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A61M 5/32 (2006.01)

(72) Inventors: **YOUNG, Matthew**; 85 Cox's End, Over, Cambridge Cambridgeshire CB24 5TY (GB). **LAMBLE, Ralph**; 74 Rampton Road, Cottenham, Cambridge Cambridgeshire CB24 8TH (GB).

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(74) Agent: **PONDER, William, Anthony, John**; Reddie & Grose LLP, 16 Theobalds Road, London Greater London WC1X 8PL (GB).

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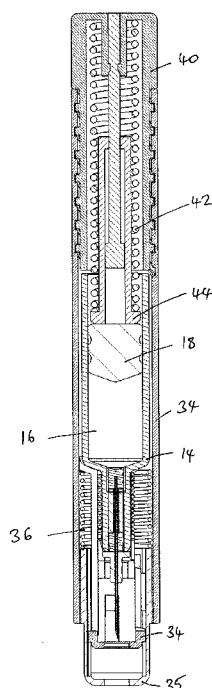
1218667.2 17 October 2012 (17.10.2012) GB  
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(71) Applicant: **OVAL MEDICAL TECHNOLOGIES LIMITED** [GB/GB]; The Innovation Centre, Unit 23, Cambridge Science Park, Milton Road, Cambridge Cambridgeshire CB4 0EY (GB).

(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, LT, 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.

[Continued on next page]

## (54) Title: AUTOMATIC DRUG DELIVERY DEVICES



(57) Abstract: The invention provides in one aspect a drug delivery device comprising a drug container (16), and a plunger (18) positioned within the container assembly, the drug container assembly having an outlet for dispensing the drug, wherein, in an initial position, the outlet is sealed; a drive mechanism comprising a first stored energy source (42) operable to apply pressure on the plunger or the drug container to pressurise the drug, and a first release mechanism operable to unseal the outlet after the drug has been pressurised. In another aspect, there is provided a drug delivery device comprising a housing, including an external housing portion configured to be held in use and a drug containing portion containing a drug, a needle assembly comprising a needle fixed to a needle hub, the needle hub configured to move relative to the drug containing portion from an initial position within the housing to an insertion position in which the needle extends beyond the housing, a first stored energy source configured to move the needle hub from the initial position to the insertion position, and a plunger within the housing and configured to move relative to the drug containing portion to eject the drug through the needle when the needle is in the insertion position.

Fig. 3



**(84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, KM, ML, MR, NE, SN, TD, TG).

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24 July 2014

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2013/071805

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. A61M5/20<br>ADD. A61M5/00                      A61M5/32                      A61M5/24                      A61M5/19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>B. FIELDS SEARCHED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Minimum documentation searched (classification system followed by classification symbols)<br>A61M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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)<br>EPO-Internal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Relevant to claim No.                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | WO 2011/117592 A1 (DUNNE STEPHEN TERENCE [GB] NEW INJECTION SYSTEMS LTD [GB]; DUNNE STEPH) 29 September 2011 (2011-09-29)<br>page 18, line 27 - page 20, line 31;<br>claims; figures<br>-----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1-51                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | FR 1 514 210 A (LABITTE JACQUES)<br>23 February 1968 (1968-02-23)<br>pages 2-3; figures<br>-----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1-51                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | GB 2 447 787 A (MEDICAL HOUSE PLC [GB])<br>24 September 2008 (2008-09-24)<br>page 9, line 10 - page 13, line 25;<br>figures<br>-----<br>-/-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 7,34-37                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <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 :<br><table border="0"> <tr> <td style="vertical-align: top;">           "A" document defining the general state of the art which is not considered to be of particular relevance<br/>           "E" earlier application or patent but published on or after the international filing date<br/>           "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)<br/>           "O" document referring to an oral disclosure, use, exhibition or other means<br/>           "P" document published prior to the international filing date but later than the priority date claimed         </td> <td style="vertical-align: top;">           "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<br/>           "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<br/>           "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<br/>           "&amp;" document member of the same patent family         </td> </tr> </table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                      | "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"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<br>"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<br>"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<br>"&" document member of the same patent family |
| "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"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<br>"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<br>"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<br>"&" document member of the same patent family |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Date of the actual completion of the international search<br><br>4 June 2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Date of mailing of the international search report<br><br>12/06/2014 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Authorized officer<br><br>Björklund, Andreas                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/071805

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                                                |                       |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                            | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                             | Relevant to claim No. |
| A                                                    | US 2010/185178 A1 (SHARP ROBERT [GB] ET AL) 22 July 2010 (2010-07-22)<br>paragraphs [0250], [0280] - [0281],<br>[0306] - [0312]; figures<br>-----                                              | 7, 34-37              |
| A                                                    | US 5 709 662 A (OLIVE ERIC [FR] ET AL)<br>20 January 1998 (1998-01-20)<br>column 7, line 36 - column 9, line 7;<br>figures<br>-----                                                            | 8-12,<br>34-37        |
| X                                                    | WO 02/24259 A2 (LAVI GILAD [IL]; YIGAL GIL<br>[IL]; BAR OR JONATHAN [IL]; TSALS IZRAIL<br>[U]) 28 March 2002 (2002-03-28)<br>page 25, paragraph 3 - page 30, line 2;<br>figures 14-30<br>----- | 1-51                  |
| X                                                    | WO 85/05275 A1 (LUCAS DIETER [DE])<br>5 December 1985 (1985-12-05)<br>pages 7-10; figures<br>-----                                                                                             | 1-51                  |
| X                                                    | US 2 693 186 A (RIKER WILLIAM M ET AL)<br>2 November 1954 (1954-11-02)<br>column 4, line 19 - column 5, line 29;<br>figures<br>-----                                                           | 1-51                  |

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2013/071805

## 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.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

1. claims: 1-37

Claim 1 essentially defines a drug delivery device with a drug container having an outlet which in an initial position is sealed, a plunger positioned within the container, a drive mechanism comprising an energy source to pressurise the drug and a first release mechanism operable to unseal the outlet after the drug has been pressurised. Claims 2-37 define preferred embodiments of this device

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2. claims: 38-51

Claims 38, 48 and 49 essentially define a drug delivery device with a housing including a drug containing portion, a needle assembly comprising a needle fixed to a needle hub, the needle hub movable relative to the drug containing portion from an initial position within the housing to an insertion position in which the needle extends beyond the housing, a first stored energy source configured to move the needle hub from the initial to the insertion position and a plunger configured to move relative to the drug containing portion to eject the drug. Claims 39-47 and 50-51 define preferred embodiments of these devices.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2013/071805

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                                                                                                                         | Publication<br>date                                                                                          |
|-------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| WO 2011117592 A1                          | 29-09-2011          | AU 2011231330 A1<br>CA 2791635 A1<br>CN 102858392 A<br>EP 2550041 A1<br>JP 2013523202 A<br>RU 2012138044 A<br>US 2013197475 A1<br>WO 2011117592 A1 | 20-09-2012<br>29-09-2011<br>02-01-2013<br>30-01-2013<br>17-06-2013<br>27-04-2014<br>01-08-2013<br>29-09-2011 |
| FR 1514210 A                              | 23-02-1968          | NONE                                                                                                                                               |                                                                                                              |
| GB 2447787 A                              | 24-09-2008          | GB 2447787 A<br>WO 2008114035 A1                                                                                                                   | 24-09-2008<br>25-09-2008                                                                                     |
| US 2010185178 A1                          | 22-07-2010          | CN 102361660 A<br>EP 2396057 A2<br>GB 2467420 A<br>SG 173061 A1<br>US 2010185178 A1<br>WO 2010084306 A2                                            | 22-02-2012<br>21-12-2011<br>04-08-2010<br>29-08-2011<br>22-07-2010<br>29-07-2010                             |
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| US 2693186 A                              | 02-11-1954          | NONE                                                                                                                                               |                                                                                                              |