0614374 B1 20140429; CA 2616088 A1 20070208; CA 2616088 C 20150505; CN 101238226 A 20080806; CN 101238226 B 20110713; HU E027079 T2 20161028; JP 2009503264 A 20090129; KR 101365652 B1 20140219; KR 20080042860 A 20080515; MX 2008001413 A 20080416; PL 1752548 T3 20170831; RU 2008107949 A 20090910; RU 2383634 C2 20100310; SI 1752548 T1 20160930; TW 200710225 A 20070316; TW I402352 B 20130721; US 2009139609 A1 20090604; US 8038806 B2 20111018; WO 2007014867 A1 20070208; ZA 200800662 B 20090729

DOCDB simple family (application)

EP 05016834 A 20050803; AU 2006274900 A 20060720; BR PI0614374 A 20060720; CA 2616088 A 20060720; CN 200680028793 A 20060720; EP 2006064479 W 20060720; HU E05016834 A 20050803; JP 2008524480 A 20060720; KR 20087005313 A 20060720; MX 2008001413 A 20060720; PL 05016834 T 20050803; RU 2008107949 A 20060720; SI 200532060 A 20050803; TW 95127714 A 20060728; US 99766806 A 20060720; ZA 200800662 A 20080122