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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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(54) Title: QUICK DISCONNECT APPARATUS FOR MODULAR TOOLING

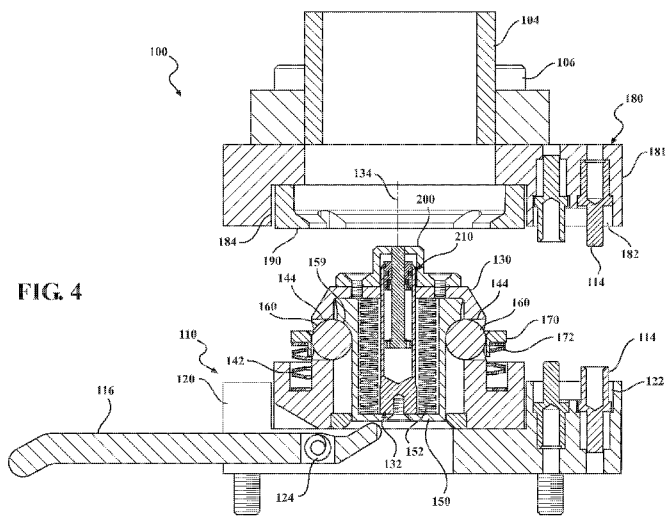


FIG. 4

(57) Abstract: A modular tooling receiver (110) that includes a wall (138) having a port that extends through it, an engaging member (160) that is movably disposed in the port, and a lock actuator (150) that is disposed on a first side of the wall. The lock actuator (150) is moveable between a first position in which the lock actuator (150) urges the engaging member (160) in a first direction defined from the first side of the wall to a second side of the wall and a second position wherein the lock actuator (150) permits the engaging member (160) to move in a second direction defined from the second side of the wall to the first side of the wall. A first biasing element (152) biases the lock actuator (150) toward the first position. A damper (210) controls a rate of motion of the lock actuator (150) from the second position toward the first position.



INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2016/018025

A. CLASSIFICATION OF SUBJECT MATTER  
INV. B25J15/04  
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)  
B25J B23B

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	WO 2014/045390 A1 (BL AUTOTEC LTD [JP]) 27 March 2014 (2014-03-27)	1,4,12
A	figures 2,4,5	2,3,5-11
A	----- WO 2014/156508 A1 (BL AUTOTEC LTD [JP]) 2 October 2014 (2014-10-02)	1,4,6,7, 12
A	figures 7,10,11,12 ----- US 4 824 298 A (LIPPACHER WOLFGANG [DE] ET AL) 25 April 1989 (1989-04-25) column 6, line 68 - column 7, line 2; figure 6 -----	1,4,12

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  
  
15 June 2016

Date of mailing of the international search report  
  
19/08/2016

Name and mailing address of the ISA/  
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Authorized officer  
  
Kielhöfer, Simon

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2016/018025

## 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.:

1-12

### 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: 1-12

Modular tooling receiver.  
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2. claims: 13-15

Coupler ring for a modular tooling apparatus with openings.  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/018025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014045390	A1	27-03-2014	NONE
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WO 2014156508	A1	02-10-2014	CN 105189052 A 23-12-2015
			KR 20150135257 A 02-12-2015
			WO 2014156508 A1 02-10-2014
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			EP 0265380 A2 27-04-1988
			US 4824298 A 25-04-1989
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