

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
25 November 2004 (25.11.2004)

PCT

(10) International Publication Number
WO 2004/100771 A3

(51) International Patent Classification⁷: **B01F 15/02**,
A61M 5/00

(21) International Application Number:
PCT/US2004/014749

(22) International Filing Date: 12 May 2004 (12.05.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/469,651 12 May 2003 (12.05.2003) US
60/520,877 18 November 2003 (18.11.2003) US

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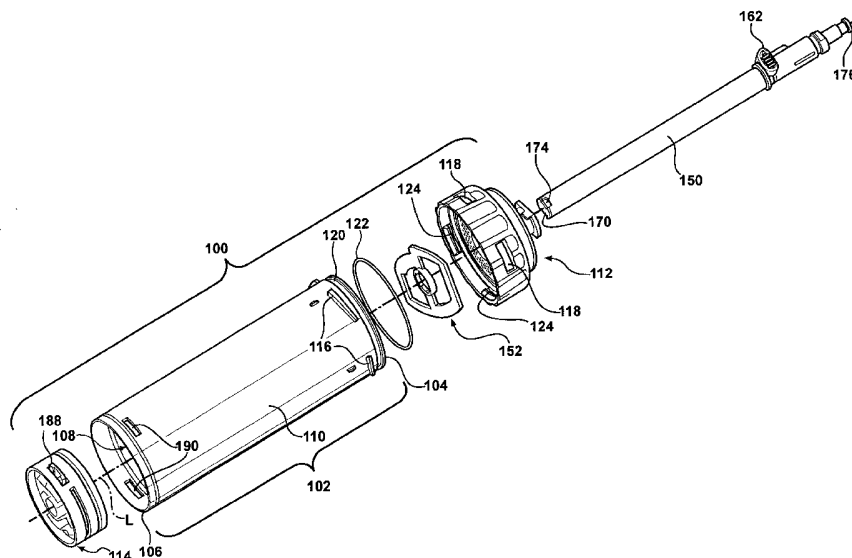
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
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TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: BONE CEMENT MIXING AND DELIVERY SYSTEM



(57) Abstract: A bone cement mixing and delivery system is provided. The system includes a mixing cartridge (100) for receiving liquid and powder components of bone cement, a mixing device (152) for mixing the components, and a delivery gun (500) for discharging the bone cement from the mixing cartridge. The mixing cartridge comprises a cylinder having proximal and distal ends with a cylinder wall extending between the ends. A piston (144) is locked at the distal end by a locking member that includes a pair of locking tabs (188) protruding into slots in the cylinder wall. With the piston in the locked position, the mixing device, e.g., a mixing shaft and blade, mixes the components. After mixing, the cartridge is placed in the delivery gun and release buttons on the locking member are engaged by a release mechanism on the delivery gun to release the piston from the locked position.



FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
23 June 2005

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/14749

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B01F 15/02; A61M 5/00

US CL : 366/189; 222/386

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)

U.S. : 366/189; 222/386

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,071,040 A (LAPTEWICZ, JR.) 10 DECEMBER 1991 (10.12.1991), see entire document.	1-24, 52-57
A	US 6,260,737 B1 (GRUENDEMAN) 17 JULY 2001 (17.07.2001), see entire document.	25-51
A	US 4,277,184 A (SOLOMON) 07 JULY 1981 (07.07.1981), see entire document.	58-60
A	US 4,371,094 A (HUTTER, III) 01 FEBRUARY 1983, see entire document.	61-67
A	US 5,876,116 A (BARKER et al) 02 MARCH 1999 (02.03.1999), see entire document.	68-72

☐ 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 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)

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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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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

13 April 2005 (13.04.2005)

Date of mailing of the international search report

27 APR 2005

Name and mailing address of the ISA/US

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P.O. Box 1450
Alexandria, Virginia 22313-1450

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/14749

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:
Please See Continuation 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 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.:

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/14749

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-25, 52-57, drawn to a mixing cartridge with piston and locking member.

Group II, claim(s) 26-51, drawn to a delivery gun.

Group III, claim(s) 58-60, drawn to a cement loading system with funnel.

Group IV, claim(s) 61-67, drawn to a mixing system with mixing shaft and blade.

Group V, claim(s) 68-72, drawn to a method of mixing bone cement.