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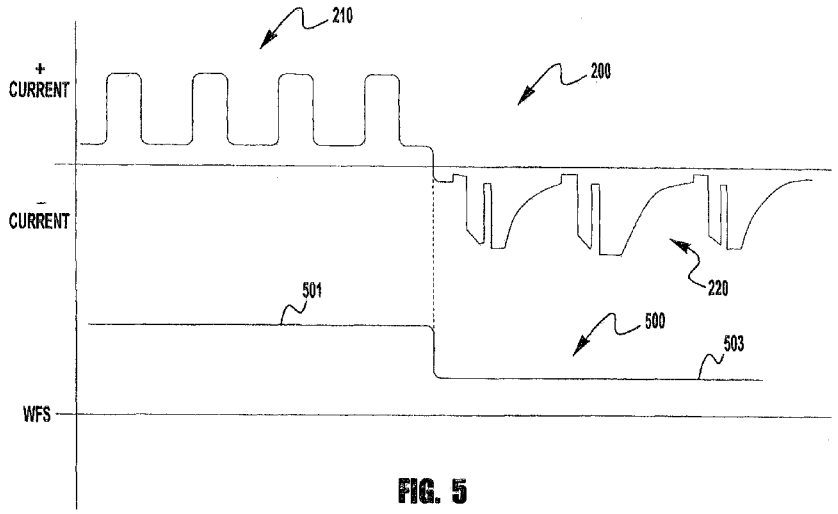

FIG. 5

(57) Abstract: A system and method is provided in which a welding system (100) modulates the heat input into a weld joint during welding by changing between a high heat input welding waveform portion (210) and a low heat input welding waveform portion (220). The system (100) can utilize detected weld joint geometry and thickness to vary the utilization of the high heat and low heat waveform portions (210, 220) to change the weld bead profile during welding. Additionally, the wire feed speed is changed with the changes between the high heat input and low heat input portions of the welding waveform (200).

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2012/074115 A1 (KAZMAIER JOERG [AT] ET AL) 29 March 2012 (2012-03-29) paragraphs [0006], [0007], [0024] - [0034], [0040], [0043] - [0045], [0052] - [0053]; figures 2,5-7 -----	1-7, 11-15 8-10
X	EP 2 455 177 A1 (PANASONIC CORP [JP]) 23 May 2012 (2012-05-23) paragraphs [0022] - [0024], [0028] - [0029]; figures 2,3; examples 1,2 -----	1,3-6, 12,14,15
Y A	US 6 023 044 A (KOSAKA TETSUYA [JP] ET AL) 8 February 2000 (2000-02-08) abstract; figures 1-5,14,15 column 12, line 66 - column 13, line 23; claims 1-10 -----	8-10 15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012074115 A1	29-03-2012	AT 508494 A1	15-01-2011
		CN 102458747 A	16-05-2012
		EP 2442938 A1	25-04-2012
		JP 2012529991 A	29-11-2012
		RU 2012101602 A	27-07-2013
		US 2012074115 A1	29-03-2012
		WO 2010144931 A1	23-12-2010
EP 2455177 A1	23-05-2012	CN 102596475 A	18-07-2012
		EP 2455177 A1	23-05-2012
		JP 5293884 B2	18-09-2013
		US 2012199567 A1	09-08-2012
		WO 2012032703 A1	15-03-2012
US 6023044 A	08-02-2000	DE 69727886 D1	08-04-2004
		DE 69727886 T2	29-07-2004
		EP 0842725 A1	20-05-1998
		JP H09277045 A	28-10-1997
		US 6023044 A	08-02-2000
		WO 9738819 A1	23-10-1997