



(43) International Publication Date
25 September 2014 (25.09.2014)

(51) International Patent Classification:

B21J 1/06 (2006.01) *C23C 4/04* (2006.01)
B21J 3/00 (2006.01) *C23C 4/10* (2006.01)
B21C 23/32 (2006.01) *C23C 4/18* (2006.01)

(21) International Application Number:

PCT/US2014/021766

(22) International Filing Date:

7 March 2014 (07.03.2014)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

13/833,144 15 March 2013 (15.03.2013) US

(71) Applicant: **ATI PROPERTIES, INC.** [US/US]; 1600
N.E. Old Salem Road, Albany, Oregon 97321 (US).

(72) Inventors: **FORBES JONES, Robin M.**; 11700 Gullane
Court, Charlotte, North Carolina 28277 (US). **KENNEDY,
Richard L.**; 206 Macedonia Church Road, Monroe, North

Carolina 28112 (US). **CAO, Wei-Di**; 4004 Wild Nursery
Court, Charlotte, North Carolina 28215 (US).

(74) Agents: **GROSSELIN, III, John E.** et al.; 1000 Six PPG
Place, Pittsburgh, Pennsylvania 15222 (US).

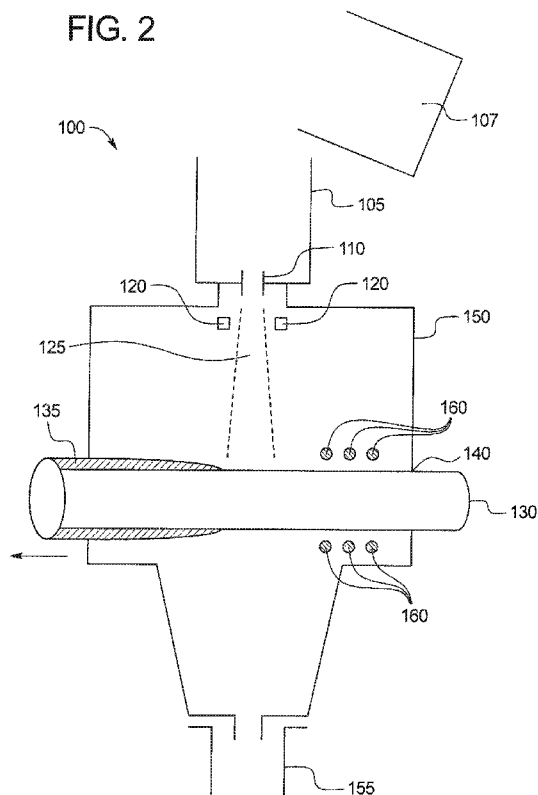
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
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, RW, SD, SL, SZ, TZ,

[Continued on next page]

(54) Title: METHODS TO IMPROVE HOT WORKABILITY OF METAL ALLOYS

FIG. 2



(57) Abstract: A method of processing an alloy workpiece to reduce thermal cracking may comprise spraying a metallic coating material onto at least a portion of a surface of the alloy workpiece to form a surface coating metallurgically bonded to the alloy workpiece. The surface coating may be more ductile than the alloy workpiece and reduces heat loss from the alloy workpiece.



UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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))*

(88) Date of publication of the international search report:

30 April 2015