Title (en)

STEEL PLATE COOLING SYSTEM AND STEEL PLATE COOLING METHOD

Title (de)

STAHLPLATTENKÜHLUNGSSYSTEM UND STAHLPLATTENKÜHLUNGSVERFAHREN

Title (fr)

SYSTÈME DE REFROIDISSEMENT DE PLAQUE D'ACIER ET PROCÉDÉ DE REFROIDISSEMENT DE PLAQUE D'ACIER

Publication

EP 2540407 B1 20160120 (EN)

Application

EP 11809748 A 20110722

Priority

- JP 2010234715 A 20101019
- JP 2010164522 A 20100722
- JP 2011066742 W 20110722

Abstract (en)

[origin: EP2540407A1] Disclosed is a steel plate cooling system including a plurality of constraining roll pairs that allows a steel plate to pass restrictively therebetween; and an upper cooling apparatus and a lower cooling apparatus that are arranged between the constraining roll pairs so as to be opposed to each other with the steel plate interposed therebetween and have a plurality of spray nozzle rows. The plurality of spray nozzle rows is formed in a plate passing direction of the steel plate, and each of the spray nozzle rows has a plurality of identical spray nozzles lined up in a width direction of the steel plate. When viewed in the plate passing direction, the spray nozzle rows are each classified into an upstream spray nozzle row group located on a relative upstream side and a downstream spray nozzle row group located on a relative downstream side. A number of spray nozzles that belong to the upstream spray nozzle row group is smaller than a number of spray nozzles that belong to the downstream spray nozzle row group.

IPC 8 full level

B21B 45/02 (2006.01)

CPC (source: EP KR)

B21B 45/02 (2013.01 - KR); **B21B 45/0233** (2013.01 - EP); B21B 45/0218 (2013.01 - EP)

Citation (opposition)

Opponent : SMS group GmbH

- GB 2062520 A 19810528 - SUMITOMO METAL IND, et al
- EP 0997203 B1 20040211 - SMS DEMAG AG [DE]
- DE 2023799 A1 19701119
- US 2851042 A 19580909 - WILLIAM SPENCE
- WO 2008035510 A1 20080327 - NIPPON STEEL CORP [JP], et al
- US 3533261 A 19701013 - HOLLANDER FRANS, et al
- JP H10180338 A 19980707 - KAWASAKI STEEL CO
- VEREIN DEUTSCHE R EISENHÜTTENLEUTE, BERICHT ÜBER DEN METEC CONGRESS 94 VOM 20. BIS 22. JUNI 1994 ;, 1994, Düsseldorf, XP055316131
- YI ZHENG ET AL.: "?Distributed model predictive control for plant-wide hot-rolled strip laminar cooling process", JOURNAL OF PROCESS CONTROL;, October 2009 (2009-10-01), pages 1427 - 1437, XP055316128

Cited by

CN114026259A; US2022251677A1; US11639537B2; EP2777836A1; EP3653312A4; US11413670B2; US10722929B2; US11084076B2

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

DOCDB simple family (publication)

EP 2540407 A1 20130102; **EP 2540407 A4 20131113**; **EP 2540407 B1 20160120**; BR 112012024915 A2 20160712; BR 112012024915 B1 20201215; CN 102834193 A 20121219; CN 102834193 B 20141217; JP 4903920 B1 20120328; JP WO2012011578 A1 20130909; KR 101266736 B1 20130528; KR 20120120972 A 20121102; WO 2012011578 A1 20120126

DOCDB simple family (application)

EP 11809748 A 20110722; BR 112012024915 A 20110722; CN 201180016857 A 20110722; JP 2011066742 W 20110722; JP 2011544714 A 20110722; KR 20127025406 A 20110722