



(43) International Publication Date
18 September 2014 (18.09.2014)

- (51) International Patent Classification:
G01N 15/14 (2006.01) G01N 15/00 (2006.01)
G01N 21/05 (2006.01)
- (21) International Application Number:
PCT/US2014/030940
- (22) International Filing Date:
18 March 2014 (18.03.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/799,014 15 March 2013 (15.03.2013) US
14/217,228 17 March 2014 (17.03.2014) US
- (71) Applicant: IRIS INTERNATIONAL, INC. [US/US];
9172 Eton Avenue, Chatsworth, California 91311 (US).
- (72) Inventors: WANDERS, Bart J.; 10 Woodbridge Court,
Trabuco Canyon, California 92679 (US).
CHAPOULAUD, Eric; 532 Eldora Road, Pasadena, Cali-
fornia 91104 (US). JORDAN, Brett; 11977 Mayfield Av-
enue, Los Angeles, California 90049 (US).

- (74) Agents: CASSELL, Nathan S. et al.; Kilpatrick Town-
send & Stockton LLP, Two Embarcadero Center, Eighth
Floor, San Francisco, California 91311 (US).
- (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.
- (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).

[Continued on next page]

(54) Title: FLOWCELL, SHEATH FLUID, AND AUTOFOCUS SYSTEMS AND METHODS FOR PARTICLE ANALYSIS IN URINE SAMPLES

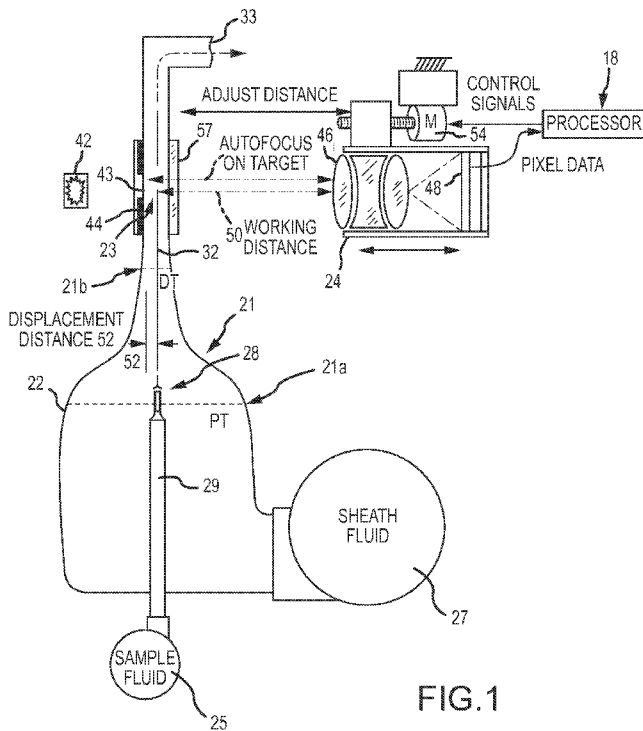


FIG. 1

(57) Abstract: The present disclosure relates to apparatus, systems, compositions, and methods for analyzing a sample containing particles. A particle imaging system or analyzer can include a flowcell through which a urine sample containing particles is caused to flow, and a high optical resolution imaging device which captures images for image analysis. A contrast pattern for autofocusing is provided on the flowcell. The image processor assesses focus accuracy from pixel data contrast. A positioning motor moves the microscope and/or flowcell along the optical axis for autofocusing on the contrast pattern target. The processor then displaces microscope and flowcell by a known distance between the contrast pattern and the sample stream, thus focusing on the sample stream. Cell or particle images are collected from that position until autofocus is reinitiated, periodically, by input signal, or when detecting temperature changes or focus inaccuracy in the image data.

WO 2014/146062 A3



Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

Published:

— *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))*

(88) Date of publication of the international search report:

18 December 2014

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/030940

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01N15/14 G01N21/05 G01N15/00
ADD.
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)
G01N
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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 167 880 A (INT REMOTE IMAGING SYSTEMS INC) 4 June 1986 (1986-06-04)	1-5, 8-11, 14-17
Y	abstract; claims 1, 9, 11; figures 1, 2 page 1, line 59 - line 61 page 1, line 84 - line 111 page 1, line 120 - line 130 page 2, line 51 - line 71 page 2, line 110 - line 126	7,13,19, 21
X	GB 2 121 976 A (INT REMOTE IMAGING SYSTEMS INC) 4 January 1984 (1984-01-04)	1-5, 8-11, 14-17
Y	abstract; figures 1, 2, 3 page 1, line 92 - line 111	7,13
	----- -/--	

Further documents are listed in the continuation of Box C.

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 7 October 2014	Date of mailing of the international search report 23/10/2014
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Zarowna-Dabrowska, A

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/030940

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 486 747 A2 (TOA MEDICAL ELECTRONICS [JP]) 27 May 1992 (1992-05-27)	1-6, 8-12, 14-17
Y	abstract; figures 1, 2 column 1, line 1 - line 16 column 2, line 11 - line 28 -----	7,13
X	EP 0 468 100 A1 (TOA MEDICAL ELECTRONICS [JP]) 29 January 1992 (1992-01-29)	1-5, 8-11, 14-17
Y	abstract page 1, line 25 - line 41 -----	7,13
X	WO 01/48455 A2 (UNION BIOMETRICA INC [US]; MOORE RICHARD CHANNING [US]; FERRANTE ANTHO) 5 July 2001 (2001-07-05)	18,20
Y	abstract; claims 1, 7, 8, 14; figures 1, 2 page 1, line 11 - line 16 page 3, line 11 - line 13 page 4, line 9 - line 24 page 7, line 5 - line 23 page 16, line 5 - line 8 page 17, line 1 - line 11 page 18, line 3 - line 15 -----	7,13,19, 21
A	US 2006/148028 A1 (NODA NAOHIRO [JP] ET AL) 6 July 2006 (2006-07-06) abstract paragraph [0018] - paragraphs [0020], [0049] -----	1-17
A	US 6 441 894 B1 (MANIAN BALA S [US] ET AL) 27 August 2002 (2002-08-27) abstract -----	1-17
X	US 3 822 095 A (HIRSCHFELD T) 2 July 1974 (1974-07-02)	18,20
Y	abstract; figure 1 column 4, line 63 - column 5, line 64 column 6, line 36 - line 43 -----	19,21
Y	US 4 338 024 A (BOLZ GUNNER ET AL) 6 July 1982 (1982-07-06) abstract column 2, line 32 - line 40 -----	19,21
A	EP 0 949 498 A2 (SYSMEX CORP [JP]) 13 October 1999 (1999-10-13) abstract; figures 1-3 -----	19,21
A	EP 0 708 334 A2 (TOA MEDICAL ELECTRONICS [JP] SYSMEX CORP [JP]) 24 April 1996 (1996-04-24) abstract; figures 3-6 -----	19,21
	-/--	

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/030940

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 2004/095574 A1 (TURNER RICHARD H [US] ET AL) 20 May 2004 (2004-05-20) abstract; figures 1-6 paragraphs [0005], [0006] - [0008], [0027] - [0031], [0068] -----	18-21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/030940

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: 1-17

Method and system for imaging particles using hydrodynamic focusing and sheath fluid of velocity different than fluid sample and adjustable optical focusing

1.1. claims: 14-17

Method and system for imaging particles using hydrodynamic focusing and adjustable optical focusing

2. claims: 18-21

Method and system for imaging viable particles in fluid sample using hydrodynamic focusing and sheath fluid of viscosity different than fluid sample

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/030940

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
GB 2167880	A	04-06-1986	AU 563260 B2	02-07-1987
			AU 4906085 A	05-06-1986
			DE 3539922 A1	05-06-1986
			FR 2573870 A1	30-05-1986
			GB 2167880 A	04-06-1986
			JP H0659782 B2	10-08-1994
			JP S61132841 A	20-06-1986
GB 2121976	A	04-01-1984	AU 1411283 A	03-11-1983
			DE 3315195 A1	03-11-1983
			FR 2526165 A1	04-11-1983
			GB 2121976 A	04-01-1984
			JP S58196440 A	15-11-1983
EP 0486747	A2	27-05-1992	DE 69114248 D1	07-12-1995
			DE 69114248 T2	25-04-1996
			EP 0486747 A2	27-05-1992
			JP 2874746 B2	24-03-1999
			JP H04188042 A	06-07-1992
			US 5159403 A	27-10-1992
			EP 0468100	A1
DE 69017675 D1	13-04-1995			
DE 69017675 T2	17-08-1995			
EP 0468100 A1	29-01-1992			
JP 2939647 B2	25-08-1999			
JP H0481640 A	16-03-1992			
US 5083014 A	21-01-1992			
WO 0148455	A2	05-07-2001	AU 2606301 A	09-07-2001
			CA 2396015 A1	05-07-2001
			EP 1242804 A2	25-09-2002
			JP 2004500562 A	08-01-2004
			WO 0148455 A2	05-07-2001
US 2006148028	A1	06-07-2006	AU 2003261795 A1	29-03-2004
			DE 10393248 T5	08-09-2005
			US 2006148028 A1	06-07-2006
			WO 2004022774 A1	18-03-2004
US 6441894	B1	27-08-2002	DE 69938512 T2	30-04-2009
			EP 1169632 A1	09-01-2002
			EP 1942333 A1	09-07-2008
			JP 4521121 B2	11-08-2010
			JP 2002541430 A	03-12-2002
			US 6130745 A	10-10-2000
			US 6441894 B1	27-08-2002
			WO 0046590 A1	10-08-2000
US 3822095	A	02-07-1974	AU 5838273 A	23-01-1975
			CH 583021 A5	31-12-1976
			DE 2340843 A1	28-02-1974
			FR 2196708 A5	15-03-1974
			GB 1425972 A	25-02-1976
			GB 1425973 A	25-02-1976
			JP S4952489 A	21-05-1974
			NL 7311146 A	18-02-1974
			US 3822095 A	02-07-1974

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/030940

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
<hr/>			
US 4338024	A	06-07-1982	AU 546258 B2 22-08-1985
			CA 1157157 A1 15-11-1983
			DE 3146423 C2 02-09-1993
			EP 0050666 A1 05-05-1982
			GB 2090427 A 07-07-1982
			JP H0352573 B2 12-08-1991
			JP S57500995 A 03-06-1982
			US 4338024 A 06-07-1982
			WO 8103224 A1 12-11-1981
<hr/>			
EP 0949498	A2	13-10-1999	CN 1237707 A 08-12-1999
			DE 69927871 D1 01-12-2005
			DE 69927871 T2 24-05-2006
			EP 0949498 A2 13-10-1999
			JP 3867880 B2 17-01-2007
			JP H11295207 A 29-10-1999
			US 6118522 A 12-09-2000
<hr/>			
EP 0708334	A2	24-04-1996	AU 701948 B2 11-02-1999
			AU 3436695 A 02-05-1996
			CA 2160962 A1 21-04-1996
			DE 69521006 D1 28-06-2001
			DE 69521006 T2 20-09-2001
			DE 69535413 T2 29-11-2007
			EP 0708334 A2 24-04-1996
			EP 1089078 A1 04-04-2001
			ES 2156927 T3 01-08-2001
			ES 2278566 T3 16-08-2007
			US 5891733 A 06-04-1999
<hr/>			
US 2004095574	A1	20-05-2004	AU 2003291562 A1 15-06-2004
			CA 2505944 A1 03-06-2004
			CN 1739018 A 22-02-2006
			EP 1565724 A2 24-08-2005
			JP 2006506648 A 23-02-2006
			US 2004095574 A1 20-05-2004
			WO 2004045488 A2 03-06-2004
<hr/>			