

Title (en)  
CONTINUOUS ANNEALING APPARATUS, CONTINUOUS HOT-DIP GALVANIZATION APPARATUS, AND STEEL SHEET MANUFACTURING METHOD

Title (de)  
VORRICHTUNG ZUM KONTINUIERLICHEN GLÜHEN, VORRICHTUNG ZUM KONTINUIERLICHEN FEUERVERZINKEN UND VERFAHREN ZUR HERSTELLUNG VON STAHLBLECH

Title (fr)  
APPAREIL DE RECUIT CONTINU, APPAREIL DE GALVANISATION PAR IMMERSION À CHAUD CONTINU ET PROCÉDÉ DE FABRICATION DE TÔLE D'ACIER

Publication  
**EP 4361295 A1 20240501 (EN)**

Application  
**EP 22841787 A 20220517**

Priority  
• JP 2021116761 A 20210714  
• JP 2022020579 W 20220517

Abstract (en)  
Provided is a continuous annealing line capable of producing a steel sheet excellent in hydrogen embrittlement resistance. A continuous annealing line 100 includes: a payoff reel 10 configured to uncoil a cold-rolled coil C to feed a cold-rolled steel sheet S; an annealing furnace 20 configured to pass the cold-rolled steel sheet S therethrough to continuously anneal the cold-rolled steel sheet S and including a heating zone 22, a soaking zone 24, and a cooling zone 26 that are arranged from an upstream side in a sheet passing direction, the cold-rolled steel sheet S being annealed in a reducing atmosphere containing hydrogen in the heating zone 22 and the soaking zone 24, and cooled in the cooling zone 26; a downstream line 30 configured to continuously pass the cold-rolled steel sheet S discharged from the annealing furnace 20 therethrough; a tension reel 50 configured to coil the cold-rolled steel sheet S being passed through the downstream line 30; and a vibration application device 60 or 70 configured to apply vibration to the cold-rolled steel sheet S being passed from the cooling zone 26 to the tension reel 50 so that the cold-rolled steel sheet is caused to vibrate at a frequency of 100 Hz or more and 100,000 Hz or less and a maximum amplitude of 10 nm or more and 500 μm or less.

IPC 8 full level  
**C21D 3/06** (2006.01); **C21D 1/26** (2006.01); **C21D 9/56** (2006.01); **C22C 38/00** (2006.01); **C22C 38/06** (2006.01); **C22C 38/58** (2006.01); **C22C 38/60** (2006.01); **C23C 2/00** (2006.01); **C23C 2/06** (2006.01); **C23C 2/40** (2006.01)

CPC (source: EP KR)  
**C21D 1/04** (2013.01 - EP); **C21D 1/26** (2013.01 - KR); **C21D 3/06** (2013.01 - KR); **C21D 9/005** (2013.01 - EP); **C21D 9/46** (2013.01 - EP); **C21D 9/56** (2013.01 - EP KR); **C21D 9/562** (2013.01 - EP); **C21D 10/00** (2013.01 - KR); **C22C 38/002** (2013.01 - EP); **C22C 38/005** (2013.01 - EP); **C22C 38/008** (2013.01 - EP); **C22C 38/02** (2013.01 - EP); **C22C 38/04** (2013.01 - EP); **C22C 38/06** (2013.01 - EP); **C22C 38/08** (2013.01 - EP); **C22C 38/12** (2013.01 - EP); **C22C 38/14** (2013.01 - EP); **C22C 38/16** (2013.01 - EP); **C22C 38/32** (2013.01 - EP); **C22C 38/38** (2013.01 - EP); **C22C 38/60** (2013.01 - EP); **C23C 2/003** (2013.01 - EP); **C23C 2/02** (2013.01 - EP); **C23C 2/022** (2022.08 - EP); **C23C 2/06** (2013.01 - EP KR); **C23C 2/20** (2013.01 - EP); **C23C 2/28** (2013.01 - EP KR); **C23C 2/29** (2022.08 - EP); **C23C 2/40** (2013.01 - EP KR)

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

Designated extension state (EPC)  
BA ME

Designated validation state (EPC)  
KH MA MD TN

DOCDB simple family (publication)  
**EP 4361295 A1 20240501**; CN 117616138 A 20240227; JP 7388570 B2 20231129; JP WO2023286440 A1 20230119; KR 20240014501 A 20240201; WO 2023286440 A1 20230119

DOCDB simple family (application)  
**EP 22841787 A 20220517**; CN 202280048053 A 20220517; JP 2022020579 W 20220517; JP 2022555184 A 20220517; KR 20237045028 A 20220517