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62/012,009 13 June 2014 (13.06.2014) US

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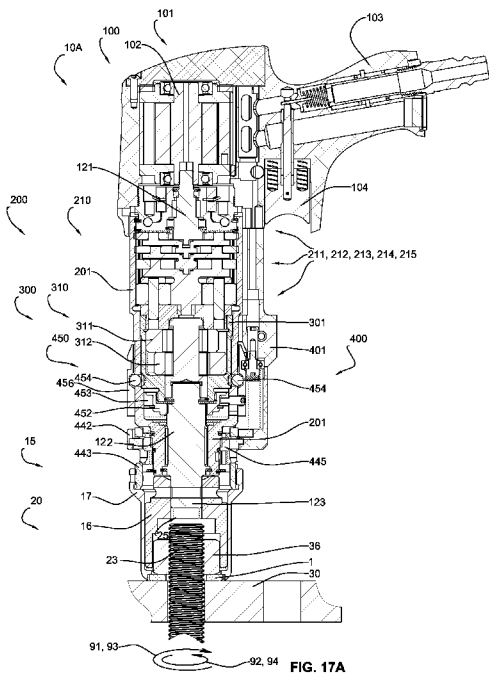
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, 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.

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[Continued on next page]

(54) Title: A REACTION WASHER AND ITS FASTENING SOCKET.



(57) Abstract: The present invention seeks to protect Applicant's HYTORC Z System which involves: tools having multi-speed / multi-torque modes with torque multiplication and vibration mechanisms without use of external reaction abutments; a force transfer means to yield in-line co-axial action and reaction for use with such tools; driving means and shifting means capable of attaching to washers under the nut for use with such tools and force transfer means; associated washers for use with such tools, force transfer means and driving means; and related accessories for use with such tools, force transfer means, driving means and washers. HYTORC® Z® Washers located under nuts or bolt heads of various types having engageable perimeters of multiple shapes, sizes, geometries and serrations, such as washer/fastener radius engagement differentials, and frictionally biased faces with relatively higher friction against the flange surface and relatively lower friction against the nut, such as friction coefficient increasing treatment means of various types, sizes and locations. HYTORC Z® Guns incorporating a powerful impact mechanism and a precise torque multiplier in the same tool combining rapid run-down with calibrated torque. HYTORC® Z® Sockets with dual drive coaxial action and reaction having outer sleeves to react on Z® Washers and an inner sleeves to turn nuts or bolt heads. HYTORC® Z® Spline Adapters and Reaction Plates for backwards compatibility with HYTORC®'s torque/tension systems including the AVANTI® square drive system, the STEALTH® limited clearance system, the pneumatic jGUN® series, the FLASH® Gun electric multiplier and more. HYTORC® Z® Washer and HYTORC® Friction Washer™ combination including a dual friction-enhanced face washer for counter-torque under a nut or bolt head on the other side of the joint; and HYTORC® Z® Dual Drive Offset Links for tight clearances while using HYTORC®'s torque/tension systems.



**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *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))*
- *with information concerning one or more priority claims considered void (Rule 26bis.2(d))*

**(88) Date of publication of the international search report:**  
12 November 2015

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/070996

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. B25B13/48 B25B17/00 B25B17/02 B25B23/00 F16B39/24  
 B25B13/06  
 ADD.  
 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 F16B

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/125163 A1 (MIYATA KATSUJI [JP]) 24 May 2012 (2012-05-24)	1-29, 67-69
Y	abstract figures 1, 8 paragraph [0007] paragraph [0011] paragraph [0012] paragraph [0015] paragraph [0017] paragraph [0021] paragraph [0028]	30-33
A	US 2009/142155 A1 (SU YONG-TSEH [TW]) 4 June 2009 (2009-06-04) figure 2	28
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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 another 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
- "&" document member of the same patent family

Date of the actual completion of the international search  14 September 2015	Date of mailing of the international search report  21/09/2015
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Hamel, Pascal
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2014/070996

## 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.:

### 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

International application No  
PCT/US2014/070996

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 988 935 A2 (JUNKERS JOHN K [US]) 29 March 2000 (2000-03-29)	30-33
A	paragraph [0018] paragraphs [0020], [0022] figure 3	1
A	----- US 6 966 735 B1 (YAMAZAKI MASAKI [JP]) 22 November 2005 (2005-11-22) figures 20, 21a, 21b	8,9, 11-13,16
A	----- WO 01/66964 A1 (SMOLAREK HANNA MARIA [AU]) 13 September 2001 (2001-09-13) figures	17,18
X	----- US 2006/090606 A1 (SPIRER STEVEN E [US]) 4 May 2006 (2006-05-04) abstract figures 12, 19 paragraphs [0034], [0091], [0103], [0115], [0129]	34-66
X	----- US 2007/157736 A1 (KAWANO HIROSHI [JP] ET AL) 12 July 2007 (2007-07-12) abstract figures paragraphs [0005], [0028]	35,36,60
X	----- WO 2011/098923 A2 (HYTORC DIVISION UNEX CORP [US]; RASKA RICHARD J [US]; JUNKERS ERIC P [ ]) 18 August 2011 (2011-08-18) abstract figures	35,36
A	----- US 2012/211249 A1 (SEITH WARREN ANDREW [US] ET AL) 23 August 2012 (2012-08-23) the whole document	37
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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

1. claims: 1-33

A reaction washer and its fastening socket

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2. claims: 34-69

A reaction arm-free torque power tool and a method for using it

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/070996

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/070996

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2014216776 A1	07-08-2014
		US 2015075829 A1	19-03-2015
		WO 2012115921 A2	30-08-2012
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