



- (51) **International Patent Classification:**
A61B 17/62 (2006.01)
- (21) **International Application Number:**
PCT/US2011/041509
- (22) **International Filing Date:**
22 June 2011 (22.06.2011)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/357,417 22 June 2010 (22.06.2010) US
- (71) **Applicant (for all designated States except US):** EXTRAORTHO, INC. [US/US]; 8275 Tournament Drive, Suite 160, Memphis, Tennessee 38125 (US).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** MULLANEY, Michael W. [US/US]; 5 Hilltop Road, Kinnelon, New Jersey 07405 (US).
- (74) **Agents:** JOHNSON, Dustin et al.; Haynes and Boone, LLP, IP Section, 2323 Victory Avenue, Suite 700, Dallas, Texas 75219 (US).

- (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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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

[Continued on next page]

(54) **Title:** HEXAPOD EXTERNAL FIXATION SYSTEM WITH COLLAPSING CONNECTORS

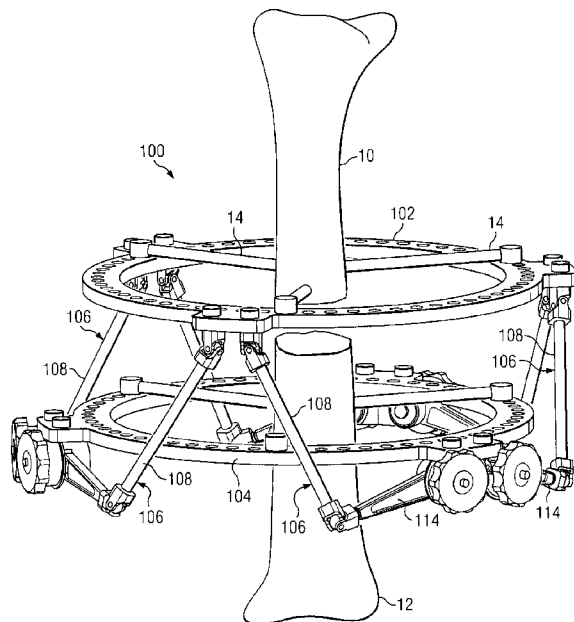


Fig. 1

(57) **Abstract:** An external fixation system includes a first base member configured to attach to a first bone segment and a second base member configured to attach to a second bone segment. A plurality of single DOF controlling elements extend between the first and second base members. The single DOF controlling elements include a crank arm having a strut interface and a base member interface, the crank arm having a first longitudinal axis and being pivotably disposed relative to one of the first and second base members. The single DOF controlling elements also include a strut extending from the strut interface toward one of the first and second base members. The strut has a second longitudinal axis, and the crank arm and strut are structurally configured so that the first and second longitudinal axes form a non-zero angle.



— *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:
26 April 2012

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/041509

A. CLASSIFICATION OF SUBJECT MATTER INV. A61B17/62 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) A61B		
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 practical, 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	DE 90 11 539 U1 (THOMAS SCHEWIOR) 5 September 1991 (1991-09-05)	1-5,13, 14, 16-20, 26,29-31
Y	figures 1b,9 page 8, lines 10-16 page 9, lines 5-10 page 14, line 27 - page 15, line 20	6-12,15, 21-25, 27,28,32
X	WO 97/30650 A1 (ORTHOFIX SRL [IT]; SALEH MICHAEL [GB]; NEAL MICHAEL [IT]; VENTURINI DA) 28 August 1997 (1997-08-28) figure 1 page 7, lines 3-7	1-3,5,26
	----- -/--	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		
<input checked="" type="checkbox"/> 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 document 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 16 September 2011		Date of mailing of the international search report 05/03/2012
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 Fourcade, Olivier

INTERNATIONAL SEARCH REPORT

International application No PCT/US2011/041509

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 376 091 A (HOTCHKISS ROBERT N [US] ET AL) 27 December 1994 (1994-12-27) figures 17-20,26-28,31,32 column 8, lines 20-33 -----	6-12,15, 21-24, 27,28
Y	US 2007/055234 A1 (MCGRATH WILLIAM M [US] ET AL) 8 March 2007 (2007-03-08) figure 1 paragraph [0020] -----	25,32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/041509

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.:

1-32

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/US2011/041509

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9011539	U1	05-09-1991	NONE
WO 9730650	A1	28-08-1997	AU 7561696 A 10-09-1997
			IT VR960018 A1 21-08-1997
			WO 9730650 A1 28-08-1997
US 5376091	A	27-12-1994	NONE
US 2007055234	A1	08-03-2007	NONE

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-32

External fixation system

2. claims: 33, 34

Dial indicator system
