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(21) International Application Number: PCT/US96/02074 (22) International Filing Date: 15 February 1996 (15.02.96) (30) Priority Data: 08/389,884 15 February 1995 (15.02.95) US (71) Applicant: BOARD OF REGENTS, THE UNIVERSITY OF TEXAS SYSTEM [US/US]; 201 West 7th Street, Austin, TX 78701 (US). (72) Inventors: CARNES, Robert, W.; 3502 Palomar Lane, Austin, TX 78727 (US). HARVILLE, Michael, W.; 12311 Bedrock Trail, Austin, TX 78727 (US). HAASE, Paul, W.; 4503 Placid Place, Austin, TX 78731 (US). (74) Agent: SERTICH, Gary, J.; Arnold, White & Durkee, P.O. Box 4433, Houston, TX 77210 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AZ, BY, KG, KZ, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report.	

(54) Title: DETERMINING, CONTROLLING ELECTRICAL RESISTANCE

(57) Abstract

The system of the present invention includes a homopolar generator, a hydraulic uniaxial press to hold the metal alloys to be welded (102), and electrical connections (101) set at selected distances from the weld interface (103) to provide a desired cooling rate for metal alloys (102) being welded. A method is disclosed for determining a cooling rate for a metal alloy pipe (102) in an electrical resistance welding process in a homopolar welding system following the resistive heating of a weld interface (103) by discharging energy from a homopolar generator through electrodes (101) attached to each of first and second pipes (102) to form a welded pipe segment. The temperature of the welded pipe segment is measured at periodic time intervals to determine a cooling rate for the welded pipe segment. A desired range for the cooling rate may be determined by adjusting the electrode gap (105) for repeated samples and analyzing the resulting metallurgical properties for each sample. In a further aspect, a method is disclosed for controlling the cooling rate of metal alloy pipe (102) by varying the electrode gap (105) to provide a desired cooling rate following resistive heating of the weld interface (103) and allowing the welded pipe (102) segment to cool at the desired cooling rate.

