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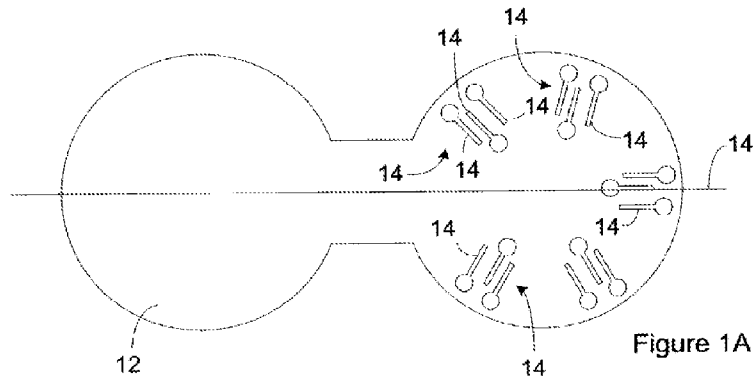
- with international search report (Art. 21(3))
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20 March 2014



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(54) Title: CARTRIDGE FOR LIQUID TRANSPORT



(57) Abstract: The cartridge includes a sensor structure that has multiple sensors positioned on a substrate. The cartridge also includes a common channel defined in the substrate such that a fluid flowing in the common channel contacts each of the sensors as a result of the fluid flowing from an inlet of the common channel to an outlet of the common channel.

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US2013/044835

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(8) - G01N 27/26 (2013.01)  
 USPC - 422/82.01  
 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)  
 IPC(8) - G01N 27/26, 27/30, 27/327, 27/403, 27/416; G01N 33/53 (2013.01)  
 USPC - 204/403.01, 403.13; 422/82.01; 435/7.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
 CPC - B01L 3/502707, 3/502738, 2200/027, 2300/0645, 2400/0487 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 PatBase, Google Patents, Google Scholar

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | US 2005/0196855 A1 (GAU et al) 08 September 2005 (08.09.2005) entire document                                                     | 1-3                   |
| -         |                                                                                                                                   | ---                   |
| Y         |                                                                                                                                   | 4-8                   |
| Y         | US 2009/0011952 A1 (GAU) 08 January 2009 (08.01.2009) entire document                                                             | 4                     |
| Y         | US 2007/0053796 A1 (GAU et al) 08 March 2007 (08.03.2007) entire document                                                         | 5-7                   |
| Y         | US 2011/0201099 A1 (ANDERSON et al) 18 August 2011 (18.08.2011) entire document                                                   | 8                     |
| A         | US 2011/0220656 A1 (GAU) 15 September 2011 (15.09.2011) para.0003-0004, 0014, 0024-0025, para.0036, para.0049, fig.1A-C, fig.4A-B | 1-8                   |

Further documents are listed in the continuation of Box C.

\* Special categories of cited documents:

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                | "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                                              |
| "E" earlier application or patent but published on or after the international filing date                                                                               | "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                                                                     |
| "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) | "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 |
| "O" document referring to an oral disclosure, use, exhibition or other means                                                                                            | "&" document member of the same patent family                                                                                                                                                                                                    |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |                                                                                                                                                                                                                                                  |

|                                                                               |                                                                          |
|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Date of the actual completion of the international search<br>30 December 2013 | Date of mailing of the international search report<br><b>17 JAN 2014</b> |
|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-3201 | Authorized officer:<br>Blaine R. Copenheaver<br><br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/044835

**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 extra 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 additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-8

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/044835

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, claims 1-8, drawn to a system, comprising: a cartridge having a common channel comprising a fluid flowing through an inlet of the common channel and an outlet of the common channel.

Group II, claims 9-18, drawn to a method and system, comprising: substrates overlapped with one another such that more than one of the substrates each has an overlapped portion that is overlapped by one or more of the other substrates and also has an exposed portion that is not overlapped by any of the other substrates; and electrodes on the exposed portions of different substrates.

Group III, claims 19,20, drawn to a system, comprising: a cartridge comprising a selection valve in liquid communication with reagents that are each in a different container and in liquid communication with the channel in the cartridge, the selection valve configured to select any one of the reagents for transport from the container that contains the selected reagent into the channel.

The inventions listed as Groups I, II and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a cartridge having a common channel comprising a fluid flowing through an inlet of the common channel and an outlet of the common channel as claimed therein is not present in the invention of Groups II and III. The special technical feature of the Group II invention: a method and system, comprising: substrates overlapped with one another such that more than one of the substrates each has an overlapped portion that is overlapped by one or more of the other substrates and also has an exposed portion that is not overlapped by any of the other substrates; and electrodes on the exposed portions of different substrates as claimed therein is not present in the invention of Groups I or III. The special technical feature of the Group III invention: a system, comprising: a cartridge comprising a selection valve in liquid communication with reagents that are each in a different container and in liquid communication with the channel in the cartridge, the selection valve configured to select any one of the reagents for transport from the container that contains the selected reagent into the channel as claimed therein is not present in the invention of Groups I or II.

Groups I, II and III lack unity of invention because even though the inventions of these groups require the technical feature of a cartridge including multiple sensors/electrodes positioned on a substrate, and a channel positioned such that contents of the channel contacts the one or more sensors, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2011/0220656 A1 (GAU) 15 September 2011 (15.09.2011), para.0003-0004, 0014, 0024-0025, 0036, 0049, fig.1A-C, fig.4A-B. Gau teaches a cartridge (para. 0004, 0024) including multiple sensors/electrodes 72 positioned on a substrate 78 (para. 0003, 0036) and a channel positioned such that contents of the channel contacts the one or more sensors (para. 0036).

Since none of the special technical features of the Group I, II or III inventions are found in more than one of the inventions, unity of invention is lacking.