

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 April 2005 (07.04.2005)

PCT

(10) International Publication Number
WO 2005/030306 A3

- (51) International Patent Classification:
B05B 12/08 (2006.01) *G01F 1/00* (2006.01)
- (21) International Application Number:
PCT/US2004/031672
- (22) International Filing Date:
27 September 2004 (27.09.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:

10/670,641	25 September 2003 (25.09.2003)	US
10/670,977	25 September 2003 (25.09.2003)	US
10/671,278	25 September 2003 (25.09.2003)	US
10/670,924	25 September 2003 (25.09.2003)	US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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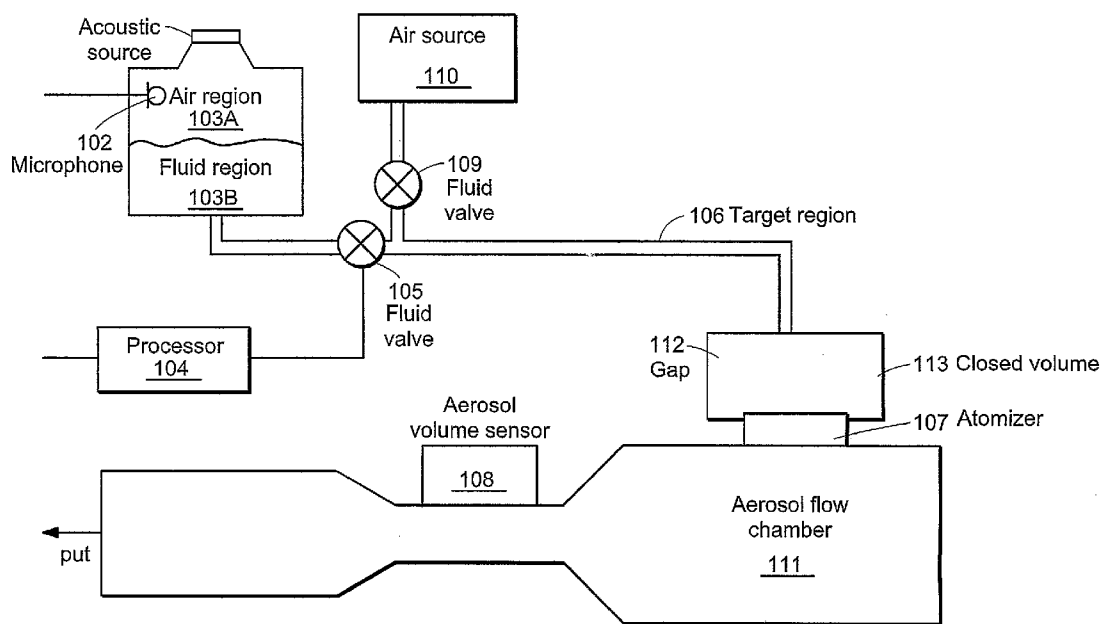
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(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

(54) Title: METERING SYSTEM AND METHODS FOR AEROSOL DELIVERY



(57) Abstract: An apparatus comprising a variable acoustic source and a microphone, both acoustically coupled to a volume having a fluid region and an air region. The apparatus also can include a processor to determine a volume of the air region based on signals received from the microphone and the variable acoustic source. A fluid valve is coupled to the processor, and is configured to allow an amount of fluid to exit the fluid region associated with the volume of the air region. An atomizer, coupled to the fluid region, is configured to aerosolize at least a portion of the fluid.

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European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
18 October 2007

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/031672

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B05B12/08 G01F1/00

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 B05B A61M G01F

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 641 892 A (LARKINS WILLIAM T ET AL) 24 June 1997 (1997-06-24)	11,12, 28-33
Y	column 1, line 30 - column 3, line 30; figure 1	1,18,34
Y	----- US 6 119 684 A (NOEHL KLAUS ET AL) 19 September 2000 (2000-09-19) the whole document	1,18,34
A	----- US 4 474 061 A (PARKER NORMAN W) 2 October 1984 (1984-10-02) column 1, line 1 - column 2, line 14 column 2, line 33 - line 68; figure 1 ----- -/--	1,18,28

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
- "E" earlier document 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

15 December 2004

Date of mailing of the international search report

14 03. 2005

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/031672

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 5 349 852 A (ARNOLD FINN ET AL) 27 September 1994 (1994-09-27)	11,12
A	column 1, line 45 - line 53 column 2, line 26 - column 3, line 9 column 4, line 6 - column 6, line 16; figures 1-3	1,18,20, 28
A	----- US 4 811 595 A (POOLE LYNN A ET AL) 14 March 1989 (1989-03-14) column 1, line 1 - line 45 column 2, line 10 - column 3, line 49; figure 1 -----	1,18,20, 28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/031672

Box 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 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 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.:

1-7, 11, 12, 18-21, 28-34

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: 1-7,11,12,18-21,28-34: atomizer

difference: an atomizer coupled to the fluid output is configured to aerosolize a portion of fluid to exit the fluid region.

problem solved: make the invention suitable for use in inhalation devices.

2. claims: 8-10,13-15: calculating aerosol volume

difference: a processor for calculating the aerosol volume.

problem solved: allow to control the concentration of the aerosolised product.

3. claims: 16,17,22-27: aerosol volume coupled to fluid output

difference: receiving an aerosol volume signal associated with a volume of an aerosol and outputting an amount of fluid associated with the aerosol volume signal and the calculated volume of the variable volume chamber.

problem solved: allow to keep the concentration of the fluid in the aerosol volume constant.

4. claims: 35-42:removable cassette

difference: the third volume is contained in a removable cassette.

problem solved: allow for the fluid to be changed or recharged easily.

5. claims: 43-57: position of two microphones

difference: the two microphones are positioned on the printed circuit board.

problem solved: easy assembly of the system avoiding to have to mount the two microphones eparately to the volumes.

6. claims: 70-73: air valve and air tank

difference: target region coupled to the fluid valve in communication with air tank through an air valve, both valves are so positioned that a substantial portion of the fluid exits the target region, and an atomizer aerosolizes this fluid mixture.

problem solved: push the fluid to exit the target region and keep the target region clean of cristals or other blockage.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

7. claims: 58-69: plurality of volumes

difference: a plurality of individually selectable fixed volumes, each fixed volume in the plurality including an air chamber and a liquid chamber.

problem solved: several drugs can be administered together.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/031672

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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