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(54) Title: LIGHT-BLOCKING SYSTEM FOR A DIAGNOSTIC ANALYZER

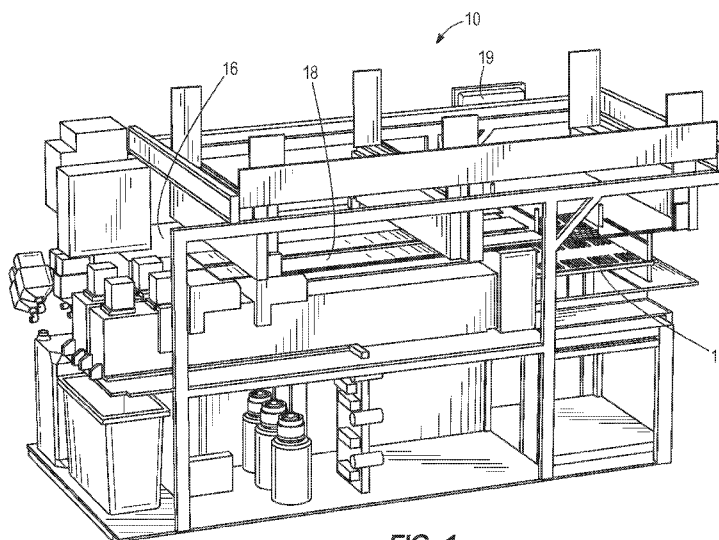


FIG. 1

(57) Abstract: A diagnostic analyzer includes a track, a light-blocking member, a motor, and an optical testing device. The track moves a reaction vessel held by the track. The light-blocking member is disposed adjacent to the track. The light-blocking member moves from a first position apart from the track to a second position closer to the track. When the light-blocking member is disposed in the first position a sample contained within the reaction vessel held by the track is exposed to light. When the light-blocking member is disposed in the second position the sample contained within the reaction vessel held by the track is blocked from exposure to the light. The motor moves the light-blocking member between the first and the second positions. The optical testing device is disposed adjacent to the track for optically testing the sample contained within the reaction vessel.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/29462

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - B01J 19/18, C12M 1/34, G01N 17/02 (2014.01) CPC - B01J 19/1862, B01J 2219/18, C12M 1/34, G01N 17/02 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)- B01J 19/18, C12M 1/34, G01N 17/02 (2014.01); CPC- B01J 19/1862, B01J 2219/18, C12M 1/34, G01N 17/02 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC- 422/68.1, 435/287.2, 435/307.1, 436/43, 436/47, 436/62; Patents and NPL (classification, keyword; search terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Pub West (US EP JP WO), Pat Base (AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO), Google Patent, Google Scholar, Free Patents Online; search terms: reactor, analyzer, vessel, tube, testing, track, rail, slide, transport, light, wavelength, irradiate, illuminate, radiate, block, shield, slot, pass, protect, position, place, open, cl																							
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 2002/0137197 A1 (AMMANN et al.) 26 September 2002 (26.09.2002), Figs. 13, 19, 20, 41; para [0016], [0105], [0118], [0237], [0241], [0344], [0347], [0354]-[0356], [0362], [0363]</td> <td>1-15</td> </tr> <tr> <td>Y</td> <td>US 2012/0308425 A1 (FRITCHIE) 06 December 2012 (06.12.2012), para [0034]-[0222]</td> <td>1-15</td> </tr> <tr> <td>Y</td> <td>US 2011/0275087 A1 (BREIDENTHAL et al.) 10 November 2011 (10.11.2011), para [0005]-[0485]</td> <td>1-15</td> </tr> <tr> <td>Y</td> <td>US 2007/0243600 A1 (LAIR et al.) 18 October 2007 (18.10.2007), para [0014]-[0550]</td> <td>1-15</td> </tr> <tr> <td>Y</td> <td>US 2005/0266570 A1 (CAREY et al.) 01 December 2005 (01.12.2005), para [0016]-[0340]</td> <td>1-15</td> </tr> <tr> <td>Y</td> <td>US 2003/0003591 A1 (LACOURT et al.) 02 January 2003 (02.01.2003), para [0007]-[0092]</td> <td>1-15</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 2002/0137197 A1 (AMMANN et al.) 26 September 2002 (26.09.2002), Figs. 13, 19, 20, 41; para [0016], [0105], [0118], [0237], [0241], [0344], [0347], [0354]-[0356], [0362], [0363]	1-15	Y	US 2012/0308425 A1 (FRITCHIE) 06 December 2012 (06.12.2012), para [0034]-[0222]	1-15	Y	US 2011/0275087 A1 (BREIDENTHAL et al.) 10 November 2011 (10.11.2011), para [0005]-[0485]	1-15	Y	US 2007/0243600 A1 (LAIR et al.) 18 October 2007 (18.10.2007), para [0014]-[0550]	1-15	Y	US 2005/0266570 A1 (CAREY et al.) 01 December 2005 (01.12.2005), para [0016]-[0340]	1-15	Y	US 2003/0003591 A1 (LACOURT et al.) 02 January 2003 (02.01.2003), para [0007]-[0092]	1-15
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☐ Further documents are listed in the continuation of Box C. ☐																							
* Special categories of cited documents: <table border="0"> <tr> <td> "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 </td> <td> "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 </td> </tr> </table>			"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																			
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Date of the actual completion of the international search 08 September 2014 (08.09.2014)		Date of mailing of the international search report 30 SEP 2014																					
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774																					

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/29462

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

-- Please see 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.:
1-15

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/US 14/29462

Continued from Box No. III, Observations where unity of invention is lacking:

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

Group I: Claims 1-15, drawn to a diagnostic analyzer comprising:

a track for moving a reaction vessel held by the track;

at least one light-blocking member disposed adjacent to the track, the at least one light-blocking member configured to move from a first position apart from the track to a second position closer to the track, wherein when the at least one light-blocking member is disposed in the first position a sample contained within the reaction vessel held by the track is exposed to light, and

when the at least one light-blocking member is disposed in the second position the sample contained within the reaction vessel held by the track is blocked from exposure to the light by the at least one light-blocking member;

a motor for moving the at least one light-blocking member between the first and the second positions; and

an optical testing device disposed adjacent to the track for optically testing the sample contained within the reaction vessel held by the track when the at least one light-blocking member is disposed in the second position blocking the sample from exposure to the light.

Group II: Claims 16-25, drawn to a diagnostic analyzer comprising:

a track comprising a plurality of lanes for holding reaction vessels containing samples;

two opposed sets of light-blocking members disposed apart on opposite sides of the track, each of the two opposed sets of light-blocking members adjacent a different one of the plurality of lanes and comprising a first light-blocking member and a second light-blocking member;

at least one motor;

a plurality of linkage members connecting the two opposed sets of light-blocking members to the at least one motor; and

at least one optical testing device;

wherein the at least one motor is configured to move the two opposed sets of light-blocking members between a first position in which the two opposed sets of light-blocking members allow light exposure to the samples in the reaction vessels held in the plurality of lanes and a second position in which the two opposed sets of light-blocking members block light exposure to the samples in the reaction vessels held in the plurality of lanes.

Group III: Claims 26-39, drawn to a method of diagnostically testing a sample comprising:

moving a track holding a reaction vessel which contains a sample so that the reaction vessel is disposed adjacent to at least one light-blocking member in a first position disposed apart from the track allowing the sample to be exposed to light;

moving the at least one light-blocking member from the first position to a second position closer to the track to dispose the reaction vessel held by the track within at least a portion of the at least one light-blocking member to block the sample contained within the reaction vessel from exposure to the light; and

optically testing the sample while the at least one light-blocking member is disposed in the second position.

The inventions listed as Groups I through 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:

Group I and II do not require a method of diagnostically testing a sample, as required by Group III.

Group II and III do not require at least one light-blocking member disposed adjacent to the track, as required by Group I.

Group I and III do not require a track comprising a plurality of lanes for holding reaction vessels containing samples and two opposed sets of light-blocking members disposed apart on opposite sides of the track, each of the two opposed sets of light-blocking members adjacent a different one of the plurality of lanes and comprising a first light-blocking member and a second light-blocking member, as required by Group II.

Group III does not require holding a reaction vessel by a track or a motor for moving a light-blocking member between a first and a second position, as required by Groups I and II.

The only feature shared by Groups I through III that would otherwise unify the groups is the technical feature of a track with a reaction vessel and a light-blocking member movable from a first to a second position with respect to an adjacent optical tester. However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is anticipated by US 2002/0137197 A1 to Ammann, et al. (hereinafter 'Ammann').

Ammann discloses a track for holding and moving a reaction vessel (Fig. 13; para [0118], transport mechanism, 500, includes a rotating main body portion, 504, defining a receptacle carrier assembly... for reaction receptacles, 160.) and a light-blocking member movable from a first to a second position with respect to an adjacent optical tester (Fig. 41; para [0105], [0355], [0356], door housings, 961, provide openings through which MTUs (multi-tube units comprising linear arrays of test tubes), 160, can enter and exit the luminometer, 950, by means of the right-side transport mechanism, 500, inserting the MUT, 160, through one of the door housings, 961. Each revolving door, 960, can be rotated between an open position, in which the cut-out portion, 963, is generally aligned with the opening of the associated door housing, 961, so that an MTU, 160, can pass through the opening, and a closed position, in which a side of the revolving door opposite the cut-out portion, 963, extends across the opening of the associated door housing, 961, so that neither an MTU, 160, nor light can pass through the opening.).

As the technical feature was known in the art at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

-- Please see Extra Sheet --

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/29462

Continued from Box No. III, Observations where unity of invention is lacking:

The only feature shared by Groups I and II that would otherwise unify the groups is the technical feature of the diagnostic analyzer comprising a motor. However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is anticipated by Ammann.

Ammann further discloses diagnostic analyzer comprising a motor (Figs. 40, 41; para [0353], [0354], luminometer, 950, within housing, 954... comprising door motors, 962, which may be stepper motors or DC gear motors.).

As the technical feature was known in the art at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

The only feature shared by Groups I and III that would otherwise unify the groups is the technical feature of optically testing the sample while the at least one light-blocking member is disposed in the second position.

However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is anticipated by Ammann.

Ammann further discloses optically testing the sample while the at least one light-blocking member is disposed in the second position (Fig. 41, 42A; para [0356], [0358], [0359], [0365], Each revolving door, 960, can be rotated between an open position, in which the cut-out portion, 963, is generally aligned with the opening of the associated door housing, 961, so that an MTU, 160, can pass through the opening, and a closed position, in which a side of the revolving door opposite the cut-out portion, 963, extends across the opening of the associated door housing, 961, so that neither an MTU, 160, nor light can pass through the opening... MTU, 160, advances through the luminometer, 950, as the lead screw, 974 rotates... after the MTU, 160, passes the PMT, 956, the MTU is ejected from the luminometer, 950... through the exit door, 961.).

As the technical feature was known in the art at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

Groups I though III therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.