

Title (en)  
ULTRASONIC ENHANCEMENT OF DIRECT CHILL CAST MATERIALS

Title (de)  
ULTRASCHALLVERBESSERUNG VON DIREKTEN KOKILLENGUSSMATERIALIEN

Title (fr)  
AMÉLIORATION PAR ULTRASONS DE MATÉRIAUX COULÉS PAR REFROIDISSEMENT INTENSE ET DIRECT

Publication  
**EP 3826787 A4 20220330 (EN)**

Application  
**EP 19841973 A 20190725**

Priority  
• US 201862703035 P 20180725  
• US 2019043445 W 20190725

Abstract (en)  
[origin: WO2020023751A1] A method and apparatus for direct chill casting of metals and metal alloys which includes application of vibrational energy to the molten material in an open-ended mold and at the outlet of the mold are provided. In an aspect, the method is directed to the production of cast aluminum alloys.

IPC 8 full level  
**B22D 11/041** (2006.01); **B22D 11/045** (2006.01); **B22D 11/049** (2006.01); **B22D 11/114** (2006.01); **B22D 11/115** (2006.01); **B22D 11/117** (2006.01)

CPC (source: EP KR US)  
**B22D 11/041** (2013.01 - US); **B22D 11/049** (2013.01 - EP KR US); **B22D 11/114** (2013.01 - EP); **B22D 11/115** (2013.01 - EP KR US); **B22D 11/117** (2013.01 - EP KR US); **B22D 11/1246** (2013.01 - US)

Citation (search report)  
• [X1] US 5360329 A 19941101 - LEMELSON JEROME H [US]  
• [X1] KR 20170100221 A 20170904 - INDUSTRY-ACADEMIC COOP FOUND CHOSUN UNIV [KR]  
• [XA] JP H0768345 A 19950314 - PECHINEY ALUMINIUM  
• [A] US 4375830 A 19830308 - ROEHRIG ADALBERT [CH]  
• See also references of WO 2020023751A1

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)  
**WO 2020023751 A1 20200130; WO 2020023751 A8 20201217**; AU 2019310103 A1 20210218; BR 112021001244 A2 20210427; CA 3107465 A1 20200130; CN 112703073 A 20210423; CN 112703073 B 20240206; CN 118002755 A 20240510; EP 3826787 A1 20210602; EP 3826787 A4 20220330; EP 3826787 B1 20240221; EP 3826787 C0 20240221; JP 2021532988 A 20211202; JP 7457691 B2 20240328; KR 20210037699 A 20210406; MX 2021000918 A 20210623; US 2021316357 A1 20211014

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**US 2019043445 W 20190725**; AU 2019310103 A 20190725; BR 112021001244 A 20190725; CA 3107465 A 20190725; CN 201980058785 A 20190725; CN 202410092930 A 20190725; EP 19841973 A 20190725; JP 2021503793 A 20190725; KR 20217005602 A 20190725; MX 2021000918 A 20190725; US 201917262860 A 20190725