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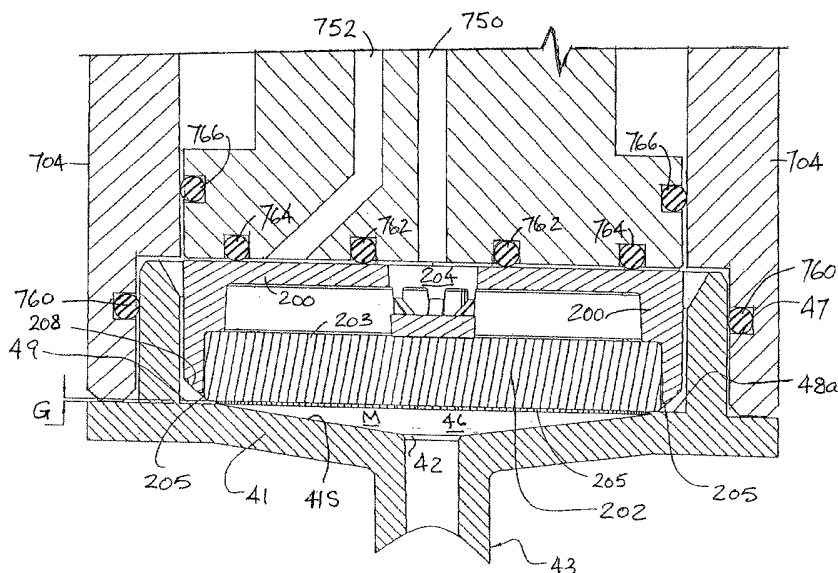
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[Continued on next page]

(54) Title: FILTRATION SYSTEM AND METHOD FOR OBTAINING A CYTOLOGY LAYER



(57) Abstract: A filter assembly for separating and collecting a layer of particulate matter (e.g., cells) from a liquid containing the particulate matter (e.g., a biological fluid specimen). The filter assembly has a holder and contiguous inner and outer fluid pervious media. The outer fluid pervious medium is attached to the sidewall of the holder. The inner fluid pervious medium is of low fluidic impedance relative to the outer fluid pervious medium. The filter assembly is designed for use in a separation housing that defines two flow paths between inlet and outlet, one directly through the filter and the other around the periphery of the filter. The inlet portion of the housing has a central inlet in a radially sloped surface that faces the filter collection site. A movable suction head is adapted to cooperate with the housing and the filter assembly.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N1/28

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 7 G01N B01L

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 practical, search terms used)

EPO-Internal, PAJ, 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 | US 5 301 685 A (GUIRGUIS RAOUF A) 12 April 1994 (1994-04-12) column 5, line 15 -column 6, line 24; figures 7,12 --- | 1 |
| X | PATENT ABSTRACTS OF JAPAN vol. 2000, no. 09, 13 October 2000 (2000-10-13) & JP 2000 180442 A (FUJI PHOTO FILM CO LTD), 30 June 2000 (2000-06-30) abstract --- | 1 |
| X | US 5 308 483 A (SKLAR ERIC ET AL) 3 May 1994 (1994-05-03) column 2, line 59 -column 3, line 68 --- -/-- | 1 |

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search

30 April 2003

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15.05.03

Name and mailing address of the ISA

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International Application No

PCT/US 02/33355

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|--|-----------------------|
| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | US 4 614 585 A (BAIRD PETER K ET AL) 30 September 1986 (1986-09-30) column 2, line 4 -column 4, line 15 --- | 1 |
| X | WO 96 37301 A (CLEMETS GARY JAMES ;IRELAND RICHARD MICHAEL (GB); HAEMOCELL PLC () 28 November 1996 (1996-11-28) page 5, line 31 -page 7, line 27; figure 3 --- | 1 |
| X | US 4 765 896 A (CHEATLEY HARVEY W ET AL) 23 August 1988 (1988-08-23) figures 1,2 --- | 19 |
| X | US 3 912 638 A (BEAUBIEN EVERETT E) 14 October 1975 (1975-10-14) figure 1 --- | 19 |
| A | | 27 |
| A | US 6 296 764 B1 (GUIRGUIS RAOUF A ET AL) 2 October 2001 (2001-10-02) figure 2 --- | 19,27 |
| A | US 5 976 824 A (GORDON JULIAN) 2 November 1999 (1999-11-02) column 11, line 56 -column 12, line 45; figures 11-14 --- | 19,27 |
| A | US 4 685 472 A (MUTO RUDOLPH) 11 August 1987 (1987-08-11) the whole document --- | 19,27 |
| X | DE 200 04 162 U (HJS FAHRZEUGTECHNIK GMBH & CO) 29 June 2000 (2000-06-29) figure 1 --- | 27 |
| A | US 6 251 467 B1 (CHUAQUI RODRIGO ET AL) 26 June 2001 (2001-06-26) column 5, line 36 -column 6, line 52; figures 2A,B,C --- | 39 |
| A | WO 99 10723 A (STAFFORD ROLAND T ;MONOGEN INC (US); CHRISTENSEN JOHN M (US); GUIR) 4 March 1999 (1999-03-04) page 24, line 3 - line 25; figures 27,28 page 35, line 32 -page 36, line 8 --- | 39 |
| A | EP 1 045 249 A (LABONORD ;PELTIER ERIC (FR)) 18 October 2000 (2000-10-18) the whole document ----- | 1 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/33355

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 fee, this Authority did not invite payment of any additional fee.
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.
- 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: 1-18

Claim 1 defines a filter assembly for separating and collecting a layer of particulate matter from a liquid, said filter assembly comprising two fluid pervious media of differing fluidic impedance.

2. Claims: 19-26

Claim 19 defines an apparatus suitable for supporting a filter, comprising a bottom wall with a radially sloped surface.

3. Claims: 27-29 and 30-32

Claim 27 defines an apparatus for separating and collecting a layer of particulate matter from a liquid, comprising a housing containing a filter such that two flow paths are defined.

Claim 30 appears to define a method using the apparatus of claim 27.

4. Claims: 33-38 and 39-44

Claim 39 defines an apparatus for collecting cells for cytology from individual specimens of biological fluid in specimen containers, said apparatus comprising a movable suction head and a head actuator.

Claim 33 defines a method for collecting cells from individual specimens of biological fluid using an apparatus comprising a movable suction head.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/33355

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|--|---|------------------|-------------------------|------------------|
| US 5301685 | A | 12-04-1994 | US 4961432 A | 09-10-1990 |
| | | | US 5024238 A | 18-06-1991 |
| | | | US 4953561 A | 04-09-1990 |
| | | | US 5042502 A | 27-08-1991 |
| | | | US 5139031 A | 18-08-1992 |
| | | | US 5429803 A | 04-07-1995 |
| | | | AU 4777693 A | 03-03-1994 |
| | | | BR 9306818 A | 08-12-1998 |
| | | | CH 686324 A5 | 29-02-1996 |
| | | | DE 69331878 D1 | 06-06-2002 |
| | | | DE 69331878 T2 | 12-12-2002 |
| | | | EP 0654972 A1 | 31-05-1995 |
| | | | JP 8508395 T | 10-09-1996 |
| | | | US 6309362 B1 | 30-10-2001 |
| | | | WO 9403103 A1 | 17-02-1994 |
| | | | US 5471994 A | 05-12-1995 |
| | | | US 6423237 B1 | 23-07-2002 |
| | | | AT 158706 T | 15-10-1997 |
| | | | AU 630653 B2 | 05-11-1992 |
| | | | AU 4789590 A | 19-07-1990 |
| | | | CA 1335787 A1 | 06-06-1995 |
| | | | DE 69031507 D1 | 06-11-1997 |
| | | | DE 69031507 T2 | 19-03-1998 |
| | | | EP 0378353 A2 | 18-07-1990 |
| | | | EP 0737443 A2 | 16-10-1996 |
| | | | JP 3012262 B2 | 21-02-2000 |
| | | | JP 3197864 A | 29-08-1991 |
| | | | US 5024237 A | 18-06-1991 |
| | | | US 5016644 A | 21-05-1991 |
| | | | US 4960130 A | 02-10-1990 |
| | | | US 5038793 A | 13-08-1991 |
| | | | US 5077012 A | 31-12-1991 |
| | | | US 5358690 A | 25-10-1994 |
| | | | US 5998214 A | 07-12-1999 |
| | | | US 6106483 A | 22-08-2000 |
| | | | AT 119071 T | 15-03-1995 |
| | | | AU 644096 B2 | 02-12-1993 |
| | | | AU 6252290 A | 21-03-1991 |
| | | | DE 69017334 D1 | 06-04-1995 |
| | | | DE 69017334 T2 | 29-06-1995 |
| | | | EP 0419168 A2 | 27-03-1991 |
| | | | ES 2072399 T3 | 16-07-1995 |
| | | | JP 3170060 A | 23-07-1991 |
| | | | US 5022411 A | 11-06-1991 |
| | | | US 5137031 A | 11-08-1992 |
| | | | AU 642904 B2 | 04-11-1993 |
| | | | AU 6300690 A | 28-03-1991 |
| | | | CA 2025261 A1 | 23-03-1991 |
| | | | EP 0425093 A2 | 02-05-1991 |
| | | | JP 3131760 A | 05-06-1991 |
| JP 2000180442 | A | 30-06-2000 | US 6405876 B1 | 18-06-2002 |
| US 5308483 | A | 03-05-1994 | CA 2143421 A1 | 17-03-1994 |
| | | | EP 0656803 A1 | 14-06-1995 |
| | | | JP 8500527 T | 23-01-1996 |
| | | | WO 9405395 A1 | 17-03-1994 |

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No

PCT/US 02/33355

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|--|----|------------------|-------------------------|------------------|
| US 4614585 | A | 30-09-1986 | AU 541787 B2 | 17-01-1985 |
| | | | AU 7613881 A | 09-09-1982 |
| | | | CA 1176575 A1 | 23-10-1984 |
| | | | DE 3169275 D1 | 18-04-1985 |
| | | | EP 0059809 A1 | 15-09-1982 |
| | | | JP 1326266 C | 16-07-1986 |
| | | | JP 57144013 A | 06-09-1982 |
| | | | JP 60049005 B | 30-10-1985 |
| WO 9637301 | A | 28-11-1996 | WO 9637301 A1 | 28-11-1996 |
| US 4765896 | A | 23-08-1988 | CA 1237290 A1 | 31-05-1988 |
| US 3912638 | A | 14-10-1975 | NONE | |
| US 6296764 | B1 | 02-10-2001 | US 6379565 B1 | 30-04-2002 |
| | | | AT 214479 T | 15-03-2002 |
| | | | AU 749820 B2 | 04-07-2002 |
| | | | AU 1208199 A | 24-05-1999 |
| | | | CA 2307499 A1 | 14-05-1999 |
| | | | DE 69804239 D1 | 18-04-2002 |
| | | | DE 69804239 T2 | 31-10-2002 |
| | | | EP 1029228 A1 | 23-08-2000 |
| | | | JP 2001522042 T | 13-11-2001 |
| | | | WO 9923468 A1 | 14-05-1999 |
| US 5976824 | A | 02-11-1999 | US 5578459 A | 26-11-1996 |
| | | | EP 0937256 A2 | 25-08-1999 |
| | | | JP 2001526773 T | 18-12-2001 |
| | | | WO 9820352 A2 | 14-05-1998 |
| | | | AT 212563 T | 15-02-2002 |
| | | | AU 1186395 A | 13-06-1995 |
| | | | CA 2176139 A1 | 01-06-1995 |
| | | | DE 69429783 D1 | 14-03-2002 |
| | | | DE 69429783 T2 | 31-10-2002 |
| | | | EP 0730495 A1 | 11-09-1996 |
| | | | ES 2173166 T3 | 16-10-2002 |
| | | | JP 9505890 T | 10-06-1997 |
| | | | WO 9514533 A1 | 01-06-1995 |
| US 4685472 | A | 11-08-1987 | NONE | |
| DE 20004162 | U | 29-06-2000 | DE 20004162 U1 | 29-06-2000 |
| US 6251467 | B1 | 26-06-2001 | US 5843657 A | 01-12-1998 |
| | | | US 5843644 A | 01-12-1998 |
| | | | US 2002037269 A1 | 28-03-2002 |
| | | | AU 716979 B2 | 16-03-2000 |
| | | | AU 7663396 A | 30-04-1997 |
| | | | CA 2233614 A1 | 17-04-1997 |
| | | | EP 0862612 A1 | 09-09-1998 |
| | | | JP 2000500325 T | 18-01-2000 |
| | | | US 6251516 B1 | 26-06-2001 |
| | | | WO 9713838 A1 | 17-04-1997 |
| | | | US 6204030 B1 | 20-03-2001 |
| | | | US 2001031481 A1 | 18-10-2001 |
| | | | US 6010888 A | 04-01-2000 |
| | | | AU 691263 B2 | 14-05-1998 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/33355

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date | |
|--|------------------|-------------------------|------------------|------------|
| US 6251467 | B1 | AU 1933795 A | 18-09-1995 | |
| | | DE 69510925 D1 | 26-08-1999 | |
| | | DE 69510925 T2 | 17-02-2000 | |
| | | EP 0748439 A1 | 18-12-1996 | |
| | | JP 10500205 T | 06-01-1998 | |
| | | AT 182405 T | 15-08-1999 | |
| | | CA 2184245 A1 | 08-09-1995 | |
| | | CN 1143413 A | 19-02-1997 | |
| | | ES 2138727 T3 | 16-01-2000 | |
| | | WO 9523960 A1 | 08-09-1995 | |
| WO 9910723 | A | 04-03-1999 | US 6309362 B1 | 30-10-2001 |
| | | | AU 755416 B2 | 12-12-2002 |
| | | | AU 9117798 A | 16-03-1999 |
| | | | BR 9811919 A | 20-11-2001 |
| | | | CA 2301551 A1 | 04-03-1999 |
| | | | CN 1277672 T | 20-12-2000 |
| | | | EP 1007937 A1 | 14-06-2000 |
| | | | JP 2001514383 T | 11-09-2001 |
| | | | NZ 503084 A | 27-07-2001 |
| | | | US 6149871 A | 21-11-2000 |
| | | | WO 9910723 A1 | 04-03-1999 |
| EP 1045249 | A | 18-10-2000 | FR 2792333 A1 | 20-10-2000 |
| | | | EP 1045249 A1 | 18-10-2000 |