

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 January 2009 (08.01.2009)

PCT

(10) International Publication Number
WO 2009/005252 A3

(51) International Patent Classification:
A61L 2/14 (2006.01)

(21) International Application Number:
PCT/KR2008/003716

(22) International Filing Date: 27 June 2008 (27.06.2008)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2007-0065359 29 June 2007 (29.06.2007) KR

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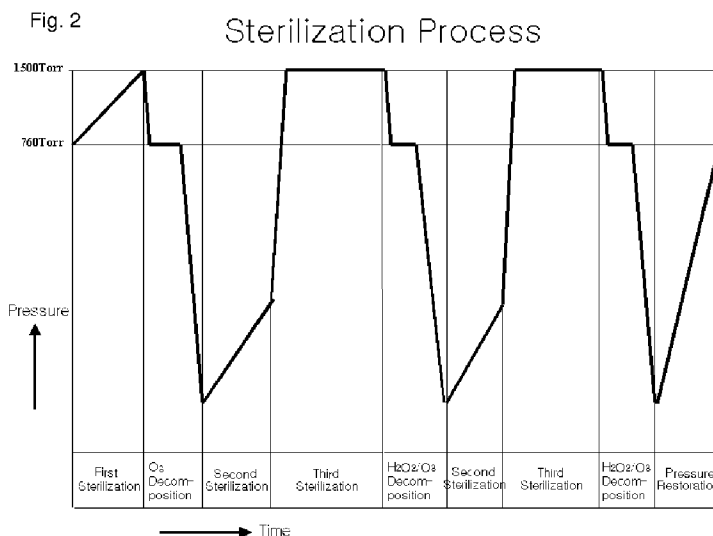
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
26 February 2009

(54) Title: METHODS OF STERILIZATION BY HYDROGEN PEROXIDE AND OZONE, AND APPARATUS USING THE METHODS



(57) Abstract: A method for sterilization according to the present invention comprises: a first sterilization step of providing a sterilization subject in a sealed sterilization chamber and sterilizing the sterilization subject by providing ozone inside the sterilization chamber; a first decomposition step of decomposing the ozone inside the sterilization chamber; a first vacuumization step discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber; a second sterilization step of providing hydrogen peroxide into the vacuumized sterilization chamber to sterilize the sterilization subject; a third sterilization step of providing ozone into the sterilization chamber; a second decomposition step of decomposing the hydrogen peroxide and ozone inside the sterilization chamber; and a second vacuumization step of discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/003716**A. CLASSIFICATION OF SUBJECT MATTER***A61L 2/14(2006.01)i*

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 A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) "ozone" "hydrogen peroxide" "sterilize"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2007-0022238 A (MIZUNO AKIRA et al.) 26 February 2007 see the claims 1-8 and Fig. 1.	1 - 8
A	JP 2000-308675 A (ETHICON INC.) 07 November 2000 see the abstract and Figs. 4-6.	1 - 8
A	JP 2002-360672 A (ISHIKAWAJIMA HARIMA HEAVY IND CO., LTD.) 17 December 2002 see the abstract.	1 - 8
A	US 4,643,876 A (Surgikos, Inc.) 17 February 1987 see the abstract and claim 1.	1 - 8

 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 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

09 JANUARY 2009 (09.01.2009)

Date of mailing of the international search report

09 JANUARY 2009 (09.01.2009)

Name and mailing address of the ISA/KR

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Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2008/003716

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 the 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 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.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims : 1-3, 5

Claims 1-3 and 5 are directed to a method for sterilization using hydrogen peroxide and ozone, comprising: a first sterilization step by providing ozone inside the sterilization chamber; a first decomposition step of decomposing the ozone inside the sterilization chamber; a first vacuumization step discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber; a second sterilization step of providing hydrogen peroxide into the vacuumized sterilization chamber; a third sterilization step of providing ozone into the sterilization chamber; a second decomposition step of decomposing the hydrogen peroxide and ozone inside the sterilization chamber; and a second vacuumization step of discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber, wherein the first or third sterilization step is carried out under the condition where the pressure inside the sterilization chamber is atmospheric pressure or higher.

2. claim 4

Claims 4 is directed to a method for sterilization using hydrogen peroxide and ozone, comprising: a first sterilization step by providing ozone inside the sterilization chamber; a first decomposition step of decomposing the ozone inside the sterilization chamber; a first vacuumization step discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber; a second sterilization step of providing hydrogen peroxide into the vacuumized sterilization chamber; a third sterilization step of providing ozone into the sterilization chamber; a second decomposition step of decomposing the hydrogen peroxide and ozone inside the sterilization chamber; and a second vacuumization step of discharging the gas inside the sterilization chamber and reducing the pressure inside the sterilization chamber, wherein the ozone provided in the first sterilization step is produced by converting oxygen contained inside the sterilization chamber.

3. claims : 6-8

Claims 6-8 are directed to a mixed sterilization apparatus using hydrogen peroxide and ozone, comprising: a sterilization chamber which holds a sterilization subject and is sealed from outside; an ozone compressor which converts an oxygen-containing substance outside the sterilization chamber into ozone and provides it into the sterilization chamber; a vacuumization accelerator which vacuumizes the inside of the sterilization chamber; and a hydrogen peroxide vaporizer which vaporizes hydrogen peroxide and provides it into the sterilization chamber, wherein the vacuumization accelerator comprises: an ozone decomposer which decomposes the ozone inside the sterilization chamber; and a hydrogen peroxide decomposer which decomposes the hydrogen peroxide inside the sterilization chamber.

The only common technical feature between Claims 1-5 and 6-8 is : sterilization apparatus comprising a sterilization chamber; ozone compressor; vacuumization apparatus; a hydrogen peroxide vaporizer; and a ozone/hydrogen peroxide decomposer.

However this feature lacks novelty and/or inventive step with respect to the following document cited in this ISR: KR 10-2007-0022238 A

Thus there is no technical relationship left over the prior art among the claimed inventions, leaving the claims without a single general inventive concept.

Hence there is lack of unity "a posteriori"(PCT Rules 13.1 and 13.2).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/003716

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