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(54) **Title:** ABSORBENT ARTICLE HAVING MEANS TO ENSURE PROPER MOUNTING THEREOF TO A WEARER

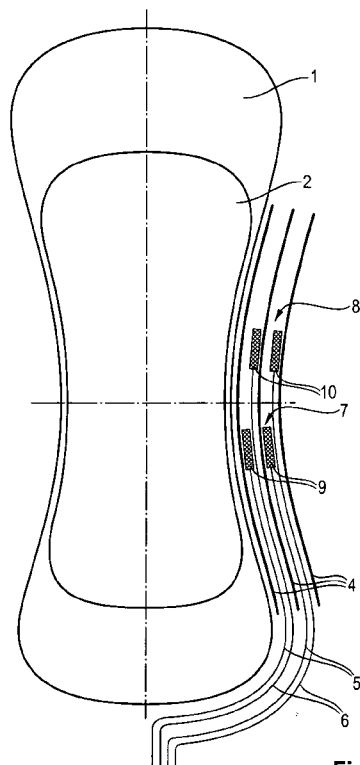


Fig. 1

(57) **Abstract:** An absorbent article that is to be worn in the crotch region of the wearer and that is for absorbing any liquid discharge when so worn. The absorbent article has portions that are to come into contact with the skin of the wearer when the absorbent article is properly mounted, the absorbent article comprises a montage detection sensor positioned at at least one of said portions. The sensor comprises first and second electrodes such that when an electric potential is applied between the first and second electrodes, electric current passes between the first and second electrodes through the skin of the wearer when the absorbent article is properly mounted to verify that the absorbent article is properly mounted to the wearer. The absorbent article comprises leg elastic portions for engaging the absorbent article with the legs of the wearer when properly mounted. The montage detection sensor is located at at least one of the leg elastic portions such that the electric current passes between the electrodes through the skin of the leg of the wearer to thereby indicate that the leg elastic portion is properly mounted to the leg of the wearer. The absorbent article comprises a pair of opposed standing gathers. There is a montage detection sensor located at at least one of the standing gathers at at least one location of the or each standing gather that are to come into contact with the skin of a wearer when the absorbent article is properly mounted. The sensor is arranged so that electric current from the first electrode to the second electrode is required to either pass from a first electrode on a first standing gather to a second electrode on a second standing gather opposed to the first standing gather or the first and second electrodes are located on the same standing gather so that the electric current is required to pass between the first and second electrodes through the skin of the patient to indicate that the standing gathers are properly mounted in contacting relation with the skin of the wearer at the location of the montage detection sensor.

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**Absorbent article having means to ensure proper mounting thereof to a wearer**

Field of the invention

The present invention is concerned with absorbent articles that are to be mounted in the crotch region of a wearer. Such absorbent articles may be adult incontinence garments or baby or toddler diapers. The present invention may also have applicability to sanitary towel type absorbent articles.

Background to the invention

Adult incontinence garments and baby or toddler diapers are well known. These garments are designed to be intuitive to mount to a wearer. Conventionally, such articles will comprise a front waist region, a rear waist region and a crotch region therebetween. The front waist region and the rear waist region are attached or attachable to one another about a wearer's torso, while the crotch region extends between the legs of the wearer. If such articles are improperly mounted to a wearer, it may affect the performance of the absorbent article. In particular, improper mounting of an absorbent article to a wearer may be the cause of article leakage.

It may be, for example, that a side leg portion of the absorbent article or some other portion becomes folded over onto itself, which can provide a direct leakage path out of the absorbent article, which may cause embarrassment or distress for the wearer. Similarly, the absorbent article may be mounted off centre with respect to a direction from one leg to the other, which will mean that any liquid discharge from a wearer will enter the absorbent article off centre and may cause a leakage problem since the absorbent article is designed with extra absorbency characteristics in its lateral centre, assuming that the absorbent article will

be properly mounted. Another mis-mount example is that of not having the article pulled up far enough about the waist region, which can also be the cause of leakage or poor absorbency performance.

#### Summary of the invention

Accordingly, it is an object of the present invention to provide an absorbent article that enables a determination of when the absorbent article is improperly mounted. It is a further object of the present invention to provide a system that provides an indication of when the absorbent article is improperly mounted.

According to the present invention, there is provided an absorbent article that is to be worn in the crotch region of the wearer, which is for absorbing any liquid discharge when so worn, the absorbent article having portions that are to come into contact with the skin of the wearer when the absorbent article is properly mounted, the absorbent article comprising a montage detection sensor positioned at at least one of said portions, the sensor comprising first and second electrodes such that when an electric potential is applied between the first and second electrodes, the electric current passes between the first and second electrodes through the skin of the wearer when the absorbent article is properly mounted to verify that the absorbent article is properly mounted to the wearer.

Preferably, the absorbent article comprises leg elastic portions for engaging the absorbent article with the legs of the wearer when properly mounted, wherein the montage detection sensor is located at at least one of the leg elastic portions such that the electric current passes between the electrodes through the skin of the leg of the wearer to thereby indicate that the leg elastic portion is properly mounted to the leg of the wearer.

In a preferred embodiment, there is a montage detection sensor on each of the leg elastic portions of the absorbent article so that the electric current is passed between the electrodes of each of the montage detection sensors to pass respectively through skin of respective legs of the wearer to indicate that the leg elastic portions are properly mounted in contacting relation with the respective legs of the wearer.

Preferably, there is a plurality of montage detection sensors on at least one of a pair of opposed leg elastic portions of the absorbent article at locations distributed along the leg elastic portion, and thus distributed around a leg of the wearer when the absorbent article is properly mounted, such that when electric current is applied between the first and second electrodes of each of the detection sensors, it is passed between the first and second electrodes through the skin of the wearer at each location assuming that the leg elastic portion is properly mounted in contacting relation with the skin of the wearer at each location.

In an alternative preferred embodiment, the first and second electrodes of the liquid discharge sensor are distributed along an elastic leg portion of the absorbent article such that the electric current is passed through the skin and around the leg of the wearer between the first and second electrodes when the leg elastic portion is properly mounted in contacting relation with the skin of the wearer.

Additionally or alternatively to providing a montage detection sensor on one or both of the leg elastic portions, a montage detection sensor can be located at standing gathers of the absorbent article at locations of the standing gathers that are to come into contact with the skin of a wearer when the absorbent article is properly mounted, the sensor being arranged so that the electric current from the first

electrode to the second electrode is required to either pass from a first electrode on a first standing gather to a second electrode on a second standing gather opposed to the first standing gather or the first and second electrodes are located on the same standing gather so that the electric current is required to pass between the first and second electrodes through the skin of the patient to indicate that the standing gathers are properly mounted in contacting relation with the skin of the wearer.

Positioning the montage detection sensor or sensors on at least one leg elastic portion of an absorbent article or on a standing gather of an absorbent article provides the sensors on particularly sensitive locations of the absorbent article that could result in leakage if improperly mounted. Thus, for example, the absorbent article may not be pulled up enough around a torso of a wearer, which would cause the standing gathers and/or the leg elastic portions to hang down from the skin of the patient in the crotch region, thereby leaving the absorbent article at risk of leakage. Similarly, these portions of the absorbent article are liable to folding over in an improper mounting, which also presents a liquid discharge leakage risk.

In an embodiment, the first and second electrodes are elongate and longitudinally oriented with respect to a central longitudinal axis extending from a front to a rear of the absorbent article.

Other suitable portions of the absorbent article that are required to be in proper intimate contact with the skin of the wearer if the absorbent article is to be deemed properly mounted exist and montage detection sensors as described above could also or alternatively be mounted to these portions.

In a preferred embodiment, leads to the first and second electrodes are insulated from the skin of the wearer when the absorbent article is properly mounted yet the first and second electrodes remain exposed so as to be able to be in direct electrical communication with the skin of the wearer to be able to pass the electrical current through the skin of the wearer between the first and second electrodes.

In a preferred embodiment, the electrodes are made in a wavy form to facilitate stretching with the absorbent article.

Preferably, the montage detection sensor has a conductive gel applied to it to improve the conductive control with the skin. To prevent the gel drying out, a releasable liner could cover it or the article could be packaged in such a way that a layer of the absorbent article covers the gel.

In a second aspect of the present invention, there is provided a system comprising an absorbent article as defined above and an electric potential generator, wherein the electric potential generator is connected to the first and second electrodes of the montage detection sensors so as to apply the electric potential between the first and second electrodes, and a measurement unit configured to measure an electrical property of any electric current being passed between the first electrode and the second electrode of the or each montage detection sensor.

Preferably, the system comprises a montage output unit that is configured to output an indication when the absorbent article is and/or is not properly mounted based on a determination by the measurement unit as to whether the first electrode, skin and second electrode circuit is completed.

In a preferred embodiment of the invention, the montage output unit is configured to issue an audible, visual or other output signal based on a determination that the first

electrode, skin, second electrode circuit through the montage detection sensor is not or not sufficiently complete for a determination to be made that the absorbent article is properly mounted at the location of the montage detection sensor.

Preferably, the measurement unit is an impedance measurement unit. Preferably, the electrical property changes in dependence on the extent to which the first and second electrodes are in contact with the skin, which will thus provide an indication of the extent to which the montage detection sensor portion of the absorbent article is properly mounted to the wearer, rather than just whether the portion is or is not properly mounted. The use of a montage output unit is an optional feature of the system of the present invention. The system may alternatively record the output of the montage detection sensor so that an analysis can subsequently determine whether the absorbent article is properly mounted to a wearer, which may be useful information for a manufacturer of absorbent articles in determining or ruling out improper montage of the absorbent article to the wearer as a cause for absorbent article failure (e.g. leakage).

Preferably, the measurement unit is configured to apply a DC voltage between the first and second electrodes or an AC voltage having a frequency of at least 500 Hz. These voltage forms are suitable for avoiding interference or disturbance as a result of wearer muscle activity.

In a preferred embodiment, a control unit is configured to compare the measured electrical property to a predetermined threshold, wherein the threshold is set so as to distinguish a leakage of liquid discharge positioned between the first and second electrodes and a proper montage condition. This aspect of the invention makes use of the liquid discharge of presenting a relatively low impedance path to the flow of

current between the two electrodes as compared to flow through the skin. Thus, the present system enables leakage and proper montage detection.

#### Brief description of the drawings

Fig. 1 discloses an absorbent article having a leg elastic portion on one side of an absorbent core of the absorbent article, wherein the leg elastic portion includes a plurality of montage detection sensors enabling a determination of whether the leg elastic portion is properly mounted to a leg of a wearer at the respective locations of the montage detection sensors.

Fig. 2 discloses an alternative embodiment of an absorbent article, wherein the first and second electrodes of a montage detection sensor are split between respective opposed standing gathers of the absorbent article for making a determination as to whether the standing gathers are properly mounted to the wearer's body.

#### Detailed description of the invention

Fig. 1 discloses an absorbent article 1 comprising an absorbent core 2. The absorbent core 2 of the absorbent article 1 is captured between a top sheet, for allowing a liquid discharge into the absorbent article 1, and a liquid impermeable back sheet, for preventing escape of the liquid discharge from the absorbent article 1. One side of the absorbent article 1 includes leg elastics 4 that secure the absorbent article 1 around a leg of the wearer when the absorbent article 1 is properly mounted on the wearer. Although not shown, there is also a leg elastic portion on the opposing side of the absorbent article 1 to secure the absorbent article 1 about the other leg of the wearer. In

this regard the absorbent article 1 is conventional for an adult incontinence garment, a baby diaper or a toddler diaper. The absorbent article 1 is modified as compared to a conventional absorbent article by including at least one montage detection sensor 7, 8 as described in the following.

In the leg elastic portion 4 shown, there is provided a first montage detection sensor 7 and a second montage detection sensor 8. The montage detection sensors 7, 8 are separated from one another along the leg elastic portion 4 in a direction extending around the leg of the wearer when the absorbent article 1 is worn. The first montage detection sensor includes first and second electrodes 9 and the second montage detection sensor includes first and second electrodes 10. The electrodes 9 of the first montage detection sensor 7 are connected to respective leads 5 that lead to a pair of contacts for contacting opposing poles of an electric potential generator. Likewise, the first and second electrodes 10 of the second montage detection sensor 8 are connected to respective leads 6 that extend to a pair of contacts for contacting an electric potential generator. The leads 5, 6 are insulated from the skin of the wearer by way of an insulative coating over an electric wire or by way of an insulative sheet covering the conductive portion of all of the leads 5, 6. The electrodes 9, 10 are exposed by the insulative layer. The electrodes 9, 10 are shown in enlarged form as compared to the leads 5, 6. In an alternative configuration, the electrodes 9, 10 could simply be an extension of the conductive portion of the leads 5, 6 with the only difference being that the electrodes 9, 10 are exposed.

In one form, the electrodes could be silver chloride electrodes. Alternatively, a metal, e.g. silver, coated polymer thread, e.g. nylon, could be used as the electrodes. In yet another alternative, the electrodes could be printed on the relevant portion of the absorbent article. The print

could be done in a wave form to allow the relevant portion of the absorbent article, e.g. a leg elastic portion or a standing gather, to stretch.

It is envisioned that a corresponding set of montage detection sensors are applied on the other leg elastic portion opposed to the shown leg elastic portion 4. In the shown embodiment, the leg elastic portion includes three elastics and the first and second electrodes are positioned intermittently with respect to the elastics 4. This is one possible arrangement. The electrodes 9, 10 could be otherwise positioned in relation to the leg elastics of the leg elastic portion 4.

In use, an electric potential generator is contacted with the absorbent article 1 so as to apply an electric potential between the first and second electrodes 9 of the first montage detection sensor. A measurement unit is used to measure an electrical property of any return current that has passed from the first electrode 9 to the second electrode 9 of the first montage detection sensor 7. If no return current is detected, this is indicative of a circuit break, which would suggest that the first and second electrodes 9 are not in contact with the skin and thus the leg elastic portion 4 is not properly mounted to the leg of the wearer at the location of the first montage detection sensor 7. If a return current is detected but it is lower than a predetermined acceptable threshold, this is indicative of the leg elastic portion 4 not being ideally mounted to the leg of the wearer at the location of the first montage detection sensor.

A recording unit can record the results of the measurement unit for subsequent analysis or an output unit can be configured to issue a visual or audible output signal to indicate that the absorbent article 1 is properly mounted or not. The visual or audible output signal could be issued

from a control unit mounted to the absorbent article 1 or it could be issued at a central control unit and the output unit could be configured to transmit a wireless signal to the remote central control unit.

The electric potential generator is further configured to apply an electric potential between the first and second electrodes 10 of the second montage detection sensor 8 so that a measurement unit can measure an electrical property associated with any electric current returning from the second detection sensor 8. A recording unit or an output unit can utilise the measured data in the same way as for the first montage detection sensor 7 described above.

An electric potential is applied to the first and second electrodes of each of the montage detection sensors as described above including any further montage detection sensors not shown in Fig. 1. The electric potential could be applied to the sensors simultaneously or sequentially.

In the embodiment of Fig. 2, a third montage detection sensor 12 is shown. The first and second electrodes 14 of the third montage detection sensor 12 are provided respectively at opposed standing gathers of the absorbent article 1. The first and second electrodes 14 are run along a top edge of the standing gathers so as to be in intimate contact with the skin of the wearer when the absorbent article 1 is properly mounted. The first and second electrodes 14 could be applied to the top edge of the standing gathers by way of a conductive ink printed thereon or by way of a conductive wire. As in the embodiment of Fig. 1, the dashed line shown in Fig. 2 represents an insulated pair of leads 16 respectively connected to the first and second electrodes 14. In a preferred implementation, the first and second electrodes are an extension of the conductive portion of the lead 16, yet differ therefrom since they are exposed by an insulating layer applied over the lead 16 so that the first

and second electrodes 14 can be placed in intimate physical and electrical contact with the skin of a wearer.

Since the first and second electrodes respectively extend longitudinally with respect to the absorbent article and along opposed standing gathers, when the potential generator applies an electric potential between the first and second electrodes by making contact with a contact portion of the leads 16, the electric current is required to extend between the first electrode 14 on one side of a crotch portion of the wearer to the second electrode 14 on the other side of the crotch portion of the wearer through the skin. The electric current passes through the skin and may also pass through deeper tissue in travelling from the first electrode 14 to the second electrode 14. If the electrodes 14 are in proper contact with the skin of the wearer in the crotch portion, then the return current will indicate this. If no current is returned, or an impedance measurement between the first and second electrodes 14 indicates a high impedance, then the electrodes 14 may be deemed not to be in proper contact with the skin of the wearer.

In the present embodiment, the first and second electrodes 14 extend over a major longitudinal portion of the absorbent core where they are positioned on the standing gathers. This provides the possibility for the measurement unit to perform an impedance measurement between the first and second electrodes 14, which will indicate whether the first and second electrodes 14 are in contact with the skin of the wearer at all and also may be indicative of the extent (the longitudinal proportion of the first and second electrodes to which the first and second electrodes are in proper contact with the skin of the wearer) of proper contact with the skin of the wearer.

An output unit or a recording unit may be responsive to the data from the measurement unit concerning the results of the

montage detection sensor 12 in the same manner as described above with respect to the embodiment of Fig. 1.

In the embodiment of Fig. 2, the third montage detection sensor 12 is shown independently of the first and second montage detection sensors of the embodiment of Fig. 1. In an alternative embodiment, one or more leg elastic portion montage detection sensors could be provided in combination with one or more standing gather montage detection sensors.

In the embodiment of Fig. 2, the first and second electrodes 14 of the montage detection sensor 12 are provided on respective standing gathers. In an alternative embodiment, the first and second electrodes of a montage detection sensor could both be provided on one of the standing gathers and a corresponding montage detection sensor could optionally also be provided on the other standing gather. In one form, the first and second electrodes could be spaced apart longitudinally along the standing gather that it is associated with. Alternatively, the first and second electrodes provided on the same standing gather could be spaced apart from one another laterally.

The ease with which the electric potential will pass between the first and second electrodes will depend upon the moistness of the skin of the wearer even if the first and second electrodes are properly mounted to the skin of the wearer. Nonetheless, the system is sensitive enough to be able to determine proper mounting by passing current between the first and second electrodes in the case of relatively moist skin and in the case of relatively dry skin.

Claims

1. An absorbent article that is to be worn in the crotch region of the wearer and that is for absorbing any liquid discharge when so worn, the absorbent article having portions that are to come into contact with the skin of the wearer when the absorbent article is properly mounted, the absorbent article comprising a montage detection sensor positioned at at least one of said portions, the sensor comprising first and second electrodes such that when an electric potential is applied between the first and second electrodes, electric current passes between the first and second electrodes through the skin of the wearer when the absorbent article is properly mounted to verify that the absorbent article is properly mounted to the wearer,

wherein the absorbent article comprises leg elastic portions for engaging the absorbent article with the legs of the wearer when properly mounted, wherein the montage detection sensor is located at at least one of the leg elastic portions such that the electric current passes between the electrodes through the skin of the leg of the wearer to thereby indicate that the leg elastic portion is properly mounted to the leg of the wearer, and/or

wherein the absorbent article comprises a pair of opposed standing gathers, wherein there is a montage detection sensor located at at least one of the standing gathers at at least one location of the or each standing gather that are to come into contact with the skin of a wearer when the absorbent article is properly mounted, the sensor being arranged so that electric current from the first electrode to the second electrode is required to either pass from a first electrode on a first standing gather to a second electrode on a second standing gather opposed to the first standing gather or the first and second electrodes are located on the same standing gather so that the electric current is required to pass between the first and second electrodes through the skin of the patient to indicate that

the standing gathers are properly mounted in contacting relation with the skin of the wearer at the location of the montage detection sensor.

2. The absorbent article of claim 1, wherein there is a montage detection sensor on each of the leg elastic portions of the wearer so that the electric current is passed between the electrodes of each of the montage detection sensors to pass respectively through respective legs of the wearer to indicate whether or not the leg elastic portions are properly mounted in contacting relation with the respective legs of the wearer.

3. The absorbent article of claim 1 or 2, wherein there is a plurality of montage detection sensors on at least one of a pair of opposed leg elastic portions of the absorbent article at locations distributed along the leg elastic portion, and thus distributed around a leg of the wearer when the absorbent article is properly mounted, such that when the electrical potential is applied between the first and second electrodes of each of the detection sensors, electric current is passed between the first and second electrodes through the skin of the wearer at each location assuming that the leg elastic portion is properly mounted in contacting relation with the skin of the wearer at each location.

4. The absorbent article of claim 1, 2 or 3, wherein the first and second electrodes of the liquid discharge sensor are distributed along an elastic leg portion of the absorbent article such that the electric current is passed through the skin and around the leg of the wearer between the first and second electrodes when the leg elastic portion is properly mounted in contacting relation with the skin of the wearer.

5. The absorbent article of any one of the preceding claims, wherein leads to the first and second electrodes are insulated from the skin of the wearer by an insulating layer

when the absorbent article is properly mounted yet the first and second electrodes remain exposed by the insulating layer so as to be able to be in direct electrical communication with the skin of the wearer to be able to pass the electrical current through the skin of the wearer between the first and second electrodes.

6. A system comprising an absorbent article that is to be worn in the crotch region of the wearer and that is for absorbing any liquid discharge when so worn, the absorbent article having portions that are to come into contact with the skin of the wearer when the absorbent article is properly mounted, the absorbent article comprising a montage detection sensor positioned at at least one of said portions, the sensor comprising first and second electrodes such that when an electric potential is applied between the first and second electrodes, electric current passes between the first and second electrodes through the skin of the wearer when the absorbent article is properly mounted to verify that the absorbent article is properly mounted to the wearer, an electric potential generator, wherein the electric potential generator is connected so as to apply an electrical potential between the first and second electrodes, and a measurement unit that is configured to measure an electrical property of any current passing between the first and second electrodes, and further comprising a montage output unit that is configured to output an indication when the absorbent article is and/or is not properly mounted based on a determination by the measurement unit as to whether the first electrode, skin and second electrode circuit is completed.

7. The system of claim 6, wherein the montage output unit is configured to issue an audible, visual or other output signal based on a determination that the first electrode, skin, second electrode circuit through the montage detection sensor is not or not sufficiently complete for a

determination to be made that the absorbent article is properly mounted at the location of the montage detection sensor.

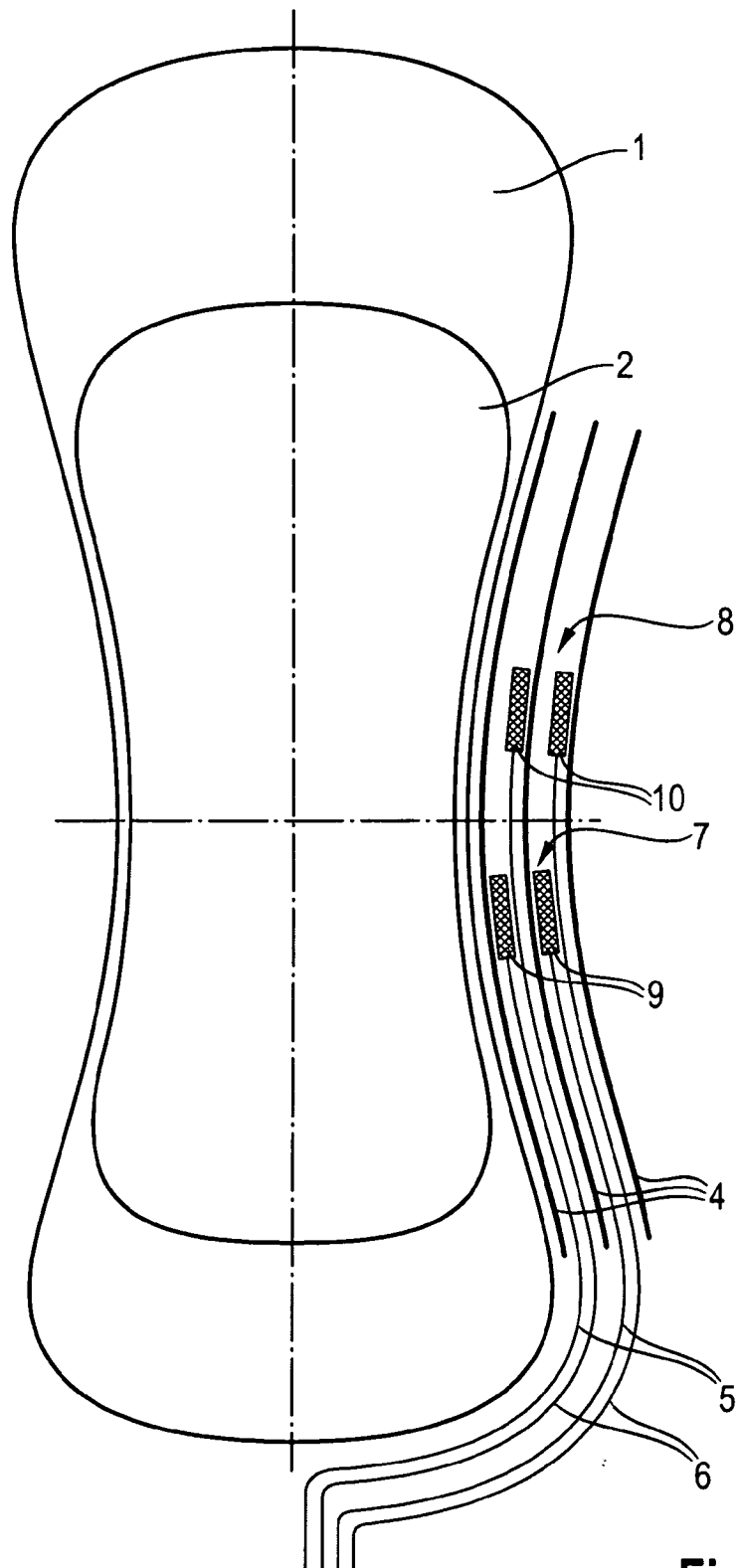


**Fig. 1**

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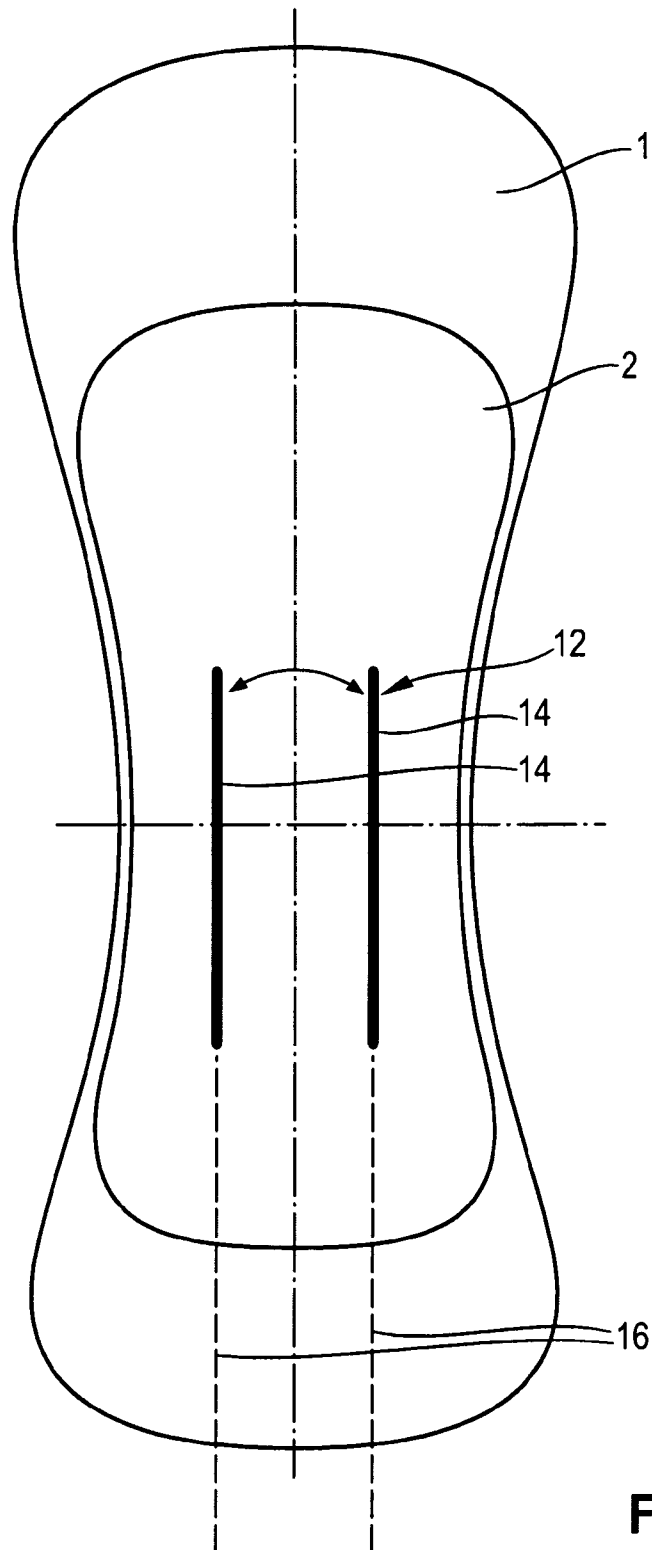


**Fig. 2**

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2011/073375

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A61F13/42 A61F13/84  
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)  
A61F

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                       | Relevant to claim No. |
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Further documents are listed in the continuation of Box C.



See patent family annex.

## \* Special categories of cited documents :

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Date of the actual completion of the international search

1 March 2012

Date of mailing of the international search report

26/03/2012

Name and mailing address of the ISA/

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Authorized officer

Douskas, K

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2011/073375

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)  | Publication<br>date         |
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