

## Title (en)

MANUFACTURING METHODS AND APPARATUS FOR TARGETED LUBRICATION IN HOT METAL ROLLING

## Title (de)

HERSTELLUNGSVERFAHREN UND VORRICHTUNG ZUR GEZIELTEN SCHMIERUNG BEIM WALZEN VON HEISSEM METALL

## Title (fr)

PROCÉDÉS DE FABRICATION ET APPAREIL POUR LA LUBRIFICATION CIBLÉE DANS LE LAMINAGE DE MÉTAL À CHAUD

## Publication

**EP 2969278 B1 20170802 (EN)**

## Application

**EP 14720800 A 20140313**

## Priority

- US 201361798769 P 20130315
- US 2014026343 W 20140313

## Abstract (en)

[origin: US2014260476A1] Rolling mill apparatus and methods of hot rolling with targeted lubrication are provided herein. A rolling mill apparatus having multiple roll stacks may include a cooling fluid pump and a lubricant pump fluidly coupled with cooling nozzles and lubrication nozzles through a piping system. The piping system may be configured such that the lubricant pump introduces neat lubricant that mixes with the cooling fluid to form a lubricating fluid as loose lubricant emulsion for discharge to select roll stacks through one or more lubrication nozzles, while one or more cooling nozzles discharge the cooling fluid without the added lubricant. The lubrication nozzles may be aimed to target discharge of the lubricant emulsion to the bite roll. Modifications to mill headers to provide targeted lubrication in accordance with the invention are also provided.

## IPC 8 full level

**B21B 27/10** (2006.01); **B21B 45/02** (2006.01)

## CPC (source: EP US)

**B21B 27/10** (2013.01 - EP US); **B21B 45/0218** (2013.01 - EP US); **B21B 45/0233** (2013.01 - US); **B21B 45/0251** (2013.01 - EP US); **B21B 45/0242** (2013.01 - EP US); **B21B 2003/001** (2013.01 - EP US); **B21B 2027/103** (2013.01 - EP US)

## Citation (opposition)

Opponent : ArcelorMittal

- US 5090225 A 19920225 - SCHIMION WERNER [DE]
- US 7690235 B2 20100406 - BUENTEN ROLF [DE], et al
- JP 2000351002 A 20001219 - KAWASAKI STEEL CO

Opponent : NOVELIS, Inc

- JP 2000351002 A 20001219 - KAWASAKI STEEL CO
- JP 2012166260 A 20120906 - KOBE STEEL LTD
- EP 1829625 A1 20070905 - NIPPON STEEL CORP [JP], et al
- J.A. SCHEY: "Tribology in Metalworking", 1983, AMERICAN SOCIETY FOR METALS, article "4.6 Aqueous Lubricants", pages: 149 - 161, XP055485400

Opponent : SMS group GmbH

- EP 1193004 A1 20020403 - NIPPON KOKAN KK [JP]
- WO 03002277 A1 20030109 - SMS DEMAG AG [DE], et al
- EP 0908248 A2 19990414 - SCHLOEMANN SIEMAG AG [DE]
- DE 602005006318 T2 20090709 - ARCELORMITTAL FRANCE [FR]
- JP H038510 A 19910116 - SUMITOMO LIGHT METAL IND
- US 3855136 A 19741217 - MCDOLE E, et al
- DE 102004040375 A1 20051229 - SMS DEMAG AG [DE]
- JP H10314805 A 19981202 - SUMITOMO LIGHT METAL IND
- EP 0367967 B1 19940907 - SCHLOEMANN SIEMAG AG [DE]
- JP 2000351002 A 20001219 - KAWASAKI STEEL CO

## 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)

**US 2014260476 A1 20140918**; BR 112015018406 A2 20170718; CN 105339101 A 20160217; EP 2969278 A1 20160120; EP 2969278 B1 20170802; ES 2639741 T3 20171030; JP 2016512174 A 20160425; KR 20160012994 A 20160203; WO 2014151731 A1 20140925

## DOCDB simple family (application)

**US 201414209484 A 20140313**; BR 112015018406 A 20140313; CN 201480008003 A 20140313; EP 14720800 A 20140313; ES 14720800 T 20140313; JP 2016502108 A 20140313; KR 20157029600 A 20140313; US 2014026343 W 20140313