



- (51) **International Patent Classification:**
A61F 13/28 (2006.01) *A61F 13/51* (2006.01)
- (21) **International Application Number:**
PCT/SE2013/050623
- (22) **International Filing Date:**
30 May 2013 (30.05.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant:** SCA HYGIENE PRODUCTS AB [SE/SE];
S-405 03 Göteborg (SE).
- (72) **Inventors:** FORSGREN BRUSK, Ulla; Plommonvägen
35, S-435 43 Pixbo (SE). HUSMARK, Ulrika; Skogsvä-
gen 6, S-435 38 Mölnlycke (SE). STRIDFELDT, Chat-
rine; Bäckslingan 14, S-436 58 Hovås (SE).
- (74) **Agents:** ZACCO SWEDEN AB et al.; P.O. Box 5581, S-
114 85 Stockholm (SE).
- (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, 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, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))

Published:

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

(54) **Title:** ABSORBENT PRODUCT

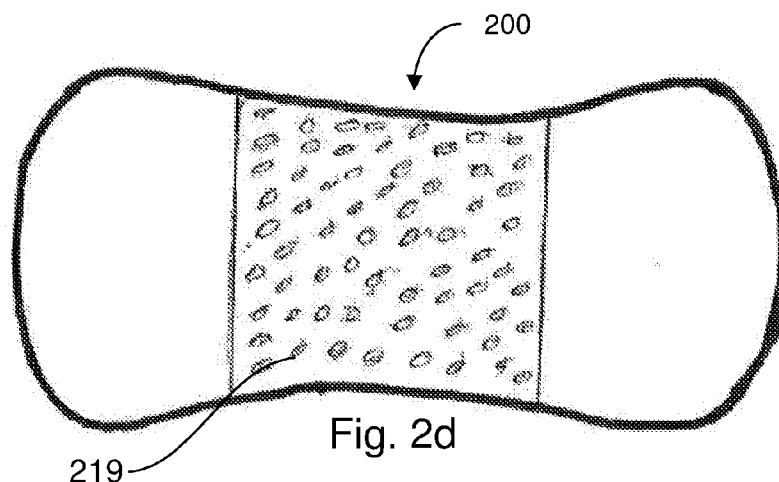


Fig. 2d

(57) **Abstract:** SUMMARY The present invention relates to an absorbent product that comprises a lubricating composition compris-
ing a buffered lactic acid in an amount of from 0 -100 weight-%, based on the total weight of the composition, wherein the 5 com-
position has a pH within the range of from 3.0 to 6.5, and a water activity of from 0.03to 0.60.The friction between the absorbent
product and the skin/mucus membrane of the user is reduced when in contact with the skin or mucus membrane of the user. An addi-
tional advantage is that the composition has a pH in the acidic range which is close to the pH of the skin 10 and/or mucus membrane.

ABSORBENT PRODUCT

TECHNICAL FIELD

- 5 The present invention relates to an absorbent product comprising a lubricating composition and to a use of a lubricating composition in an absorbent product.

BACKGROUND ART

10

Absorbent products, such as tampons for intra-vaginal use and wearable absorbent products such as diapers, sanitary napkins and incontinence products have long been in use to absorb bodily fluids, such as urine and/or blood.

- 15 Tampons have been favoured by many women as they are considered to be hygienic, non-obtrusive and comfortable to wear. Tampons are commonly made from absorbent fibres, usually cellulosic fibres such as cotton fibres or regenerated cellulose fibres, such as viscose. In order to better utilise the absorption material it has been suggested to provide tampons with external
- 20 grooves or channels in order to increase the surface of the tampon that will be available for absorption. When the tampon is inserted into a vagina, the mucus membrane of the user may be irritated due to friction between the mucus membrane and the tampon. Further, if mucus membrane is fragile and/or dry it may be difficult and painful to use regular tampons.
- 25 Consequences of the use may be small wounds and irritations. The use of additives in tampons has not been widely spread as certain substances that will be in contact with the skin and/or mucosal tissues may potentially cause problems with irritation and allergy.

- Similarly, absorbent wearable products or articles, such as diapers, sanitary
- 30 napkins and incontinence products, have been used to absorb bodily fluids.

Problems with skin irritation due to friction between the skin and the mucus membrane of a user and absorbent wearable products may also occur.

Accordingly, there is a need to reduce the risk for irritation in mucus membrane and/or on skin when an absorbent product is used.

5

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a lubricant which reduces the risk for irritation in mucus membrane and/or skin. The object is attained
10 by reducing friction between the user and a wearable product, thus enabling the use of tampons and/or wearable absorbent products by a user having a sensitive skin and/or dry or fragile mucus membrane.

According to the present invention the problem is solved by providing a
15 composition comprising a buffered lactic acid in an amount of 10-100 weight-%. The composition has a pH within the range of from 3.0 to 6.5, and a water activity of from 0.03 to 0.60. It has been surprisingly found that the composition is lubricating. The composition per se is gel-like, viscous and slippery, and thus provides these features to a product to which it is applied.
20 The friction between the absorbent product and the skin/mucus membrane of the user is reduced when in contact with the skin or mucus membrane of the user. An additional advantage is that the composition has a pH in the acidic range which is close to the pH of the skin and/or mucus membrane.

25 The composition may have pH within the range of from 3.5 to 5.5, which is advantageous from a skin/mucus membrane care point of view.

The water activity of the composition may be from about 0.10 to about 0.50. This is advantageous, since the amount of free water in the composition is
30 thus low. Since there is only a very small amount of free water in the

composition, microbial growth may be inhibited and the product can be kept hygienic during storage.

5 The buffered lactic acid has been dried to obtain the water activity of from 0.03 to 0.60. By drying the buffered lactic acid in controlled environment, the desired water activity may be obtained in an efficient way.

10 The amount of the buffered lactic in the composition may be from 20 to 100 weight-%, based on the total weight of the composition. Within this range, besides having very good lubricating properties, the composition has also preferable pH regulating properties.

15 The salt buffering the lactic acid may be an alkali metal salt of lactic acid. The salt can be for example potassium lactate.

20 The composition may further comprise an essentially water-free additive. The additive may be dried to become water-free. These water-free additives may further contribute to the skin and/or mucus membrane caring properties of the composition and thus improve the properties of the absorbent product. Since the additive is substantially water-free, microbial growth can be prevented. The water-free additive may be for example hydrophobic and naturally essentially water-free additive such as oils, waxes and fats. The addition of these hydrophobic substances can increase the barrier properties of the formulation and hence improve the protection of skin against irritating substances. Examples of oils are vegetable and mineral oils. Examples of waxes are petrolatum, beeswax, silicone wax, vegetable waxes. Examples of fats are lanolin and cocoa butter.

30 Additives can also be dried to be essentially water free. Examples of additives that can be dried and may contribute to soothing and/or prevention of infection/irritation are: botanical actives, prebiotic substances, probiotic bacteria, minerals, inorganic additives, salts and vitamins. The additive used

in the composition according to the present invention may be chosen from these additives.

The absorbent product can be a tampon. A tampon comprising the lubricating
5 composition is significantly more slippery and smooth and reduces friction
between the tampon and the user. Thus, it will be easier to use the tampon
even if the mucus membrane of the user is fragile or dry. The absorbent
product may also be a wearable absorbent product, such as a diaper,
sanitary napkin or incontinence product. Also these products are rendered
10 more slippery and smooth, either locally or over the entire surface of the
products depending on where in the product the lubricating composition is
applied. The lubricating composition may be applied on the areas of the
wearable absorbent product that come into contact with the urogenital region
of the user, whereby a product with advantageous skin caring properties is
15 provided while problems with chafing are reduced.

The composition may be coated on a surface of the absorbent product. In
this way, the composition can come into contact with the skin or mucus
membrane of the user, and thus friction between the product and the skin
20 and/or mucus membrane can be decreased.

According to one further aspect of the invention, the absorbent product
comprises a water-soluble film. This water-soluble film may be provided on
the surface of the absorbent product and thus it covers the absorbent product
25 and therefore prevents the composition having low water activity from
migrating into the absorbent product. However, when the absorbent product
comes into contact with bodily liquids or moisture e.g. if the product is a
tampon and placed inside the vagina of the user, the water-soluble film
dissolves and thus does not affect the absorbent capacity of the tampon.
30 According to one embodiment the water-soluble film is provided on the
surface of the absorbent product and the composition may be coated on the

water-soluble film, wherein the film thereby forms a barrier layer for the composition.

5 The water-soluble film can comprise a thermoplastic water-soluble polymer that can be heated so that it softens and becomes moldable. The softened polymer may be coated on the absorbent product in a simple manner e.g. by extruding it to provide a film or by immersing the absorbent product or at least a part thereof in the softened polymer. After cooling down the polymer, a film is formed on the surface of the absorbent product.

10

The thermoplastic water-soluble polymer can be polyethylene oxide, polyvinyl alcohol, polysaccharide such as modified starch, sugar or sugar alcohol, polyacrylamide, polyvinylamine, polyvinylpyridine, polyvinylpyrrolidine, or a mixture thereof. These polymers are non-toxic and suitable for use in

15 absorbent products.

The whole surface of the absorbent product may be coated with the composition. In this way it is possible to reduce friction between the product and the user over the entire surface area of the product.

20

According to one embodiment, the absorbent product is wrapped in a liquid tight package. This reduces the risk that the water activity increases. The package may be additionally water-vapour impermeable and thus has low water vapour permeability.

25

The invention also relates to a use of a buffered lactic acid as a lubricating agent in an absorbent article, wherein the buffered lactic acid has a water activity of from 0.03-0.60 and a pH within the range from 3.0 to 6.5, and that the content of the buffered lactic acid as the lubricating agent is from 10 to 80

30 weight-%, based on the total weight of the composition. The buffered lactic acid has been dried to obtain the desired water activity.

Other features and advantages of the invention are described below also with reference to the appended drawings.

DETAILED DESCRIPTION

5

By “absorbent product” is meant a product that absorbs or is adapted to absorb bodily fluids, such as urine or blood.

10 By “wearable absorbent product” is meant an absorbent article which is to be worn by the user, such as a diaper, pant-type diaper, sanitary napkin, panty-liner or incontinence product.

15 By “buffered” is meant that a salt of weak acid (or base) has been added to a composition to resist changes in its acidity (or alkalinity) and thus the pH of the composition has been stabilized.

“Water activity” of a composition is defined as the ratio of the vapour-pressure of water in the composition (p) to the vapour-pressure of pure water (p_0) at the same temperature. Hence water activity of pure water $a_w=1$, 0.
20 Water activity can also be expressed as “free” or “available” water in the composition. Water activity affects physical properties of the composition as well as rates of deteriorative reactions and microbial growth during storage.
By “lubricating” is meant a substance or composition that serves to lubricate.

25 By “water-soluble” is meant a substance which is capable of dissolving when in contact with water or an aqueous solution, e.g. urine or blood. In this context it is further meant that the water-soluble material dissolves at least partially.

30 By “thermoplastic” is meant a material that is capable of being repeatedly softened by heating and hardened by cooling, and in the softened state

capable of being repeatedly shaped by flow into articles by moulding, extrusion, or forming.

By "liquid tight package" is meant that the package is comprised of a material
5 that is impermeable to liquids.

By a "water-vapor impermeable package" is meant a package comprised of a material having a highest WVTR (Water Vapor Transmission Rate) of 6 g/m²/24h according to ASTM E 398-83 at 37,8 °C (100 °F) and 90% relative
10 humidity, can be at most 1 g/m² /24h, for example at most 0,1 g/m² /24h. The package may also protect the absorbent product comprising the composition in such a way that the composition will retain its lubricating affect for at least 6 months, for example for at least 9 months and most preferably for at least 12 months at 23 °C (73,4 °F) and 50% relative humidity after the packaging
15 date. The data and values mentioned with respect to WVTR (Water Vapor Transmission Rate) correspond to unsaturated values in accordance with the standard ASTM E 398-83, which is generally applied in this field and is known to the person skilled in this art.

20 The absorbent product according to the present invention may be for example a tampon, diaper, sanitary napkin or incontinence product and comprises a lubricating composition.

In accordance with the present invention, the lubricating composition
25 comprises a buffered lactic acid in an amount of from 10 to 100 weight-%, based on the total weight of the composition. Thus, the composition may consist of the buffered lactic acid alone. The composition has a pH within the range of from 3.0 to 6.5, and a water activity of from 0.03 to 0.60. It has been surprisingly found out that the composition is gel-like and slippery in
30 consistency, and thus provides for a lubricating effect when used in absorbent products. The composition is also acidic and thus suitable for use in close contact with the skin and/or mucus membrane of a wearer of the

absorbent product. Further, since the composition is dried to a low water activity, there is no or a very small risk for microbial growth in the composition, and hence no preservative is needed. Therefore, the composition has been found to be suitable for use in absorbent products. The
5 amount of buffered lactic acid in the composition can be of from 20 to 100 weight-%.

The pH of the composition may be within the range of from 3.5 to 5.5, since the human skin and mucus membrane are slightly acidic. Thus risk of skin
10 irritation can be reduced. The pH of the composition may be modified or adjusted by varying the ratio of the buffering salt and lactic acid in the composition. The buffering salt may be for example an alkaline earth metal salt or alkali metal salt of lactic acid. Also alkali solutions such as potassium hydroxide may be used to buffer lactic acid.

15

The water activity of the composition is from 0.03 to 0.60 and may be obtained by drying the composition to a desired water activity. The water activity may be of from 0.10 to 0.50, whereby there is a very low or practically no microbial proliferation in the composition.

20

The composition may comprise an essentially water free additive. The water-free additive may be for example hydrophobic and naturally essentially water-free additive such as oils, waxes and fats. The addition of these hydrophobic substances can increase the barrier properties of the formulation and hence
25 improve the protection of skin against irritating substances. Examples of oils are vegetable and mineral oils. Examples of waxes are petrolatum, beeswax, silicone wax, vegetable waxes. Examples of fats are lanolin and cocoa butter.

Additives can also be dried to be essentially water free. Examples of
30 additives that can be dried and may contribute to soothing and/or prevention of infection/irritation are: botanical actives, prebiotic substances, probiotic bacteria, minerals, inorganic additives, salts and vitamins. The additives

further improve the properties of the composition making the composition smooth and providing skin and/or mucus membrane caring properties to the composition. If needed, the additive may be dried to become water-free. Therefore, it can be added to the composition after the buffered lactic acid
5 has been dried to a desired water activity. If the additive needs to be dried, it may also be added to the composition prior to drying and be dried as a mixture. The amount of the water free additive may be of from 0 to 90 % by weight, based on the total dry weight of the composition, and for example the amount can be of from 0 to 40 % by weight, based on the total weight of the
10 composition.

According to one embodiment of the invention, the absorbent product is a tampon. The tampon may be a compressed menstrual tampon comprising an elongated generally rod-shaped absorption body having an insertion end and
15 a withdrawal end and having a withdrawal string extending from the withdrawal end. The absorption body may have compression lines extending from the insertion end to the withdrawal end.

In order to facilitate insertion, the tampon usually has a rounded, tapered, or
20 flat tip at the insertion end or the insertion end may be bullet shaped and a flat generally circular withdrawal end surface at the withdrawal end. The insertion end is the part extending from the tip or upper end of the tampon one third of the length toward the withdrawal end surface or lower end of the tampon. Similarly, the withdrawal end is the part of the tampon extending
25 from the withdrawal end surface one third of the tampon length toward the tip of the tampon. Middle part of the tampon is the part of the tampon extending between the insertion end and the withdrawal end, and is also about one third of the length. The compressed, unused tampon has a generally smooth, low friction body-contacting surface to facilitate comfortable insertion.
30 However, if the mucus membrane of the user is dry or fragile, further friction reduction is required and this is provided by the lubricating composition in accordance with the present invention.

The tampon length may be 30-70 mm.

5 The tampon can have a liquid permeable cover on the outside of the absorption body of the tampon. The liquid permeable outer cover may be arranged on the absorption body. The cover may comprise thermoplastic material that melts or softens and serves as a binder for binding the cover to the tampon body. The thermoplastic material may be polyolefins such as polyethylene and polypropylene, polyesters or mixtures of thermoplastic
10 materials. The thermoplastic material may be in the form of film or fibres such as monocomponent or multicomponent fibres. The cover may be a material that exhibits low friction to facilitate insertion and withdrawal of the tampon. The cover may be a nonwoven material which may be a spunbonded, carded or spunlaced web comprising polypropylene, polyethylene, viscose,
15 bicomponent or any other suitable fibrous material. Perforated plastic films, cast, woven or knitted nettings or similar porous materials may also be used. The cover may be hydrophilic. A hydrophilic cover material may be made from hydrophobic polymer materials and may be provided with a hydrophilic finish to render the cover wettable. The cover material may be applied to the
20 entire tampon surface or may be applied only to a part of the surface. The cover is an optional feature of the tampons according to the invention and may be completely omitted, if desired. If no cover is used on the tampon, it is preferred that the absorption body be made of a material with sufficient integrity to avoid that fibres and/or particles are shed from the tampon during
25 use.

According to the present invention, the composition comprising the buffered lactic acid is coated on the surface of the tampon. If the tampon comprises a cover, the composition may be applied to the cover otherwise it can be
30 applied directly to the absorbent body. The whole surface of the tampon may be coated with the composition or just the insertion end of the tampon may be coated with the composition. The coating may be performed for example

by immersing the tampon or the insertion end thereof in the composition, or for example by means of printing, e.g. flexographic, gravure or digital printing. The composition may be applied to the absorbent article in an amount ranging from 1-100 g/m².

5

The tampon may also be provided with a protective, removable packaging cover, such as a cellophane film or after application of a packaging cover. The package may be at least liquid tight, but can also be water-vapour impermeable.

10

According to another embodiment of the invention, the absorbent product may be a wearable kind of an absorbent product such as a diaper, sanitary napkin or incontinence product and may have the following basic structure. Starting from the side closest to the wearer, there is a top sheet. The liquid permeable top sheet may be of a nonwoven material, e.g., spunbonded, meltblown, carded, hydroentangled, wetlaid, etc. Further examples of topsheet materials are porous foams, apertured plastic films, etc.

15

20

Beneath the top sheet, an optional liquid distribution layer or an acquisition layer can be positioned. Beneath the liquid distribution layer, or directly beneath the top sheet (in case no liquid distribution layer is present) an absorbent core, also referred to as an absorbent body can be positioned. For example, the absorbent core may be a pressure-bonded airlaid core comprising superabsorbent polymers. Examples of commonly occurring absorbent materials are cellulosic fluff pulp, tissue layers, highly absorbent polymers (superabsorbent), absorbent foam materials, absorbent nonwoven materials, or the like.

25

30

Beneath the core structure, a back sheet is provided. The back sheet is liquid impermeable and may consist of a thin plastic film, e.g., a polyethylene or polypropylene film, a nonwoven material coated with a liquid impervious material, a hydrophobic nonwoven material that resists liquid penetration, or

laminates of plastic films and nonwoven materials. The back sheet material may be breathable so as to allow vapor to escape from the absorbent core, while still preventing liquids from passing through the back sheet material.

- 5 The wearable type of an absorbent product has several parts that come in to contact with the skin or mucus membrane. During use, chafing can be caused in the areas where the absorbent product is in contact with the skin, such as in the areas around the waist, hips, and legs and urogenital region. Chafing can also be caused near the crotch region of the wearable product
- 10 that lies close to the urogenital region of the user. These regions or areas are also wet areas of the absorbent products, i.e. areas where the absorbent product receives and stores urine and/or blood. Further possible areas where chafing can occur are for example the top sheet or part thereof, elasticized side flaps, barrier flaps, wings, belts in a belted diaper, and/or waist portion,
- 15 hip portion, outer edges of the absorbent product, outer parts of standing gathers and/or in or on the wet parts of the product.

According to the present invention, the wearable absorbent product may comprise the lubricating composition over a part of the surface of the product,

20 e.g. on parts of the top sheet of the product that is in contact with the skin and/or mucus membrane of the user. The lubricating composition may be applied on the parts of the product that come into contact with the urogenital region of the user, e.g. in the region of the wearable absorbent product. When the lubricating composition is applied to the crotch region of the

25 absorbent product, the skin caring properties of the lubricating agent may be beneficial in the sensitive urogenital region of the user.

Alternatively, the lubricating agent may be applied on other parts than in the crotch region of the absorbent product where there is a risk for chafing of the

30 skin and thus the lubricating composition may additionally or alternatively be applied to any other portion of the article that is in contact with the skin of the wearer during use. Such portions include for example the edge regions of the

top sheet, elasticized side flaps, barrier flaps, standing gathers, wings, belts in a belted diaper and other parts located in the waist portion and/or the hip portion.

- 5 The composition may be added to one or several of the mentioned positions, or alternatively on the whole surface of the wearable absorbent product. The composition may be applied by means of any suitable application method, such as for example spraying, coating, and/or printing.
- 10 The absorbent product may further comprise a water-soluble film that functions as a barrier layer to prevent migration of the lubricating composition into the product. The water soluble film is provided on the surface of the absorbent product. The water-soluble film is then coated with the lubricating composition. The lubricating composition has a low water-activity and
- 15 therefore, the film will not be dissolved during storage of the product. When the hygiene product is used and is in place, the humidity will increase and the film will be dissolved and the absorption properties will not be affected. The water-soluble film may consist or comprise of a water-soluble thermoplastic polymer.
- 20 The water-soluble film may comprise a thermoplastic water-soluble polymer. When the film then comes into contact with bodily fluids, it dissolves and thus allows the absorbent body of the absorbent product to absorb liquids. The thermoplastic water-soluble polymer may be for example polyethylene oxide,
- 25 polyvinyl alcohol, polysaccharide such as modified starch, sugar or sugar alcohol, polyacrylamide, polyvinylamine, polyvinylpyridine, polyvinylpyrrolidine, or a mixture thereof.

Polyethylene oxides (PEO), which can be formed of ethylene oxide

30 monomers and derivatives thereof, may have a molecular weight of from about 50.000 to about 1.000.000 g/mol, such as between 100.000-600.000 (g/mol). If the molecular weight is lower, the polymer becomes very brittle.

However, also brittle polymers are usable in some embodiments of the present invention. If the molecular weight is higher, the polymer may become difficult to dissolve in aqueous solutions. Polyethylene oxides have an advantage of being non-toxic, stable to heat, they are inert to many chemical agents and they do not hydrolyze or deteriorate.

Polyvinyl alcohol is easy to use in film forming processes and is water-soluble. Suitable polyvinyl alcohol polymers may have a molecular weight of from about 3.500 to about 700.000 (g/mol).

10

Also polysaccharides may be used in the water-soluble carrier matrix of the present invention. Polysaccharides may be for example chemically modified starches which are soluble in water, such as dextrin. The starches may be derived for example from wheat, corn, waxy corn, sorghum, rice, and waxy rice; potato; roots, sweet potato and arrowroot. Examples include sugars containing one or more of glucose, sucrose, fructose, raffinose, maltodextrose, galactose, xylose, maltose, lactose, mannose, and erythrose, sugar alcohols such as e.g., erythritol, xylitol, malitol, mannitol, and sorbitol, polyols e.g., ethylene glycol, glycerol, propylene glycol, dipropylene glycol, butylene glycol, and hexane triol, etc.

15
20

Starches may have a molecular weight ranging from about 3.000-1.000.000 grams per mole (g/mol), such as from about 3.000-5.000 g/mole.

Also other polymers may be used, such as polyacrylamide which can be formed of acrylamide monomers and derivatives thereof, polyvinylamine, polyvinylpyridine which can be formed of vinyl pyridine monomer and polyvinylpyrrolidine, which can be formed monomers such as vinyl pyrrolidone monomer.

25
30

The water soluble film is coated on the surface of the absorbent product by means of any suitable technology, such as for example, thermal adhesive

(such as hot-melt adhesive) coating technology, by immersing or dipping the absorbent product in the melted thermoplastic polymer compound or by means of printing, for example flexographic, gravure printing or digital printing. For example, the thermoplastic polymer is first melted and then a
5 predetermined amount of the resulting melt may be extruded out and coated on the surface of the absorbent product.

BRIEF DESCRIPTION OF THE DRAWINGS

10 The invention will in the following be described in more detail, with reference to the figures that are shown on the appended drawings. In the drawings:

Fig. 1 shows a tampon according to the invention,

15 Figs. 2a-2d show examples of a panty liner according to the invention,

Fig. 3 shows a sanitary towel according to the invention,

20 Fig. 4 shows a diaper according to the invention,

Fig. 5 shows a diaper comprising a belt according to the invention,

25 Fig. 6 shows a front view of the arrangement used in example 1 to measure slip-force,

Fig. 7 shows a side view of the arrangement used in example 1 to measure slip-force,

30

Fig. 8 shows a diagram with the measured slip-force values,

Fig. 9 shows a diagram with the measured pH values.

The tampon 100 shown in Fig. 1 comprises an absorption body 102 enclosed in a liquid permeable cover 103 and having two withdrawal string ends 104 that are joined together in a knot 105. The tampon 100 has an elongate bullet-shape with a longitudinal direction L and a radial direction R, perpendicular to the longitudinal direction L and an insertion end 106 and a withdrawal end 107, and a middle part 108. Each of the insertion end 106 and the withdrawal end 107 and the middle part 108 occupy approximately one third of the total length of the tampon 101. The insertion end is shown with a rounded tip 117 and a flat withdrawal end surface 120. The tampon length between the tip 117 and the withdrawal end surface 120 may be determined by means of a slide calliper. Tampons commonly have a length in the dry, non-expanded state of from 30 to 70 mm, more common from 40 to 50 mm. The length will commonly vary with the size and design absorption capacity of the tampon. In Fig. 1 the whole surface of the tampon 100 is coated with the lubrication composition 111 in accordance with the present invention. The lubricating composition on the surface of the tampon thus reduces the friction between the tampon and the mucus membrane of the vagina of the user.

The tampon 100 is provided with longitudinally extending grooves or channels in the form of compression lines 108, 109. The compression lines are wave-shaped in Fig. 1 but they may be straight or any other suitable shape.

As described above, the lubricating composition of the present invention may be also be used on wearable absorbent products to reduce friction between the absorbent product and for example urogenital region of the user and/or other areas of the body of the user.

The lubricating agent may be used on the wearable absorbent product to reduce the friction between the wearable absorbent product and the urogenital region of the user.

- 5 Figs. 2a-2d schematically show examples of a panty liner 200 in accordance with the present invention. Generally, all the panty liners 200 comprise a covering layer in the form of a liquid-permeable top sheet 201, as shown in Fig. 2a, that is arranged on the side of the panty liner 200 which during use faces towards the wearer. The panty liner also comprises a second covering layer, a back sheet (not shown), which during use faces away from the
10 wearer. Further, the panty liner 200 comprises an absorbent core (not shown) arranged between the top sheet 201 and the back sheet. The top sheet and back sheet can be joined together in the reinforcement region 203, as shown in Fig. 2a, for example by means of gluing or ultrasonic welding.
15 Other means for joining together the panty liner may be also used.

As best shown in Figs. 2a and 2d, the lubricating composition is coated on a crotch region 219 of the panty liner 200. The lubricating composition is applied on the surface of the panty liner 200. The lubricating composition
20 may be positioned in the areas of the wearable absorbent product that come into contact with the urogenital region of the user, i.e. the areas in the crotch region of the wearable absorbent product. In this way friction may be reduced between the absorbent product and the user while optimal skin care is provided due to the low pH of the composition.

25

As shown in Figs. 2c and 2d, the lubricating composition is coated to the surface in a spotted pattern that can be obtained for example by means of printing. In the embodiment shown in Fig. 2b, the lubricating composition is coated to the surface in a striped pattern, which may also be obtained by for
30 example means of printing.

Generally, the printing method may be chosen from any suitable means, e.g. flexographic, gravure or digital printing utilizing e.g. spray application.

Of course, any coating method and the different coating patterns may be
5 used in all kinds of tampons and/or wearable absorbent products.

In another embodiment, only the outer edges on the reinforcement region 203, as illustrated in Fig 2a, are coated with the lubrication composition to reduce friction between the thighs of the wearer and the panty liner and thus
10 reduce the risk for chafing.

In yet another embodiment, the whole surface of the panty liner 200 is coated with the lubricating composition.

15 Fig. 3 shows a sanitary napkin 300 in accordance with the present invention. The sanitary napkin 300 comprises a covering layer in the form of a liquid-permeable top sheet 301, which is arranged on the side of the sanitary napkin 300 which during use faces towards the wearer. The sanitary napkin 300 also comprises a second covering layer, a back sheet (not shown),
20 which during use faces away from the wearer. The sanitary napkin 300 further comprises an absorbent core arranged between the top sheet 301 and the back sheet. The top sheet and back sheet are joined together in the reinforcement region 303 by means of gluing or ultrasonic welding. The sanitary towel comprises wings 305 to facilitate the attachment of the sanitary
25 napkin to an undergarment. The sanitary napkin 300 comprises the lubricating composition in the crotch region of the napkin, i.e. approximately in the area located between the wings 305 so that the lubricating composition comes into contact with the urogenital region of the user.

30 Alternatively, the outer edges on the reinforcement region 303 and/or the wings are coated with the lubrication composition 311 to reduce friction

between the thighs of the wearer and the panty liner and thus reduce the risk for chafing.

In a similar manner as in connection with the panty liner shown in Figs. 2a-
5 2d, the lubricating composition may be coated in a specific pattern to the surface of the absorbent product.

FIG. 4 shows a diaper 400 for an infant or an incontinent adult in accordance with the present invention. The diaper comprises a chassis comprising a
10 liquid permeable top sheet 401, a liquid impermeable back sheet 409 and an absorbent body or core 407 enclosed there between. The top sheet 401 and the back sheet material 409 have a somewhat greater extension in the plane than the absorbent core 407 and extend outside the edges thereof. The layers 401 and 409 are connected to each other within the projecting portions
15 thereof, e.g., by gluing or welding by heat or ultrasonic. The top sheet and/or the back sheet may further be attached to the absorbent core 407 by any method known in the art, such as adhesive, heat-bonding, etc. The absorbent core may also be unattached to the top sheet and/or the back sheet. The diaper 400 comprises a front portion 415 intended during use to be worn on
20 the front part of the user's body, a rear portion 417 intended during use to be worn on the rear part of the user's body, and a more narrow crotch region 419 located between the front and rear portions and which is intended to be worn in the crotch region of the user between the legs. The rear portion 417 is provided with a pair of adhesive tape tabs 421 or other type of attachment
25 means such as hook-and-loop type fasteners. The diaper further comprises elastic barrier flaps 423 that form leakage barriers and are at their proximal edges secured to the top sheet 401. The diaper 400 may further comprise an elasticized waist feature in the form of elastic members 411 extending in the transverse direction of the article in the waist portion thereof.

30

The lubricating composition may be coated on part of the surface facing the wearer, or the composition may be coated for example on the front portion

415 and/or rear portion 417 and/or on the elastic barrier flaps 423, i.e. on the areas where there is a risk for chafing and where friction between the wearer and the diaper needs to be reduced.

- 5 Alternatively, the lubricating composition may be coated on the parts of the crotch region 419 that come into contact with the urogenital region of the user. As above, in this way friction may be reduced between the absorbent product and the user while optimal skin care is provided due to the low pH of the composition.

10

The diaper 500 shown in Fig. 5, has a similar construction as the diaper in Fig. 4, except that the diaper 500 comprises belt portions 511, 521 attached to the rear portion 517 of the diaper 500 and intended to be fastened together around the waist of the wearer. Fastening means on the front part of the
15 diaper are then attached to the outside of the belt to fasten together the diaper to the desired pant-like shape. An example of a belted diaper is shown in WO 01/00129. Similarly as in connection with the diaper shown in Fig. 4, the lubricating composition may be coated on part of the surface facing the wearer, or the composition may be coated for example on the front portion
20 515 and/or rear portion 517 and/or on the belt portions 511, 521, i.e. on the areas where there is a risk for chafing and where friction between the wearer and the diaper needs to be reduced.

Alternatively, the lubricating composition may be coated on the parts of the
25 crotch region 519 that come into contact with the urogenital region of the user. As above, in this way friction may be reduced between the absorbent product and the user while skin care is provided due to the low pH of the composition.

30

EXAMPLES

Example 1

- 5 This test was performed to show if the lubricating composition comprising the buffered lactic acid could be used to lower shear forces and hence possibly chafe when for example used on the surfaces of tampons.

10 The test was performed using a device illustrated in Figs. 6 and 7. The device 600 consisted of a flat support surface 601 which was at an 30° angle from horizontal and covered with film, which was prolonged and attached to the support surface. A tampon 603 (Libresse®Normal -new twist wrap) was mounted on this surface and standardized pressed on to this surface by means of a plastic ruler 605. The ruler 605 had a fixed length of 20 cm and
15 was fixed to the flat support surface in the ends. The tampon was always positioned at the centre of the ruler, i.e. at 10 cm.

A tensometer, DIA-STRON MMT 170, measured the force during the pulling of the tampon 603 from its position, pressed to the surface and under the
20 ruler, and out. The Start position was 20 mm, displacement was 50 mm and rate was 150 mm/min. During the process of pulling out the tampon, the force varied. In the Table 1 below the slip-force (force when tampon starts to move) was registered.

- 25 Since there are small variations in size of tampons even within the same package the same tampon was measured both before and after treatment with the lubricating composition comprising buffered lactic acid. First the slip-force was measured three times with the untreated tampon and thereafter the lubricating composition was distributed on the surface of the tampon and the
30 slip-force was measured three more times. The lubricating composition was evenly distributed on the lower half of surface of the tampon by means of a

tiny brush. The amount of lubricating composition on the tampons was between 0.7-0.8 g. The measured values are also shown in Table 1.

5 In this test many different lubricating compositions comprising buffered lactic acid were tested. The lactic acid was buffered with either potassium lactate or potassium hydroxide. It was buffered to different pH. The lubricating composition was dried to different levels to achieve different water activities. The instrument used to measure water activity was: AquaLab, Model Series 3 TE, Serial# TE8105. It was calibrated using lithium chloride 13.41M and all
10 measurements were performed in 23 C.

Table 1 below shows the different lubricating compositions and the measured pH, water activity and slip-forces. The slip-force is a mean value from three repetitions.

15

In Fig. 8 the slip force of the tampons is displayed before and after treatment with the lubricating composition.

Table 1: The different samples: Tampons with buffered Lactic acid and reference tampon without Lactic acid.

Tampon number	Salt buffering Lactic acid	Measured pH	Measured water activity (measured at 23 °C)	Measured amount of buffered Lactic acid (g)	Slip-force (N) with buffered Lactic acid	Slip-force (N) Reference without buffered Lactic acid
1	Potassium Lactate	3.7	0.42	0.79	11.85	17.14
2	Potassium Lactate	4.6	0.41	0.70	12.03	17.93
3	Potassium Lactate	6.2	0.29	0.79	11.62	15.20
4	Potassium Lactate	4.0	0.80	0.80	11.18	17.43
5	Potassium Hydroxide	3.8	0.40	0.72	10.61	19.23
6	Potassium Hydroxide	5.6	0.34	0.79	10.69	15.55
7	Potassium Hydroxide	7.1	0.23	0.73	12.66	18.81
8	Potassium Hydroxide	4.5	0.76	0.80	10.69	17.00

5

Based on the results in the tests it can be concluded that there was a reduced slip-force for all the tampons comprising the lubricating composition comprising lactic acid. In all cases the tampon covered with the composition showed lower slip-force compared to the untreated tampon.

10

Example 2

This test was performed to investigate if the lubricating composition comprising buffered lactic acid was able to adjust pH on skin when it was
5 used alone and in a hydrophobic blend with Petrolatum (Snow white P1 from Sonneborn) according to table 2.

0.1 g of the composition was applied on the fore arm skin of a test person as a circular spot of about 2 cm diameter and covered by a plastic film. The
10 composition was kept on the skin for 1 hour. Thereafter the excess of lubricating composition was gently removed with a soft wipe, gently flushed with deionised water and gently dried with a dry piece of paper. After another one minute of rest in air pH on skin was measured using a pH meter (flat probe VWRTM SYMPHONY SB80PI).

15

The composition used was produced with 15.2 ml of DL-lactic acid solution (85 weight %) which was blended with 46.6 ml potassium lactate solution (50 weight %). This blend was further dried in a dry chamber to a water activity of 0.2. This lubricating composition was further equilibrated in a climate of 25 °C
20 and 50% rH which resulted in a water activity of 0.3. pH on the readymade lubricating composition was measured to be 4.3.

Table 2: The different blends

Sample	Lactate gel (%)	Petrolatum (%)
1	100	0
2	60	40
3	10	90
4	0	100

25

Table 3: Measured values of pH

Sample	Start value Forearm skin	End value Forearm skin
1	4.9	3.5
2	5.3	3.5
3	5,.3	3.6
4	5.4	5.1

Fig. 9 figure shows pH on forearm skin – before and after exposure to the samples described in Table 2. As can be seen in Fig. 9 all lubricating composition containing the buffered lactic acid resulted in a pH of about 3.5 after 1 hour of exposure.

Thus it can be concluded that the lubricating composition comprising buffered lactic acid was able to adjust pH on the fore arm skin – both alone or blended with petrolatum. The same final pH was achieved for all the blends containing the lubricating composition comprising buffered lactic acid.

The above embodiments are merely illustrative and are in no way intended to limit the present invention.

CLAIMS

1. Absorbent product **characterized in** that the absorbent product comprises a lubricating composition comprising a buffered lactic acid in
5 an amount of from 10 -100 weight-%, based on the total weight of the composition, wherein the composition has a pH within the range of from 3.0 to 6.5, and a water activity of from 0.03 to 0.60.
2. Absorbent product according to claim 1, **characterized in** that the pH of the composition is within the range of from 3.5 to 5.5.
- 10 3. Absorbent product according to claim 1 or 2, **characterized in** that the water activity of the composition is from 0.10 to 0.50.
4. Absorbent product according to any one of the preceding claims, **characterized in** that the lubricating composition has been dried to obtain the water-activity.
- 15 5. Absorbent product according to any one of the preceding claims, **characterized in** that the amount of the buffered lactic acid in the composition is of from 20 to 100 weight-%, based on the total weight of the composition.
6. Absorbent product according to any one of the preceding claims, **characterized in** that the salt buffering the lactic acid in the
20 composition is an alkali metal salt of lactic acid.
7. Absorbent product according to claim 6, **characterized in** that the salt is potassium lactate.
8. Absorbent product according to any one of the preceding claims, **characterized in** that the composition comprises an essentially water-
25 free additive.
9. Absorbent product according to claim 8, **characterized in** that the water-free additive is naturally water-free, such as oils, waxes and fats or the water-free additive is dried to be essentially water-free and is
30 chosen from botanical actives, prebiotic substances, probiotic bacteria, minerals, inorganic additives, salts and vitamins.

10. Absorbent product according to any one of the preceding claims, **characterized in** that the absorbent product is a tampon.
11. Absorbent product according to any one of claims 1-9, **characterized in** that the absorbent product is a wearable absorbent product.
- 5 12. Absorbent product according to any one of the preceding claims, **characterized in** that the composition is coated on a surface of the absorbent product.
13. Absorbent product according to any one of the preceding claims, **characterized in** that the absorbent product comprises a water-soluble film.
- 10 14. Absorbent product according to claim 13, **characterized in** that the water-soluble film is coated on a surface of the absorbent product and the composition is coated on the water-soluble film, wherein the film thereby forms a barrier layer for the composition.
- 15 15. Absorbent product according to claim 13 or 14, **characterized in** that the water-soluble film comprises a thermoplastic water-soluble polymer.
16. Absorbent product according to claim 15, **characterized in** that the thermoplastic water-soluble polymer is polyethylene oxide, polyvinyl alcohol, polysaccharide such as modified starch, sugar or sugar alcohol, polyacrylamide, polyvinylamine, polyvinylpyridine, polyvinylpyrrolidine, or a mixture thereof.
- 20 17. Absorbent product according to any one of the preceding claims, **characterized in** that at least part of the surface of the absorbent product is coated with the composition.
- 25 18. Absorbent product according to any one of the preceding claims, **characterized in** that the absorbent product is wrapped in a liquid tight package.
19. Use of a buffered lactic acid as a lubricating agent in an absorbent article, wherein the amount of the buffered lactic acid in the lubricating agent is of from 10-100 weight-%, based on the total weight of the
- 30

lubricant, and wherein the lubricant has a pH within the range of from 3.0 to 6.5, and a water activity of from 0.03 to 0.60.

20. Use according to claim 19, wherein the buffered lactic acid has been dried to obtain the desired water activity.

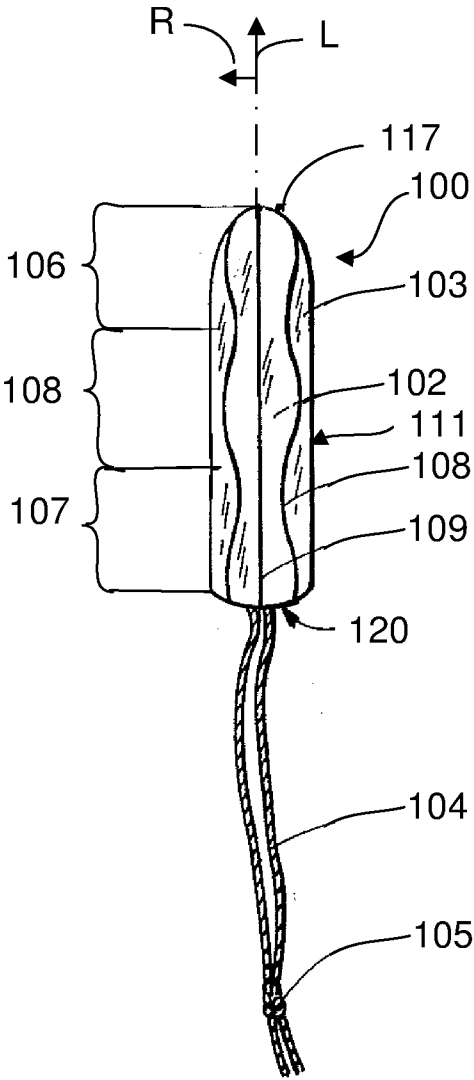


Fig. 1

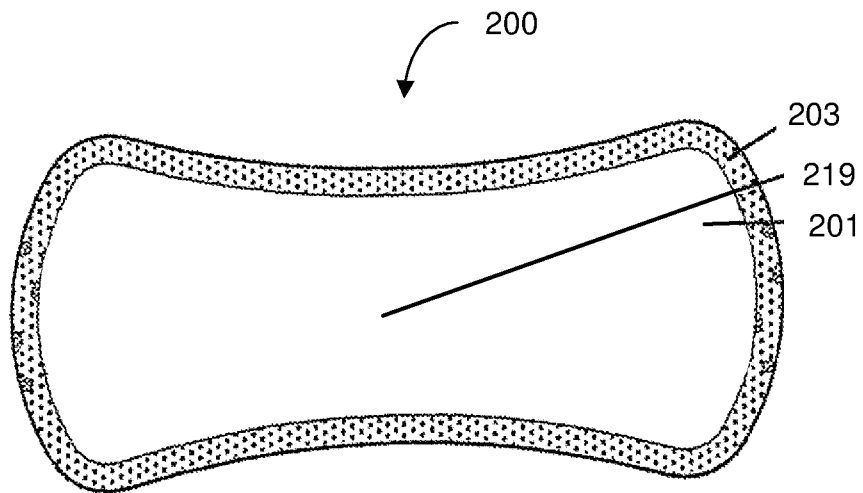


Fig. 2a

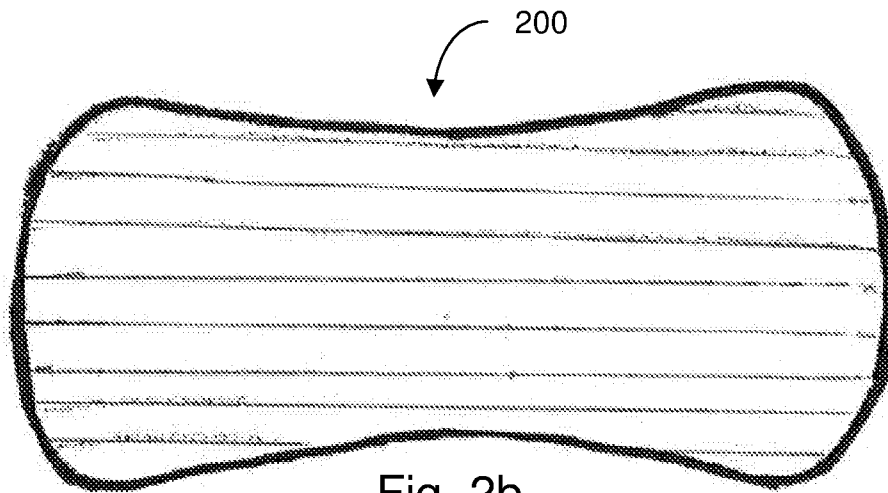


Fig. 2b

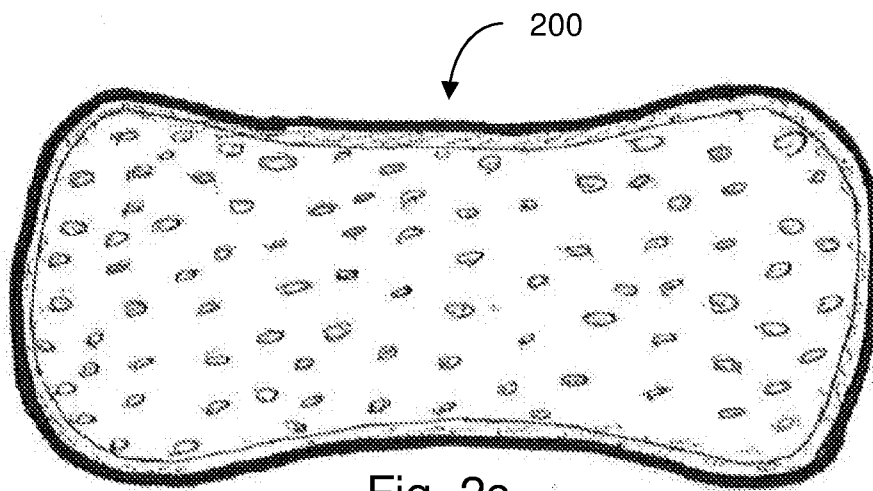


Fig. 2c

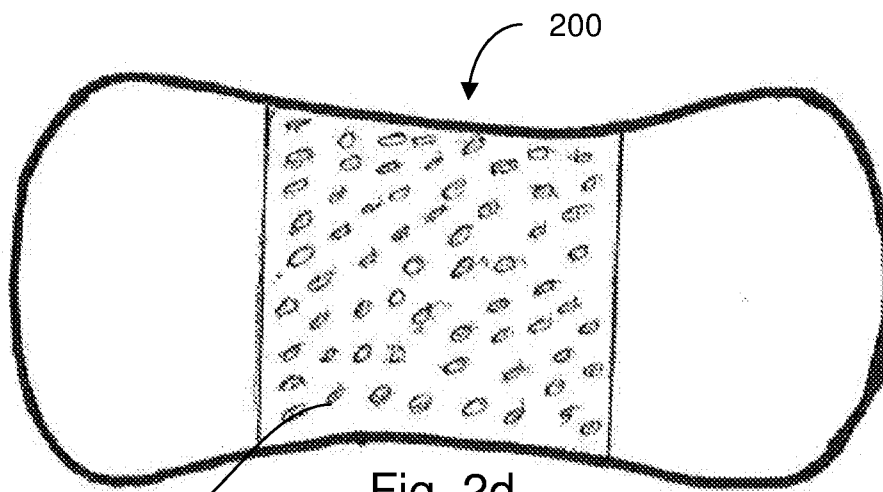


Fig. 2d

219

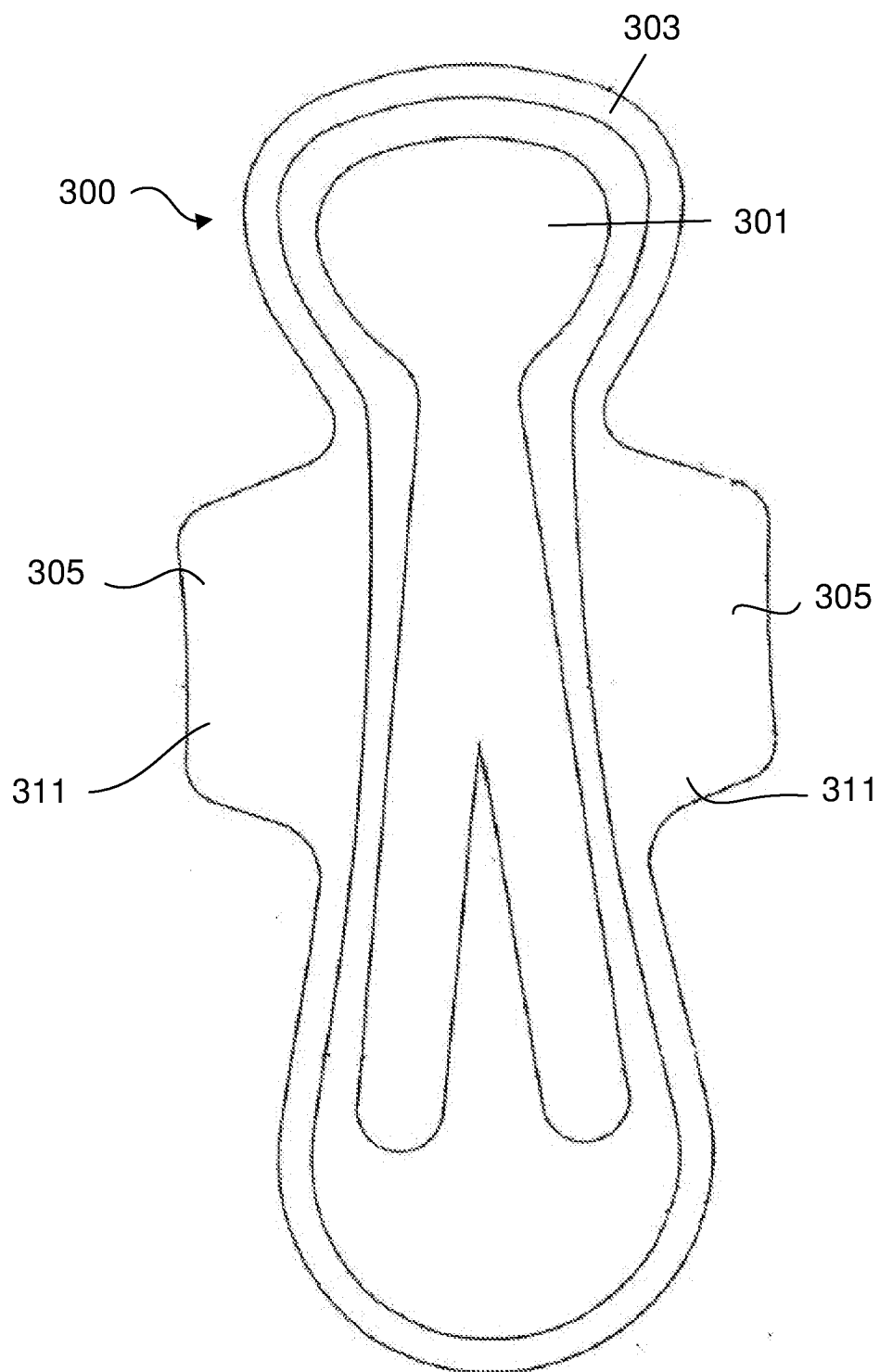


Fig. 3

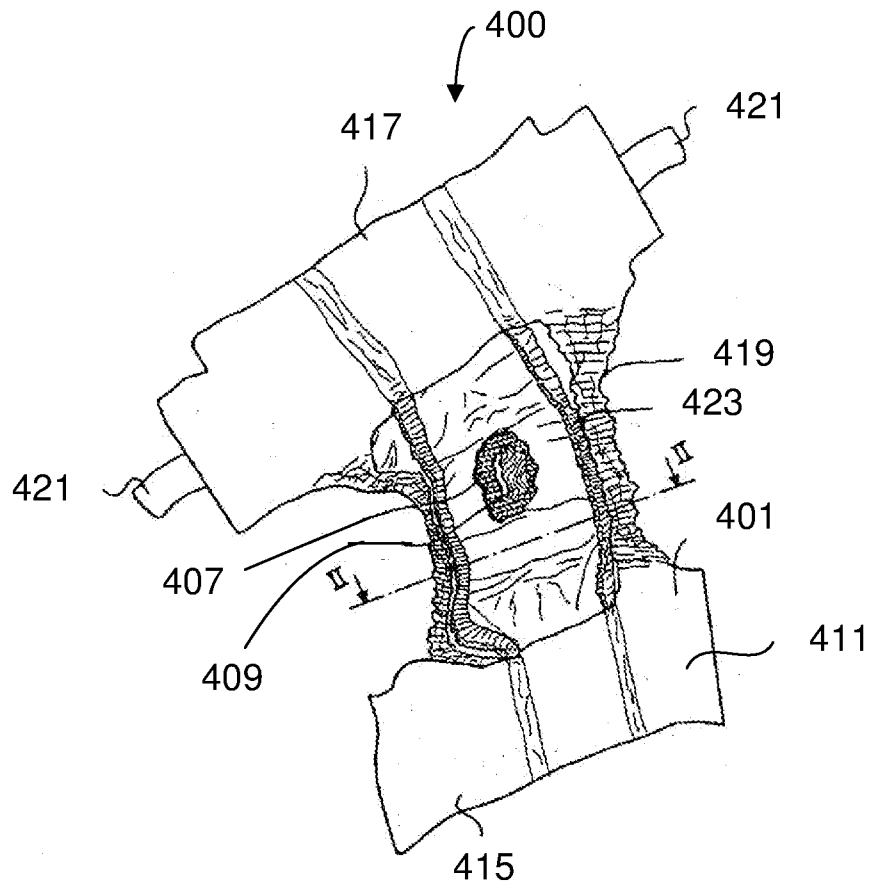


Fig. 4

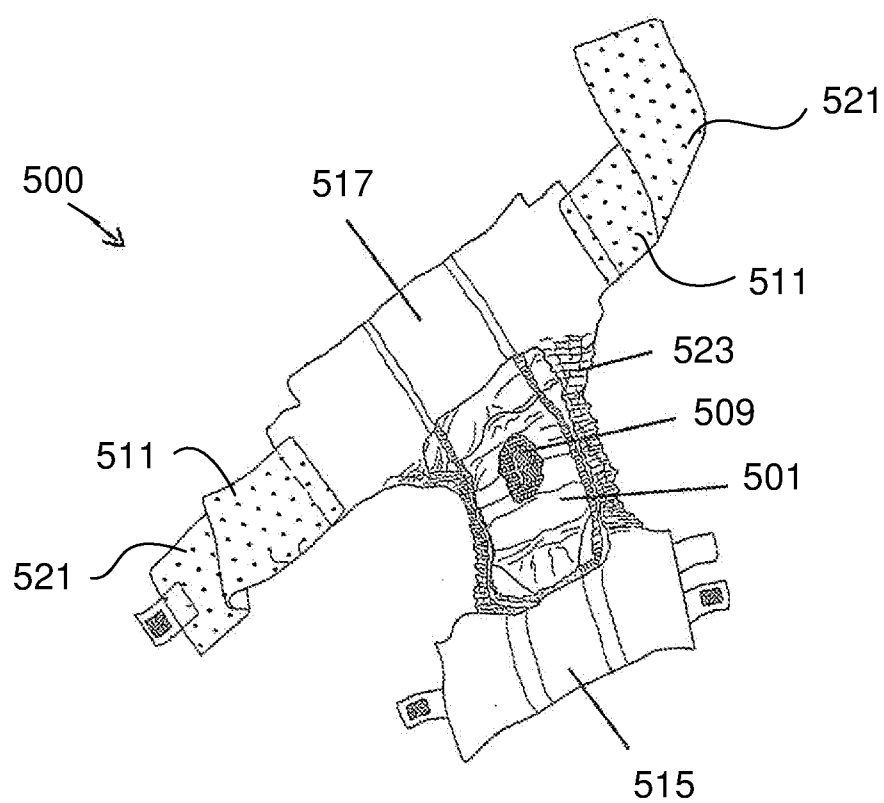


Fig. 5

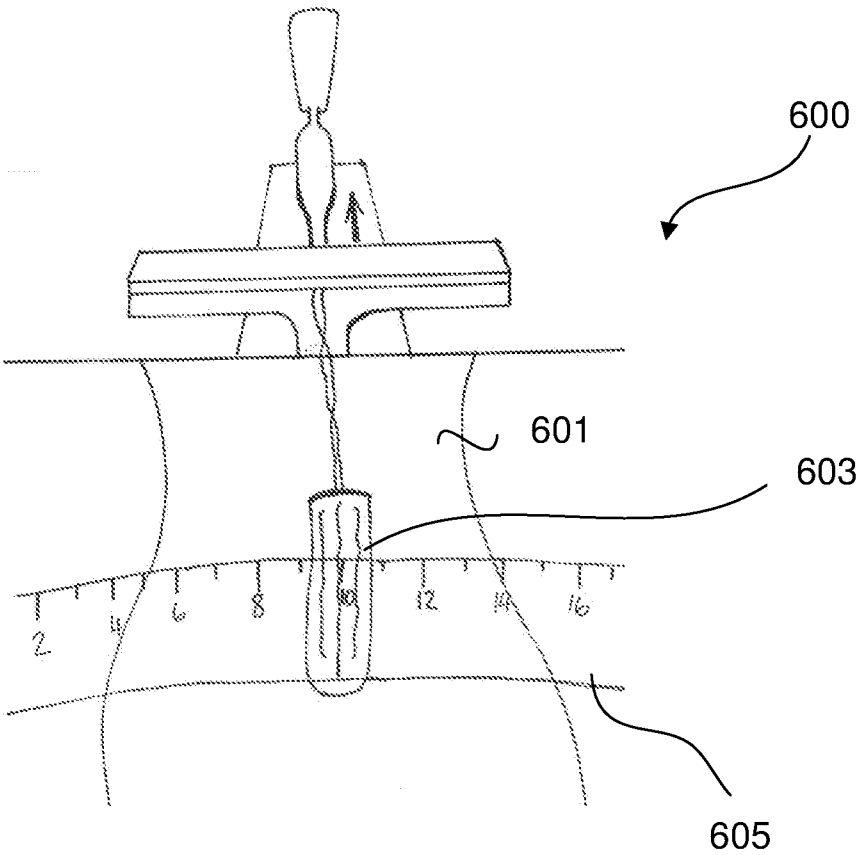


Fig. 6

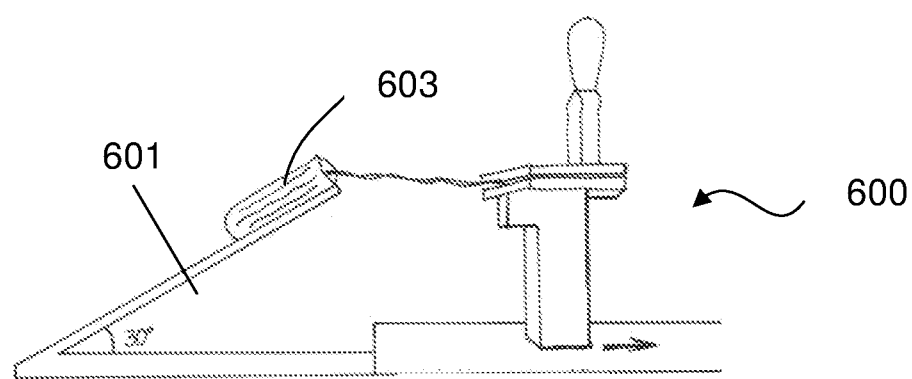


Fig. 7

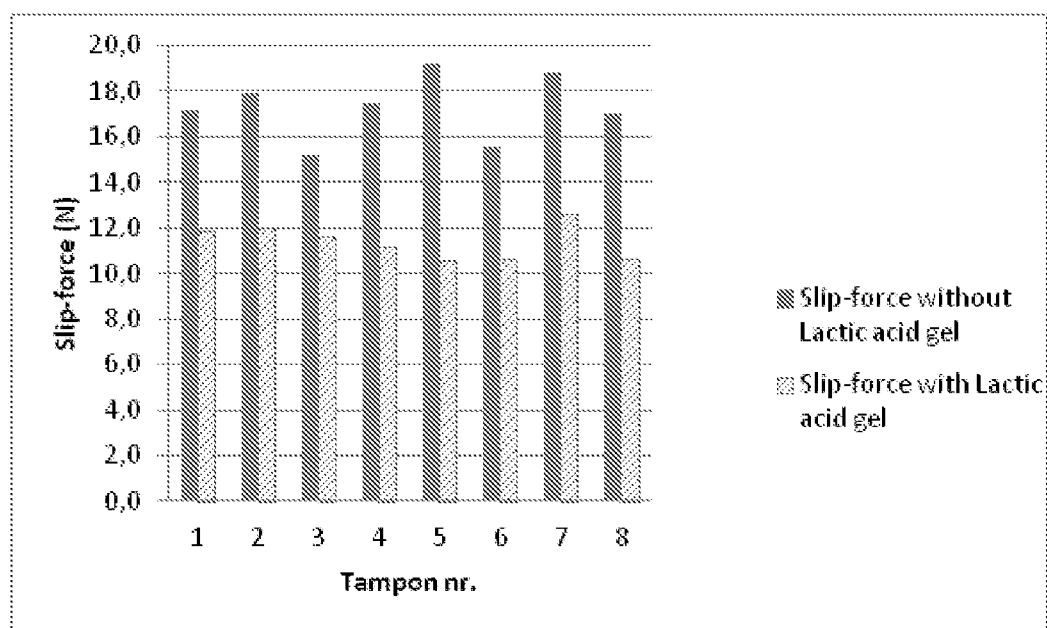


Fig. 8

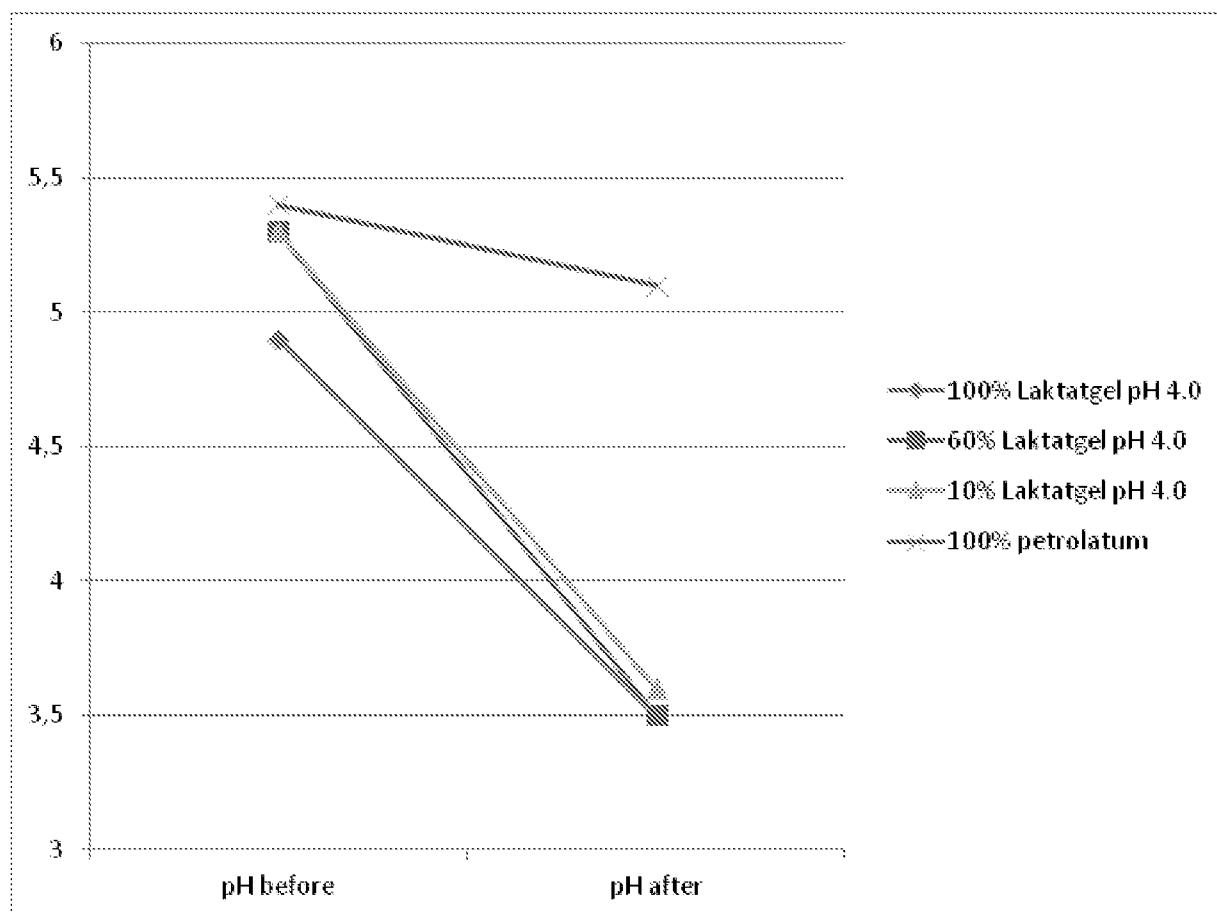


Fig. 9

INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/SE2013/050623

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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: A61F

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

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, 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 20090156979 A1 (ANDERSCH BJOERN), 18 June 2009 (2009-06-18); whole document; paragraph [0078]	1-12, 17-20
Y	--	13-16
Y	US 6359191 B1 (RUSCH VOLKER ET AL), 19 March 2002 (2002-03-19)	13-16
A	US 20040241151 A1 (SCA HYGIENE PROD AB), 2 December 2004 (2004-12-02); whole document	1-20



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

03-02-2014

Date of mailing of the international search report

04-02-2014

Name and mailing address of the ISA/SE

 Patent- och registreringsverket
 Box 5055
 S-102 42 STOCKHOLM
 Facsimile No. + 46 8 666 02 86

Authorized officer

Erika Stenroos

Telephone No. + 46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/050623

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 20060122569 A1 (SCA HYGIENE PROD AB), 8 June 2006 (2006-06-08); whole document --	1-20
A	US 5201326 A1 (KUBICKI JOERN ET AL), 13 April 1993 (1993-04-13) -- -----	1-20

Continuation of: second sheet

International Patent Classification (IPC)

A61F 13/28 (2006.01)

A61F 13/51 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2013/050623

US	20090156979 A1	18/06/2009	DK	1855633 T3	18/03/2013
			EP	1700588 A1	13/09/2006
			US	8026409 B2	27/09/2011
			WO	2006094753 A1	14/09/2006
US	6359191 B1	19/03/2002	AT	224687 T	15/10/2002
			CA	2286329 A1	15/10/1998
			DE	19713908 A1	08/10/1998
			EP	0971669 B1	25/09/2002
			JP	2000512880 A	03/10/2000
			WO	9844884 A3	21/01/1999
US	20040241151 A1	02/12/2004	NONE		
US	20060122569 A1	08/06/2006	AT	476949 T	15/08/2010
			AT	335454 T	15/09/2006
			AU	2002359102 B2	03/04/2008
			AU	2002349856 B2	17/04/2008
			CO	5590878 A2	30/12/2005
			CO	5590879 A2	30/12/2005
			DE	60213855 D1	21/09/2006
			DE	60237305 D1	23/09/2010
			EP	1455712 B1	09/08/2006
			EP	1455710 B1	11/08/2010
			ES	2269800 T3	01/04/2007
			MX	PA04004990 A	11/08/2004
			MX	PA04005047 A	19/08/2004
			PL	369413 A1	18/04/2005
			PL	369513 A1	18/04/2005
			RU	2303972 C2	10/08/2007
			RU	2004121990 A	10/03/2005
			RU	2303973 C2	10/08/2007
			RU	2004121991 A	10/03/2005
			SE	520670 C2	12/08/2003
			SE	0104268 L	19/06/2003
			US	7589250 B2	15/09/2009
			WO	03063746 A1	07/08/2003
			WO	03051250 A1	26/06/2003

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2013/050623

US	5201326 A1	13/04/1993	AT	111721 T	15/10/1994
			CA	2024275 A1	01/03/1991
			DE	3928677 A1	07/03/1991
			EP	0415087 A1	06/03/1991
			ES	2063871 T3	16/01/1995
			NO	175403 C	12/10/1994
			NO	903792 A	01/03/1991
			PT	95133 A	30/04/1992
