



(51) International Patent Classification:  
*A61L 15/18* (2006.01)

(21) International Application Number:  
PCT/US2012/042017

(22) International Filing Date:  
12 June 2012 (12.06.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
11170462.3 17 June 2011 (17.06.2011) EP

(71) Applicant (for all designated States except US): **THE PROCTER & GAMBLE COMPANY** [US/US]; One Procter & Gamble Plaza, Cincinnati, Ohio 45202 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CARLUCCI, Giovanni** [IT/IT]; Via Fieramosca, 118, I-66100 Chieti (IT). **RUIZPARDO, Adelaida** [ES/CH]; 55c Route Stain Georges, CH-1213 Geneva (CH).

(74) Common Representative: **THE PROCTER & GAMBLE COMPANY**; c/o Timothy B. Guffey, Global Patent Services, 299 East Sixth Street, Sycamore Building, 4th Floor, Cincinnati, Ohio 45202 (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, 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, IS, JP, KE, KG, KM, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: ABSORBENT ARTICLES COMPRISING HYDRATABLE NON-DELIQUESCENT INORGANIC SALTS

(57) Abstract: A composition for blocking blood-containing fluids is provided. The composition contains one or more hydratable non deliquescent inorganic salts. In one embodiment, for example, the composition contains magnesium sulfate (MgSO<sub>4</sub>). The composition may be placed in an absorbent core in an absorbent article to help block blood-containing fluids (e.g., menses exuded from the body).



## ABSORBENT ARTICLES COMPRISING HYDRATABLE NON-DELIQUESCENT INORGANIC SALTS

### 5 FIELD OF THE INVENTION

The present invention relates to absorbent articles comprising a hydratable non-deliquescent inorganic salt to help block blood-containing aqueous fluids, such as for example menses.

10

### BACKGROUND OF THE INVENTION

Absorbent articles are known in the art. Typical examples for personal hygiene include sanitary napkins, panty liners, adult incontinence articles, infant diapers, paper  
15 towels, bath tissue and facial tissue. Such articles are often used to absorb and retain bodily fluids and other exudates excreted by the human body.

Fluids are often retained in absorbent articles within an absorbent element comprising absorbent materials which often include superabsorbent materials, such as absorbent  
20 gelling materials (AGM), usually in finely dispersed form, e.g. typically in particulate form. Conventional superabsorbent materials known in the art for use in absorbent articles typically comprise water insoluble, water swellable, hydrogel forming crosslinked absorbent polymers which are capable of absorbing large quantities of liquids and of retaining such absorbed liquids under moderate pressure. In general,  
25 absorbent articles comprising conventional absorbent gelling materials commonly have good absorption and retention characteristics to water and urine; however, there still remains room for improvement for absorption and retention towards certain liquids. In particular, proteinaceous or serous body fluids such as typically menses, blood, vaginal secretions, milk, or more particularly blood-containing aqueous fluids  
30 require more time to be effectively absorbed and consequently, especially in case of large amount of fluids, these might not be retained by the article and may leak outside.

Therefore in some cases it may be desirable to provide absorbent articles which are able to prevent leakage of body fluids, especially proteinaceous body fluids such as blood-containing aqueous fluids, even in the case when large amounts of fluids are discharged.

5

## SUMMARY OF THE INVENTION

The present invention provides an absorbent article comprising a composition for blocking blood-containing aqueous fluids, wherein the composition comprises one or  
10 more hydratable non-deliquescent inorganic salts. Absorbent articles according to the present invention have improved retention properties for blood-containing aqueous fluids.

## DETAILED DESCRIPTION OF THE INVENTION

15

The term "absorbent article" is used herein in a very broad sense including any article able to receive and/or absorb and/or contain and/or retain fluids and/or exudates, especially bodily fluids/bodily exudates. Exemplary but not exclusively absorbent articles in the context of the present invention are disposable absorbent articles. The  
20 term "disposable" is used herein to describe articles, which are not intended to be laundered or otherwise restored or reused as an article (i.e. they are intended to be discarded after a single use and preferably to be recycled, composted or otherwise disposed of in an environmentally compatible manner). Typical disposable absorbent articles according to the present invention are personal hygiene articles such as  
25 diapers, surgical and wound dressings and perspiration pads, incontinence pads, as well as absorbent articles for feminine hygiene like sanitary napkins, pantliners, vaginal tampons, interlabial devices, nursing pads or the like. Absorbent articles suitable for use in the present invention include any type of structures, from a single absorbent layer to more complex multi layer structures. Certain absorbent articles  
30 include a fluid pervious topsheet, a backsheet, which may be fluid impervious, and an absorbent core comprised there between.

The term "use", as used herein, refers to the period of time that starts when the absorbent article is actually put in contact with the anatomy of a wearer.

By "body fluid" it is meant herein any fluid produced by human body including, but not limited to, perspiration, urine, menstrual fluids, vaginal secretions and the like. Particularly, by "blood-containing aqueous fluid" it is meant a fluid, typically a body  
5 fluid, containing blood, such as for example blood as such and menses.

Hydratable inorganic salts are inorganic salts which can contain water molecules in a defined ratio in their crystal structure. A hydratable inorganic salt is said to be anhydrous when it does not contain any water in its crystal structure. As it is known in  
10 chemistry, hydratable inorganic salts are capable of holding water molecules combined in a definite ratio within their crystal structure, forming hydrates. Such hydrates are also said to contain water of crystallization, or water of hydration. The notation of hydrous compound  $\cdot n\text{H}_2\text{O}$ , where  $n$  is the number of water molecules per formula unit of the salt, is commonly used to show that a salt is hydrated.

15

Hydrates can normally lose water upon appropriate heating, so providing the corresponding anhydrous salts. Typically, when the water of crystallization is removed, the structure of the hydrate crumbles into an anhydrous powder. Hydratable inorganic salts have different levels of affinity for water, or hygroscopy. Some  
20 hydratable inorganic salts have such a strong affinity with water, that they will absorb relatively large amounts of water if they are exposed to it, for example even moisture from the atmosphere, forming a liquid solution. Salts which form a liquid solution by absorbing water are said to be deliquescent. Typical deliquescent salts are for example calcium chloride, magnesium chloride, zinc chloride, potassium carbonate, potassium  
25 phosphate, and so on.

Therefore "hydratable non-deliquescent inorganic salts" according to the present description are hydratable inorganic salts which do not possess this characteristic, i.e. upon exposure to water they do absorb it in the definite ratio in order to form the  
30 hydrate, but do not form a liquid solution.

The present invention relates to an absorbent article comprising a composition for blocking the blood-containing aqueous fluids, wherein the composition comprises one or more hydratable inorganic salts which are non-deliquescent.

According to the present description, the one or more hydratable non-deliquescent inorganic salts comprised in the composition can be typically anhydrous. Hydratable non-deliquescent inorganic salts to be comprised in absorbent articles according to the present invention can also be selected among those which form hydrates with more than six water molecules, i.e., can hold more than six water molecules in the formula unit, hence in the  $\cdot n\text{H}_2\text{O}$  notation mentioned above, the hydratable non-deliquescent inorganic salts can have  $n > 6$ .

10 An exemplary hydratable non-deliquescent inorganic salt according to the present description can be magnesium sulfate ( $\text{MgSO}_4$ ), which indeed actually loses the water of hydration to air at ordinary temperatures, and is capable of absorbing water forming at least a heptahydrate ( $n \geq 7$ ).

15 In general, according to the present description the absorbent article can also comprise a superabsorbent material.

The absorbent article according to the present description may comprise an absorbent core intended to retain body fluids which may include natural or synthetic absorbent fibers or foams and/or one or more superabsorbent polymers. The absorbent article according to the present description may also typically comprise a fluid pervious topsheet and a fluid impervious backsheet, with the absorbent core comprised therebetween. In these embodiments the composition may be comprised in any or all of topsheet, backsheet and absorbent core or may be comprised within additional elements interposed between them in any way which allow the contact of the composition with fluids upon use of the article.

The composition may be incorporated in any manner available to the skilled person such as finely dispersed, e.g. in powder form, within the selected element of the absorbent article, such as for example the absorbent core, and/or partially or totally absorbed within the absorbent fibres or the superabsorbent polymers of the absorbent core, or coated or printed on or within the selected element or elements of the absorbent article.

For example, the composition can be provided to the absorbent core adjacent to a surface thereof, e.g. to the surface which, in use, is opposite to the direction of the incoming fluid, which in a personal hygiene absorbent article such as a sanitary napkin corresponds, in use, to the surface facing the wearer's garment.

5

The composition can be provided in the absorbent article, namely to the selected element or elements, in a uniform or non-uniform, continuous or non-continuous distribution. For example, according to an aspect of the present description, the composition can be provided only to a peripheral zone of the absorbent core, leaving  
10 the inwardly located zone free.

According to an aspect of the present description the absorbent article can also comprise a further substrate layer, typically a fibrous layer, such as for example an airlaid web or a spunlaced web, adjacent to the absorbent core, for example comprised  
15 between the absorbent core and the fluid pervious backsheet, wherein the composition can be provided to the substrate layer. The composition can be for example actually comprised between the substrate layer and the absorbent core.

In general, the composition can be comprised in the article according to the present  
20 description, being provided to at least a selected element thereof, in order to block blood-containing aqueous fluids within the absorbent article, typically at the selected element comprising the composition.

The amount of composition which is usually present in the absorbent articles  
25 according to the present description can be from 10 mg to 10.000 mg per each absorbent article, or from 20 mg to 8.000 mg per each absorbent article, or from 50 mg to 5.000 mg per each absorbent article.

According to an aspect of the present description the absorbent article can be a  
30 feminine hygiene article like a sanitary napkin, an interlabial pad, a vaginal tampon or a pantiliner. According to another aspect of the present description, the absorbent article can be a surgical or wound dressing, or also a meat pad.

The composition can be introduced within the absorbent article in any form, including in dry powder form, as a suspension in a liquid or as a solution.

5 An absorbent article according to the present description has an improved capacity to retain body fluids, particularly blood-containing aqueous body fluids such as typically menses or blood.

Without wishing to be bound by theory it is believed that the composition acts as a dryer for the high content of water present in the blood containing fluid so as to cause  
10 a solidification of the overall fluid, actually blocking it within the structure of the absorbent article, and hence an increased retention of the fluid blocked within the absorbent article. The efficiency of this working mechanism can be further enhanced when the composition comprises a hydratable non-deliquescent inorganic salt, such as magnesium sulfate, which typically does not absorb moisture from air, since its  
15 absorption capacity can be fully utilized towards the fluid entering the absorbent article.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each  
20 such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

## Claims

What is claimed is:

- 5     1.     An absorbent article comprising a composition for blocking blood-containing aqueous fluids, said composition comprising one or more hydratable non-deliquescent inorganic salts.
2.     An absorbent article according to claim 1, wherein said one or more inorganic  
10     salts are anhydrous.
3.     An absorbent article according to any preceding claim, wherein said one or more inorganic salts form hydrates with more than six water molecules.
- 15     4.     An absorbent article according to any preceding claim, wherein said composition comprises magnesium sulfate.
5.     An absorbent article according to any preceding claim comprising a fluid pervious topsheet, a fluid impervious backsheet, and an absorbent core  
20     comprised therebetween, wherein said composition is comprised in said absorbent core.
6.     An absorbent article according to claim 5 further comprising a substrate layer adjacent to said absorbent core, wherein said composition is provided to said  
25     substrate layer.
7.     An absorbent article according to claim 6, wherein said substrate layer is an airlaid web or a spunlaced web.
- 30     8.     An absorbent article according to any preceding claim, wherein said composition is comprised in an amount from 10 mg to 10.000 mg, preferably from 20 mg to 8.000 mg, more preferably from 50 mg to 5.000 mg.

9. An absorbent article according to any preceding claim, further comprising a superabsorbent material.
10. An absorbent article according to any preceding claim, wherein said absorbent  
5 article is a sanitary napkin, or a pantiliner, or a vaginal tampon, or an interlabial pad.
11. An absorbent article according to any of claims 1 to 9, wherein said absorbent  
10 article is a pad for absorbing blood, such as a surgical or wound dressing or a meat pad.
12. Use of an absorbent article according to any preceding claim for the absorption of blood-containing aqueous fluids, for example menses.

# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/042017

## A. CLASSIFICATION OF SUBJECT MATTER

INV. A61L15/18

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)

A61L

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         | US 2008/221277 A1 (WALDEN MIRKO [DE] ET AL) 11 September 2008 (2008-09-11)<br>page 1, paragraph 0013<br>page 3, paragraph 0037 - paragraph 0038<br>page 7, paragraph 0111<br>page 8, paragraphs 0113-0119, 0124, 0125<br>----- | 1-12                  |

☐ 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

10 July 2012

Date of mailing of the international search report

17/07/2012

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

Dudás, Eszter

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/042017

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 2008221277 A1                          | 11-09-2008          | BR PI0610075 A2            | 25-05-2010          |
|                                           |                     | EP 1888132 A2              | 20-02-2008          |
|                                           |                     | JP 2008536989 A            | 11-09-2008          |
|                                           |                     | US 2008221277 A1           | 11-09-2008          |
|                                           |                     | WO 2006111404 A2           | 26-10-2006          |
| -----                                     |                     |                            |                     |