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(71) Applicant: **BG RESEARCH LTD** [GB/GB]; 5 The Business Centre, Harvard Way, Kimbolton Cambridgeshire PE28 0NJ (GB).

(72) Inventors: **NAZARETH, Nelson**; BG Research LTD, 5 The Business Centre, Harvard Way, Kimbolton Cambridgeshire PE28 0NJ (GB). **EDGE, David**; BG Research LTD, 5 The Business Centre, Harvard Way, Kimbolton Cambridgeshire PE28 0NJ (GB). **TYLER, Adam**; BG Research LTD, 5 The Business Centre, Harvard Way, Kimbolton Cambridgeshire PE28 0NJ (GB). **SADLER, Matthew**; BG Research LTD, 5 The Business Centre, Harvard Way, Kimbolton Cambridgeshire PE28 0NJ (GB).

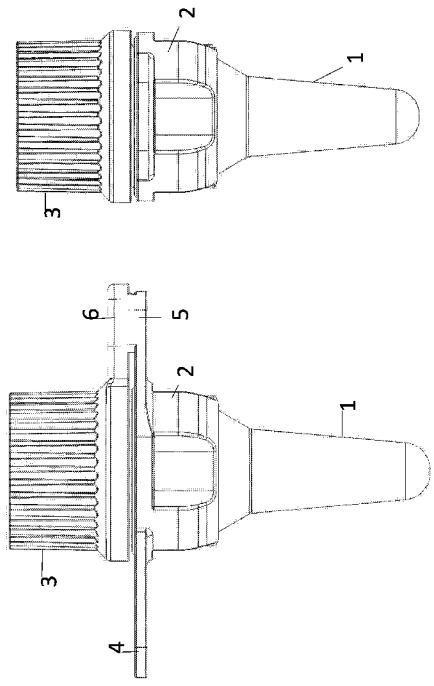
(74) Agent: **PEARS, Michael**; Potter Clarkson LLP, The Belgrave Centre, Talbot Street, Nottingham NG1 5GG (GB).

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(54) Title: METHODS

Figure 1



(57) Abstract: The present invention relates to bio-secure means for the detection of pathogens and provides a bio-secure reaction vessel and methods of preparing a sample for PCR-based pathogen detection. The reaction vessel comprises a reaction chamber portion (1); a cap holder portion (2); and a cap (3). Two points of security, such as two O-ring seals (9, 10), are provided between the cap (3) and the reaction chamber portion (1). A first seal (9) may be located at a top of the cap holder portion (2) and a second seal (10) may be located at a base of the cap (10).

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[Continued on next page]

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/051156

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01L3/00
ADD. C12Q1/686 B01L7/00

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)
B01L B65D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2016/354775 A1 (BRUNO ALBERT R [US] ET AL) 8 December 2016 (2016-12-08)	1-4, 10-15, 18, 20-24, 26,28,29
Y	paragraphs [0001] - [0009], [0020] - [0027], [0029]; claims 1, 6, 7; figures 1-6	5-9,25, 27,46, 51,57,58

X	US 2014/339191 A1 (FOROUGHI HORMOZ [US]) 20 November 2014 (2014-11-20)	1-4, 10-12, 15-17,19
A	paragraphs [0002], [0039], [0040], [0048], [0053], [0061], [0062], [0066]; claims 1-3, 9, 12-15; figures 9-14	46,51

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 October 2019	30/10/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Fauché, Yann

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2019/051156

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.

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 2010/203595 A1 (WARD DAVID [GB] ET AL) 12 August 2010 (2010-08-12)	5-9,25, 27
A	paragraphs [0002], [0005], [0015], [0038] - [0041], [0063], [0066]; claims 1, 23, 24; figures 1, 6	1
Y	WO 2017/055791 A2 (BG RES LTD [GB]) 6 April 2017 (2017-04-06)	57,58
A	page 1 lines 3-7; page 6 lines 22-27; page 7 lines 5-18; page 11 lines 4-18; figures 1-3	1-7,26, 28,29
A	US 2015/290640 A1 (GOETTKE SABINE [DE]) 15 October 2015 (2015-10-15) figures 1-5	1
X	US 2017/268043 A1 (JACKY LUCIEN [US] ET AL) 21 September 2017 (2017-09-21)	30-45, 47-50, 53-56
Y	paragraphs [0002], [0006] - [0009], [0016], [0017], [0023], [0036], [0037], [0040], [0042] - [0044], [0051], [0053], [0055], [0057] - [0060], [0063]; tables 1-3 paragraphs [0066] - [0072]; claims 1-20	46,51
X	US 2017/239653 A1 (EDVINSSON LARS [SE] ET AL) 24 August 2017 (2017-08-24)	30-33, 35-37, 39,40, 42,43, 47,50, 52-56
A	paragraphs [0002], [0012], [0017], [0032], [0035], [0039], [0054] - [0059], [0066] - [0073], [0075], [0077], [0082], [0086]; claims 1, 2	46,51
X	US 6 783 993 B1 (MALMQUIST MATS [SE]) 31 August 2004 (2004-08-31) column 5 lines 10-19; column 10 lines 39-57; claims 1, 3, 11; figure 2	30,31, 40, 43-45, 47,50

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2019/051156

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016354775 A1	08-12-2016	CN 106238108 A	21-12-2016
		US 2016354775 A1	08-12-2016
		US 2017266658 A1	21-09-2017
		WO 2016200361 A1	15-12-2016
US 2014339191 A1	20-11-2014	NONE	
US 2010203595 A1	12-08-2010	US 2010203595 A1	12-08-2010
		WO 2008107683 A2	12-09-2008
WO 2017055791 A2	06-04-2017	CN 108136393 A	08-06-2018
		JP 2018533359 A	15-11-2018
		US 2018214879 A1	02-08-2018
		WO 2017055791 A2	06-04-2017
US 2015290640 A1	15-10-2015	CA 2888947 A1	01-05-2014
		CN 104870094 A	26-08-2015
		DE 102012110111 A1	24-04-2014
		EP 2911790 A1	02-09-2015
		US 2015290640 A1	15-10-2015
		WO 2014063948 A1	01-05-2014
US 2017268043 A1	21-09-2017	AU 2015353685 A1	06-07-2017
		BR 112017010902 A2	06-02-2018
		CA 2968851 A1	02-06-2016
		CN 107250377 A	13-10-2017
		EP 3224383 A1	04-10-2017
		US 2017268043 A1	21-09-2017
		WO 2016085955 A1	02-06-2016
US 2017239653 A1	24-08-2017	NONE	
US 6783993 B1	31-08-2004	AT 468175 T	15-06-2010
		AU 766869 B2	23-10-2003
		CA 2366732 A1	05-10-2000
		CN 1352576 A	05-06-2002
		EP 1173284 A1	23-01-2002
		ES 2346128 T3	11-10-2010
		HK 1043749 A1	19-11-2010
		JP 4681736 B2	11-05-2011
		JP 2002539937 A	26-11-2002
		US 6783993 B1	31-08-2004
		WO 0058013 A1	05-10-2000

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-29, 57, 58

   Reaction vessel configured to provide for a better attachement or sealing between cap and chamber (technical effect resulting from the provision of "at least two points of security")

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2. claims: 30-56

   Method for preparing a samplefor RT, PCR, or RT-PCR in a reaction vessel

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