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Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

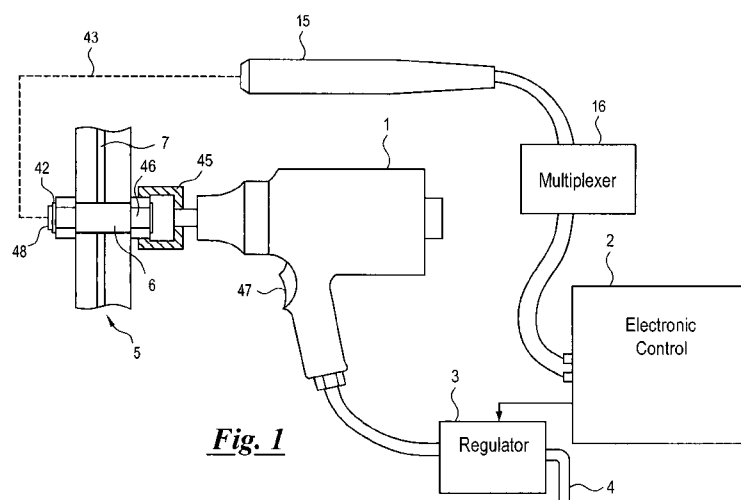
— with international search report (Art. 21(3))

— 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))

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

31 May 2012

(54) Title: SYSTEM FOR PERFORMING PREDEFINED FASTENER INSTALLATION PROCEDURES



*Fig. 1*

(57) Abstract: Complex assembly procedures for joining components with plural fasteners are accomplished using predefined procedures for performing a multi-step assembly of a joint using a dynamically controllable assembly tool, or to inspect an assembled joint. An assembly tool is coupled with an electronically controlled regulator for reducing the tightening rate, or the load increase per impact for an impact or impulse tool, so the tool can be stopped precisely at a specified stopping load or torque. The predefined procedures for performing the desired tightening operation are established in a controller coupled with the electronically controlled regulator, for dynamically controlling the assembly tool. The system can be used to assemble joints involving multiple fasteners and which are subject to elastic interaction between the fasteners, rocking, or joint relaxation, and in assembly or inspection operations in which an operator is to be guided through a particular sequence of instructions.



**A. CLASSIFICATION OF SUBJECT MATTER*****B25B 21/00(2006.01)i, G01L 5/24(2006.01)i, F16B 31/00(2006.01)i, F16B 31/02(2006.01)i***

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)

B25B 21/00; G01L 5/24; F16B 31/00; F16B 31/02

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

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: assembling, joint, fastener, torque, load, control, ultrasonic, pneumatic, regulator and similar terms

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2007-117575 A2 (INNOVATION PLUS, LLC) 18 October 2007 See the whole document.	1-22
Y	US 5717143 A (JENCO, JOHN M. et al.) 10 February 1998 See column 2 line 45-column 8 line 28 and figure 1.	1-22
Y	US 2009-0038402 A1 (KIBBLEWHITE, IAN E. et al.) 12 February 2009	22
A	See abstract, paragraphs 14-29 and figure 1.	1-21
A	KR 10-2008-0094930 A (FUJITSU LIMITED) 27 October 2008 See paragraphs 50-132 and figures 1-4.	1-22

 Further documents are listed in the continuation of Box C. 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 citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

29 MARCH 2012 (29.03.2012)

Date of mailing of the international search report

**06 APRIL 2012 (06.04.2012)**

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2011/000759**

**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:

Group I, claims 1-22, drawn to an apparatus or a method for assembling a joint including plural fasteners where an assembly tool, an electronically controllable unit and an electronic control circuit comprise a common technical feature.

Group II, claims 23 and 24, drawn to a backup wrench assembly for combination with a fastener coupled with a joint where a wrench body and a retaining bracket comprise a common technical feature.

- 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 fee, this Authority did not invite payment of any additional fee.
  
- 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.:  
1-22

**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.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2011/000759**

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