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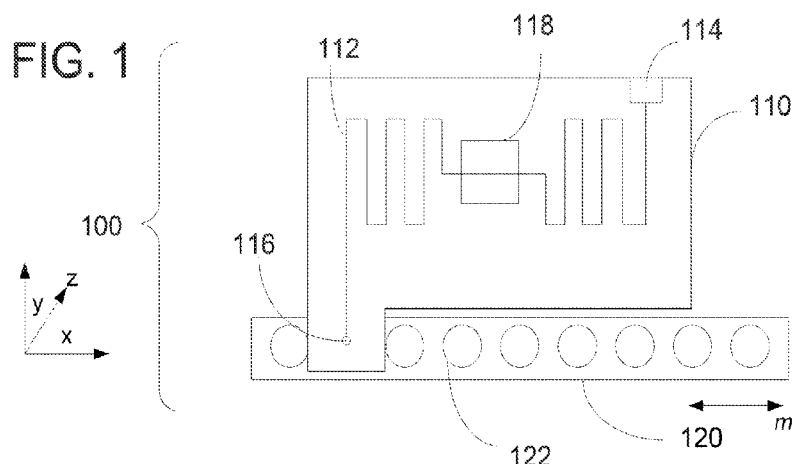
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- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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## (54) Title: TWO PART ASSEMBLY



(57) Abstract: A device that includes a first portion, the first portion including at least one fluid channel; a fluid actuator; and an introducer; a second portion, the second portion including at least one well, the well containing at least one material, wherein one of the first or second portion is moveable with respect to the other, wherein the introducer is configured to obtain at least a portion of the material from the at least one well and deliver it to the fluid channel, and wherein the fluid actuator is configured to move at least a portion of the material in the fluid channel.

## INTERNATIONAL SEARCH REPORT

PCT/US14/39400

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G01N 29/036, 35/02; H03H 9/15 (2014.01)

CPC - A61B 5/0051; B82Y 15/00; G01N 35/02

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): A61B 10/00; G01N 29/14, 33/50, 35/02, 35/10; H01L 27/20; H03H 9/15 (2014.01) CPC: A61B 5/0051, 2562/16; B01L 3/502; B82Y 15/00; G01N 29/2437, 35/02 USPC: 73/579; 204/192.18; 210/656; 310/320; 422/63; 435/287.3; 436/809

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)

MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); Google Scholar; ProQuest; IP.com; actuator, pump, fluid, liquid, gas, introducer, pipette, syringe, sensor, thin film acoustic resonator, piezoelectric, slot, hole, gap, aperture, slit, window, movable, rotate, spin, slide, unit, part, section element, channel, conduit, thickness, well, TFBAR

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                   | Relevant to claim No.                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| X         | US 2004/0262162 A1 (ROACH, DJ et al.) 30 December 2004; figure 1; paragraphs [0013], [0015], [0031]-[0032], [0035]-[0036], [0040], [0044], [0047], [0051]-[0053], [0077]                                                                                             | 1-2, 3/1-2, 33-34, 35/33-34, 36/35/33-34 |
| Y         | US 2011/0316522 A1 (SHINOBU, W et al.) 29 December 2011; figure 2; paragraphs [0016], [0075], [0077]-[0079], [0081]-[0082], [0103], [0122]                                                                                                                           | 40-41, 42/40-41, 50-51, 52/50-51         |
| Y         | US 8,154,093 B2 (BRADLEY, K et al.) 10 April 2012; figures 1A, 1C, 11C; column 9, lines 5-7, lines 28-33; column 10, lines 1-4, lines 25-29; column 14, lines 38-40; column 22, lines 28-30; column 24, lines 7-11, lines 43-47; column 25, lines 42-45, lines 50-53 | 40-41, 42/40-41,                         |
| Y         | US 2010/0218353 A1 (KOLOSOV, O et al.) 02 September 2010; figures 3A, 6D; paragraphs [0006], [0012], [0036], [0050]                                                                                                                                                  | 50-51, 52/50-51                          |
| A         | US 5,405,510 A (BETTS, RE et al.) 11 April 1995; entire document                                                                                                                                                                                                     | 1-2                                      |
| A         | US 7,695,681 B2 (WANG, LP et al.) 13 April 2010; entire document                                                                                                                                                                                                     | 40, 50                                   |
| A         | US 4,361,026 A (MULLER, RS et al.) 30 November 1982; entire document                                                                                                                                                                                                 | 40, 50                                   |
| A         | US 2012/0304776 A1 (NOVOTNY, VJ) 06 December 2012; entire document                                                                                                                                                                                                   | 1, 40, 50                                |
| A         | US 2009/0017491 A1 (LEMME, CD et al.) 15 January 2009; entire document                                                                                                                                                                                               | 1, 40                                    |
| A         | US 7,288,229 B2 (TURNER, H et al.) 30 October 2007; entire document                                                                                                                                                                                                  | 1, 40, 50                                |

☐ 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

"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

28 October 2014 (28.10.2014)

Date of mailing of the international search report

01 APR 2015

Name and mailing address of the ISA/US

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\*\*\*-Continued from Box III: Observations where unity of invention is lacking-\*\*\*

The inventions listed as Groups I-II 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 features of Group I include a device comprising: a first portion, the first portion comprising: at least one fluid channel; a fluid actuator; and an introducer; a second portion, the second portion comprising: at least one well, the well containing at least one material, wherein one of the first or second portion is moveable with respect to the other, wherein the introducer is configured to obtain at least a portion of the material from the at least one well and deliver it to the fluid channel, and wherein the fluid actuator is configured to move at least a portion of the material in the fluid channel, which are not present in Group II; the special technical features of Group II include an assembly comprising: an electrical connection board having a board thickness, first and second opposing surfaces, and at least one slot therein; a thin film bulk acoustic resonator (TFBAR) sensor positioned on the electrical connection board adjacent the first surface and spanning the slot and electrically connected to the board; an offset positioned between the sensor and the first surface of the board, the offset having an offset thickness; a sensor opposing member, the sensor opposing member positioned adjacent the second surface of the board and spanning the slot, wherein the electrical connection board, the TFBAR sensor, the offset and the sensor opposing member form a sensor channel, having a height defined by the combined thickness of the board thickness and the offset thickness; and a thin film bulk acoustic resonator (TFBAR) sensor positioned on the electrical connection board and electrically connected to the electrical connection board with wire bonds; a sensor opposing member, the sensor opposing member positioned opposite the sensor; and two supports, wherein the electrical connection board, the TFBAR sensor and the two supports form a sensor channel, having a height defined by the height of the supports, which are not present in Group I.

The common technical features of Groups I-II are a first portion and second portion.

These common technical features, as well as the special technical features of Group I (claim 1), are disclosed by US 2004/0262162 A1 to Roach, et al. (hereinafter 'Roach'). Roach discloses a device (an instrument; paragraph [0009]) comprising: a first portion (a gantry (33) with a gantry frame (38) and a first track (20) with a first frame (13); figure 1; paragraphs [0031], [0036]), the first portion comprising: at least one fluid channel (a microchip (15), having microchannels for fluid flow (fluid channels), resides in the first frame (13); figure 1; paragraphs [0031]-[0032], [0053]); a fluid actuator (the microchip contains voltage sources (fluid actuator) that stimulate liquid sample migration; paragraphs [0015], [0032], [0044], [0051]-[0052]); and an introducer (the gantry frame (38) supports a pipettor assembly (introducer); figure 1; paragraph [0036]); a second portion (a second track (30) with a second frame (23); figure 1; paragraphs [0031], [0035]), the second portion comprising: at least one well (a microtiter plate (25), comprising a plurality of sample reservoirs (wells), resides in the second frame; figure 1, paragraphs [0035], [0040], [0077]), the well containing at least one material (the reservoirs contain samples; paragraph [0077]), wherein one of the first or second portion is moveable with respect to the other (the first frame (13), gantry frame (38) and second frame (23) can be moved independently of each other; figure 1; paragraphs [0013], [0031], [0035]-[0036]), wherein the introducer is configured to obtain at least a portion of the material from the at least one well and deliver it to the fluid channel (the pipettor assembly (introducer) withdraws (obtains) liquid samples from the microtiter plate and delivers the samples to a microchannel injection region; paragraphs [0015], [0044], [0047]), and wherein the fluid actuator is configured to move at least a portion of the material in the fluid channel (voltage sources (fluid actuator) stimulate sample migration in the microchannels; paragraphs [0015], [0051]-[0052]).

Since the common technical features, and the special technical features of Group I, are previously disclosed by Roach, these common features are not special and so Groups I-II lack unity.

**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.: 4-32, 37-39, 43-49, 53-56  
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:

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 1-2, 3/1-2, 33-34, 35/33-34, and 36/35/33-34 are directed toward a device comprising a first and second portion.

Group II: Claims 40-41, 42/40-41, 50-51, and 52/50-51 are directed toward assemblies having an electrical connection boards.

\*\*\*Continued Within the Next Supplemental Box\*\*\*

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.:

**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.