



(51) International Patent Classification:

F27B 3/20 (2006.01) *C22B 9/16* (2006.01)
F27D 99/00 (2010.01) *H01J 37/305* (2006.01)

(21) International Application Number:

PCT/US2010/044944

(22) International Filing Date:

10 August 2010 (10.08.2010)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

12/546,785 25 August 2009 (25.08.2009) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

— with international search report (Art. 21(3))

(54) Title: ION PLASMA ELECTRON EMITTERS FOR A MELTING FURNACE

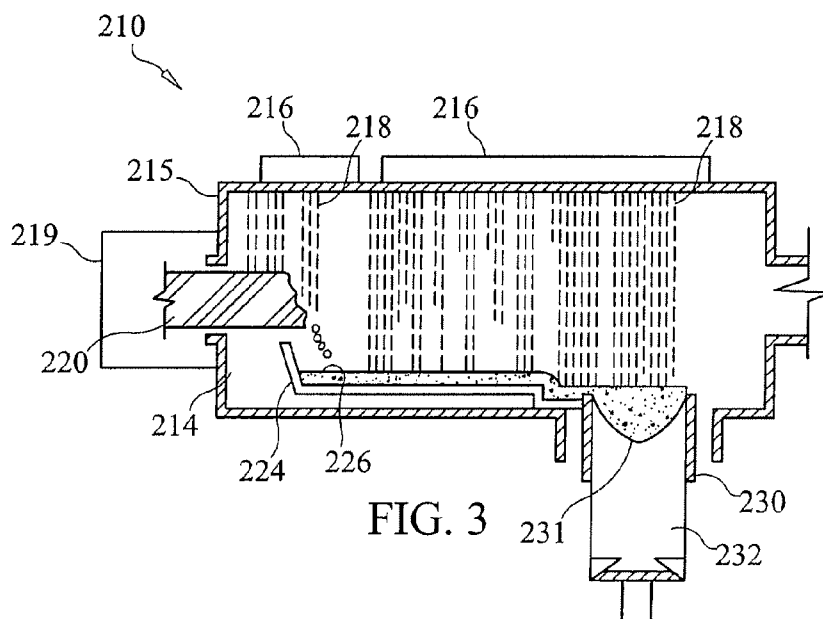


FIG. 3

(57) Abstract: An apparatus for melting an electrically conductive metallic material comprises an auxiliary ion plasma electron emitter configured to produce a focused electron field including a cross-sectional profile having a first shape. The apparatus further comprises a steering system configured to direct the focused electron field to impinge the focused electron field on at least a portion of the electrically conductive metallic material to at least one of melt or heat any solidified portions of the electrically conductive metallic material, any solid condensate within the electrically conductive metallic material, and/or regions of a solidifying ingot.