

Title (en)  
HEAT EXCHANGE METHOD, HEAT EXCHANGE MEDIUM, HEAT EXCHANGE DEVICE, PATENTING METHOD, AND CARBON STEEL WIRE

Title (de)  
WÄRMETAUSCHVERFAHREN, WÄRMETAUSCHERMEDIUM, WÄRMETAUSCHERVORRICHTUNG, PATENTIERUNGSVERFAHREN UND KOHLENSTOFFSTAHLDRAHT

Title (fr)  
PROCÉDÉ D'ÉCHANGE DE CHALEUR, MILIEU D'ÉCHANGE DE CHALEUR, DISPOSITIF D'ÉCHANGE DE CHALEUR, PROCÉDÉ DE PATENTAGE ET FIL D'ACIER AU CARBONE

Publication  
**EP 3919633 A1 20211208 (EN)**

Application  
**EP 20749310 A 20200128**

Priority  
• JP 2019015517 A 20190131  
• JP 2020002904 W 20200128

Abstract (en)  
The present invention provides a novel heat exchange medium to replace lead. A carbon-steel wire 1A heated in a heating furnace 11 is passed through a bath 12A filled with a liquid-phase Mg-Al-Ca alloy 20 obtained by melting a Mg-Al-Ca alloy in which the main constituent elements are Mg (magnesium), Al (aluminum) and Ca (calcium). When it passes through the bath 12A, the carbon-steel wire 1A, which has been heated for example to about 950°C in the heating furnace 11, is cooled to about 550°C. The Mg-Al-Ca alloy is non-toxic and has no environmental impact as well.

IPC 8 full level  
**C21D 1/48** (2006.01); **C21D 9/64** (2006.01); **C22C 23/02** (2006.01); **C22C 30/00** (2006.01)

CPC (source: EP KR US)  
**C21D 1/32** (2013.01 - EP); **C21D 1/48** (2013.01 - EP KR US); **C21D 1/56** (2013.01 - EP); **C21D 1/607** (2013.01 - EP); **C21D 6/00** (2013.01 - EP);  
**C21D 9/5732** (2013.01 - EP); **C21D 9/64** (2013.01 - EP KR US); **C22C 21/00** (2013.01 - US); **C22C 23/02** (2013.01 - EP KR US);  
**C22C 30/00** (2013.01 - KR US); **C21D 2211/009** (2013.01 - EP)

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

DOCDB simple family (publication)  
**EP 3919633 A1 20211208; EP 3919633 A4 20230628; CN 113227408 A 20210806; JP 7161735 B2 20221027; JP WO2020158704 A1 20211202; KR 20210118910 A 20211001; KR 20240019379 A 20240214; US 2021355561 A1 20211118; WO 2020158704 A1 20200806**

DOCDB simple family (application)  
**EP 20749310 A 20200128; CN 202080007801 A 20200128; JP 2020002904 W 20200128; JP 2020569632 A 20200128; KR 20217027224 A 20200128; KR 20247003139 A 20200128; US 202117443545 A 20210727**