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- (81) **Designated States** (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
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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,
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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,
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- (88) **Date of publication of the international search report:**
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(54) **Title:** SYSTEM, DEVICE AND METHOD FOR DELIVERY OF BIOMATERIALS FOR FRACTURE FIXATION

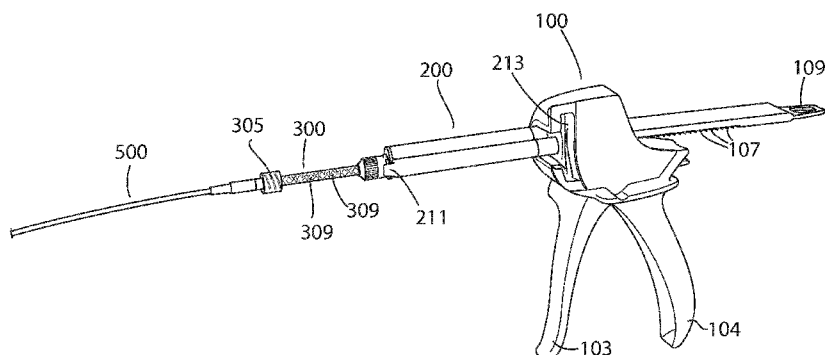


Fig. 16

(57) **Abstract:** The invention relates to a delivery system, device and method for delivering biomaterials for fracture fixation (including augmented fixation), in particular, for delivery of bone cements. The mixing system ensures the biomaterial only commences setting upon extrusion from the mixer, cannula or during injection through an appropriate internal fracture fixation device, allowing for rapid closing by the surgeon. The system also permits the surgeon to cease injecting the cement for an extended period of time before continuing the injection in another area using the same cartridge, through the simple removal of one mixer and attaching another in its place. The invention also provides a method of delivery of biomaterials to a desired implantation site.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/88 A61B17/70
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 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	US 2011/106054 A1 (OSBORNE THOMAS A [US] ET AL) 5 May 2011 (2011-05-05) paragraphs [0003] - [0004], [0022] - [0025], [0029], [0031], [0052]; figures 1,3,11	1-15,18, 19,22-37
X	US 2011/208238 A1 (HOFFMAN JEFFREY MICHAEL [US]) 25 August 2011 (2011-08-25) paragraphs [0027], [0029], [0035]; figure 1 ----- -/--	1-5, 11-15, 18,19, 22-32, 34,36,37

☒ 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

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"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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/058461

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/152742 A2 (ARSENAL MEDICAL INC [US]; SHARMA UPMA [US]; BUSOLD RANY [US]; RAGO ADA) 25 September 2014 (2014-09-25) paragraphs [0059], [0065]; figures 1,3 -----	1,3-12, 14,15, 18,19, 22,37
X	US 2004/267272 A1 (HENNIGES BRUCE D [US] ET AL) 30 December 2004 (2004-12-30) paragraph [0075]; figures 1,24,41-42 -----	1-11,14, 15,22,37
X	WO 2005/016170 A2 (3M ESPE AG [DE]; PEUKER MARC [DE]; HOHMANN ARNO [DE]; PAUSER HELMUT [D]) 24 February 2005 (2005-02-24) abstract; figures 1-4,6,10-11,20-21,30 page 6, line 27 - line 32 page 9, line 23 - page 10, line 4 page 11, line 1 - line 14 page 14, line 1 - line 17 page 16, line 30 - line 32 -----	1,3-5, 11,12, 14,15, 18,19, 23-25, 27-30, 32,33, 35,37
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X	US 2015/073423 A1 (HOEFER FABIAN [DE] ET AL) 12 March 2015 (2015-03-12) paragraphs [0015], [0017], [0020], [0023], [0025], [0026], [0030] - [0031], [0033], [0034], [0042], [0044], [0045], [0049], [0050], [0055], [0057]; figures ----- -/--	37-41

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/058461

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/083662 A1 (MIDDLETON LANCE M [US]) 1 May 2003 (2003-05-01) paragraphs [0007] - [0009], [0061] - [0062]; claim 1; figures 10B-C -----	37-39
A	US 8 231 632 B1 (JORDAN CHRISTOPHER S [US] ET AL) 31 July 2012 (2012-07-31) figures 4,5A-B -----	40-43
A	US 2006/293664 A1 (SCHUMACHER JORG [DE]) 28 December 2006 (2006-12-28) paragraph [0070]; figure 4 -----	40,41

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2016/058461

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.: 44-46
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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.:
1-15, 18, 19, 22-43
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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-15, 18, 19, 22-37

Biomaterial delivery system with locking means or release button

2. claim: 16

Biomaterial delivery system with stop member

3. claims: 17, 20, 21

Biomaterial delivery system with removable sealing means

4. claims: 38-43

Biomaterial delivery system with internal fracture fixation device

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/058461

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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