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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))*

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15 September 2016

(54) Title: AUTOMATED WELDING TRANSLATION PLATFORM

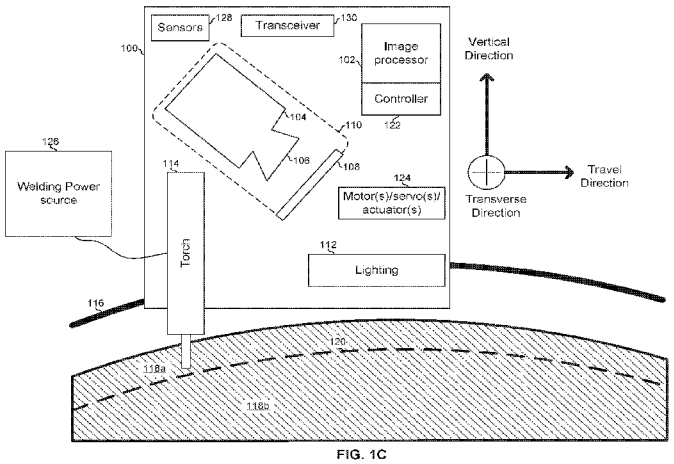

FIG. 1C

(57) Abstract: An automated welding device comprises a camera (104), processing circuitry (102, 122), a welding torch (114), and an electromechanical subsystem (124). The camera is operable to capture, using visible and/or infrared wavelengths, a high dynamic range image of one or more workpieces. The processing circuitry (102, 122) is operable to process the image for determination of physical characteristics of the one or more workpieces. The processing circuitry (102, 122) may be operable to generate, during welding of the one or more workpieces by the welding torch, electrical signals which are based on the determined physical characteristics of the one or more workpieces, and which control one or more welding parameters of the automated welding device during the welding of the one or more workpieces. The electromechanical subsystem (124) is operable to convert the electrical signals into the one or more welding parameters of the automated welding device.

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. B23K9/095 B23K9/12 B23K9/127 B23K37/02
ADD. B23K101/06

According to International Patent Classification (IPC) or to both national classification and IPC

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.
Y	US 2013/206740 A1 (PFEIFER KYLE ANDREW [US] ET AL) 15 August 2013 (2013-08-15) paragraphs [0025], [0033] - [0035]	1-4,13, 18
Y	Cameron Serles: "Why Weld Cameras Need High Dynamic Range Imaging", , 10 April 2013 (2013-04-10), XP055269605, Retrieved from the Internet: URL:http://blog.xiris.com/blog/bid/258666/Why-Weld-Cameras-Need-High-Dynamic-Range-Imaging [retrieved on 2016-04-29] the whole document	1-4,13, 18

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2016	26/07/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Hernanz, Sonsoles

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	"AD-081CL Digital 2CCD Progressive Scan HDR / High Frame Rate Camera User's Manual", , 1 July 2012 (2012-07-01), page 27, XP055269758, Retrieved from the Internet: URL:http://www.stemmer-imaging.de/media/uploads/docmanager/53730-JAI_AD-081_CL_Manual.pdf [retrieved on 2016-04-29] the whole document & Anonymous: "JAI introduces unique high-dynamic-range camera", , 5 November 2009 (2009-11-05), XP055269759, Retrieved from the Internet: URL:http://www.jai.com/en/newsevents/news/ad-081cl [retrieved on 2016-04-29] "Typical HDR applications for the AD-081CL include inspection tasks where incident light or bright reflections are present, such as ... welding"	18
Y	US 2005/103767 A1 (KAINEC STEPHEN M [US] ET AL) 19 May 2005 (2005-05-19) paragraph [0042]	3,4
Y	US 2006/207980 A1 (JACOVETTY RONALD R [US] ET AL) 21 September 2006 (2006-09-21) paragraphs [0051] - [0053]	3,4

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2015/067931

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013206740 A1	15-08-2013	US 2013206740 A1	15-08-2013
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		US 2013208569 A1	15-08-2013
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		JP 2007527322 A	27-09-2007
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		WO 2005076953 A2	25-08-2005
US 2006207980 A1	21-09-2006	AU 2006201064 A1	05-10-2006
		CA 2538835 A1	15-09-2006
		DE 202006021272 U1	13-11-2014
		EP 1702707 A1	20-09-2006
		US 2006207980 A1	21-09-2006

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/067931

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-4, 13, 18

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 13, 18

   System according to claim 1, characterized by a transceiver. Technical problem solved: to enable communication between the system and other systems.

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2. claims: 5, 10-12, 16, 17

   System according to claim 1, characterized by a particular weld parameter control as a function of the physical characteristics. Technical problem solved: to provide for dynamic feedback and/or feedforward based control of the automated welding device (paragraph 12).

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3. claim: 6

   System according to claim 1, characterized by an optical shield. Technical problem solved: to protect the camera (paragraphs 32, 58).

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4. claims: 7, 8, 19

   System according to claim 1, characterised by lighting control. Technical problem solved: to enhance features of interest and to suppress the effects of external lighting (paragraph 68).

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5. claim: 9

   System according to claim 1, characterised by joint location tracking. Technical problem solved: how to accurately identify edges. (paragraphs 44-49)

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6. claims: 14, 15

   System according to claim 1, characterised by a multi-modal learning configuration (paragraph 41). Technical problem solved: to avoid camera dependence for the determination of physical characteristics (paragraphs 38, 39).

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7. claim: 20

   System according to claim 1, characterised by a translation system. Technical problem solved: to enable the welding device to move automatically.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210