

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199921326 B2
(10) Patent No. 732399

(54) Title
Absorbent article for prevention of sideward leak

(51)⁶ International Patent Classification(s)
A61F 013/15

(21) Application No: 199921326 (22) Application Date: 1999.03.22

(30) Priority Data

(31) Number	(32) Date	(33) Country
10-74057	1998.03.23	JP
10-74076	1998.03.23	JP
10-319136	1998.11.10	JP

(43) Publication Date : 1999.10.07
(43) Publication Journal Date : 1999.10.07
(44) Accepted Journal Date : 2001.04.26

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(56) Related Art
WO 97/19663
US 4405310
EP 319314

ABSTRACT OF THE DISCLOSURE

An absorbent article to be worn inside of another absorbent article, which has a liquid-permeable facing layer that faces the wearer, a backing layer that faces another absorbent article, the backing layer formed from a liquid-impermeable sheet and having at least one opening made therein or, alternatively, the backing layer
5 formed from a liquid-permeable sheet, and an absorbent core interposed between the facing layer and the backing layer.



AUSTRALIA

Patents Act 1990

**ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT**



Application Number:
Lodged:



Invention Title: **ABSORBENT ARTICLE FOR PREVENTION OF SIDEWARD LEAK**



The following statement is a full description of this invention, including the best method of performing it known to us :-

ABSORBENT ARTICLE FOR PREVENTION OF SIDEWARD LEAK

FIELD OF THE INVENTION

The present invention relates to an absorbent article, including urine-
5 absorbent pads, which is used inside a disposable diaper, and a sanitary napkin which
is laid on top of the article to provide an absorbent article which exhibits excellent
liquid-absorbing properties.

BACKGROUND OF THE INVENTION

10 A common means for caring for individuals suffering from
incontinence is the use of an absorbent article, such as urine-absorbent pad, worn
inside a disposable diaper. A conventional urine-absorbent pad contains a facing
layer and a backing layer, with an absorbent core interposed between the layers. The
facing layer, which faces the wearer in use, is liquid-permeable. The backing layer,
15 which faces the disposable diaper in use, is liquid-impermeable. The absorbent core
is formed from crushed pulp or a mixture of crushed pulp and super absorbent polymer
(SAP). In addition, the urine-absorbent pad has an adhesive layer which sticks to the
inside of the disposable diaper so as to prevent the urine-absorbent pad from slipping
out of place in the disposable diaper.

20 The urine-absorbent pad receives a liquid insult directly in the case of
an incontinence episode, and has the capacity to retain an amount of urine excreted by
an adult during one or two episodes. The pad must be replaced as it is saturated with
urine, which depends on the frequency of episodes, in order to prevent liquid from
moving to the disposable diaper. Thus, it is possible to avoid the replacement of the
25 disposable diaper by frequently changing the wet pad. However, this is not always
possible, such as during periods of sleep, when the urine-absorbent pad is left in place
for a long time. After repeated liquid insults, the urine-absorbent pad cannot absorb
additional liquid, which results in excess liquid leaking from the pad.

The problem is that the excess liquid flows to the side or periphery

(which is in contact with the groin) rather than to the centre of the disposable diaper (absorbent area of the disposable diaper), because the backing layer of the urine-absorbent pad is impermeable to liquid and faces the centre of the disposable diaper. The periphery of the conventional disposable diaper does not sufficiently absorb urine, thereby causing it to leak at the sides of the diaper, which results in wet clothes or sheets. This same problem also occurs if two sanitary napkins are worn together on top of each other.

SUMMARY OF THE INVENTION

The present invention provides an absorbent article that prevents liquid from leaking from the sides of the article.

The invention further provides an absorbent article which efficiently absorbs liquid when used in combination with another absorbent article.

In one aspect, the present invention provides a urine-absorbent pad to be worn inside of a disposable diaper, including:

a liquid-permeable facing layer to face the wearer in use,

a backing layer to be directed toward the diaper in use, said backing layer being formed of a liquid-impermeable sheet and having a plurality of openings made therein,

an absorbent core interposed between the facing layer and backing layer, and

a removable, liquid-impermeable covering sheet to close the openings, said covering sheet being attached to the backing layer through an adhesive means for maintaining the covering sheet in place and providing an adhesive force to the surface of the diaper after the covering sheet is removed,

wherein the openings are arranged to form a liquid-passing area in substantial communication with an absorbing area where the absorbent core exists, and the adhesive means is applied to the backing layer within the absorbing area in such a manner that the adhesive means occupies less than 60% the absorbing area and the adhesive means is in a striped pattern to extend along the lengthwise direction of the absorbing area in a range of from more than 50% to 100% the length of absorbing area.



In a further aspect, the present invention provides a urine-absorbent pad to be worn inside of a disposable diaper, including:

- a liquid-permeable facing layer to face the wearer in use,
- a liquid-permeable backing layer to be directed toward the diaper in use,
- an absorbent core interposed between the facing layer and backing layer,

and

a removable, liquid-impermeable covering sheet to cover the entire surface of the backing layer, said covering sheet being attached to the backing layer through an adhesive means for maintaining the covering sheet in place and providing an adhesive force to the surface of the diaper after the covering sheet is removed,

wherein the adhesive means includes a first adhesive means and a second adhesive means, the second adhesive means being located on both sides of the urine-absorbent pad and the first adhesive means being located inwardly from the second adhesive means, and

wherein the second adhesive means exhibits a stronger adhesive force to the covering sheet than the first adhesive means, but the first adhesive means exhibits a stronger adhesive force to the surface of the diaper than the second adhesive means after the covering sheet is removed.

In one embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid-permeable facing layer which is in contact with the wearer, a backing layer which is in contact with a second absorbent article, the backing layer being formed from a liquid-impermeable sheet and having at least one opening made therein, and an absorbent core interposed between the facing layer and the backing layer.

In another embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid permeable facing layer which is in contact with the wearer, and a liquid-permeable backing layer which is in contact with the second article, and an absorbent core interposed between the facing layer and the backing layer.



disposable diaper. Accordingly, the leakage of excess liquid from the side of the absorbent article is prevented.

The absorbent article can be modified such that the backing layer is provided with a liquid-impermeable covering sheet that can be removed at any time when necessary. With the covering sheet on, it stops the flow of urine; with the covering sheet removed, it permits the passage of urine. When frequent changing of the absorbent article is possible, such as during the daytime, it may be used with the covering sheet attached to prevent frequent replacement of the second absorbent article, such as a disposable diaper, used in combination with absorbent article. When frequent changing is unlikely, such as during periods of sleep, the absorbent article may be used with the covering sheet removed, thereby absorbing liquid efficiently and securely in combination with another absorbent article.

The absorbent article can be modified such that the backing layer is provided with an adhesive means for fastening the backing layer to another absorbent article. In such a structure, the absorbent article will not slip out of place, and the movement of liquid to the other absorbent article is ensured.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1(A) is a perspective view showing a urine-absorbent pad as an example of an absorbent article according to the invention.

Fig. 1(B) is a plan view of the urine-absorbent pad shown in **Fig. 1(A)**, as viewed from a backing layer, with a covering sheet attached.

Fig. 1(C) is a plan view of the urine-absorbent pad shown in **Fig. 1(B)**, as viewed from the backing layer, with the covering sheet removed.

Fig. 2 is a perspective view which illustrates how the urine-absorbent pad of **Fig. 1(A)** is used in combination with a disposable diaper.

Fig. 3 is a plan view which illustrates how the urine-absorbent pad shown in **Fig. 1(A)** is used in combination with a disposable diaper.

Fig. 4 is a schematic sectional view taken along the line IV-IV in **Fig.**

3.

Fig. 5 is a perspective view of the urine-absorbent pad shown in **Fig. 1(A)** which is folded for use by a man, with its shape so modified as to enclose a penis.

Fig. 6(A) is a plan view of a urine-absorbent pad as another example of the absorbent article according to the invention, as viewed from a backing layer, with a covering sheet attached.

Fig. 6(B) is a plan view of the urine-absorbent pad shown in **Fig. 6(A)**, as viewed from the backing layer, with the covering sheet removed.

Figs. 7(A) and **7(B)** are perspective views of examples of openings.

Fig. 8(A) is a plan view of a urine-absorbent pad as another example of the absorbent article according to the present invention, as viewed from a backing layer, with a covering sheet attached.

Fig. 8(B) is a plan view of the urine-absorbent pad shown in **Fig. 8(A)**, as viewed from the backing layer, with the covering sheet removed.

Fig. 9 is a plan view of another embodiment of the urine-absorbent pad shown in **Fig. 8(A)**, with the covering sheet removed.

DETAILED DESCRIPTION OF THE INVENTION

A urine-absorbent pad, as an example of one embodiment of the absorbent article according to the invention, is shown in **Fig. 1(A)** (perspective view), **Fig. 1(B)** (plan view as viewed from a backing layer, with a covering sheet attached), and **Fig. 1(C)** (plan view as viewed from the backing layer, with the covering sheet removed).

The urine-absorbent pad **20** comprises a liquid-permeable facing layer **21** which faces the wearer in use, and a backing layer **22**, which faces a disposable diaper in use, and an absorbent core **23** which is interposed between the two layers.

The facing layer **21** can be made from a nonwoven fabric of hydrophilic fibers, hydrophobic fibers containing a hydrophilic surfactant, or the like,

which can be formed by various processes such as point bonding, through-air bonding, spun bonding, or spun lacing.

The backing layer **22** is made of a liquid-impermeable, breathable sheet of resin, such as polyolefin.

5 The absorbent core **23** is formed from crushed pulp or a mixture of crushed pulp and SAP (super-absorbent polymer), and is covered with an absorbing sheet **23a** such as tissue. (See Fig. 4.) The SAP can be made of polyacrylic acid, sodium polyacrylate, polyacrylamide, polyacrylonitrile, polyvinyl alcohol, an addition
 10 as starch or cellulose, a protein such as collagen and the like. Examples of the SAPs include cross-linked compound of sodium polyacrylate, graft copolymer of starch having sodium polyacrylate and graft copolymer of cellulose having polyacrylonitrile chains.

15 The absorbent core **23** is rectangular in shape as indicated by the dotted lines in Figs. 1(B) and 1(C). It may also take on an hourglass shape. With the absorbent core **23** interposed, the facing layer **21** and the backing layer **22** are bonded together with a hot-melt adhesive, or the like, along the periphery of the absorbent core **23**.

20 As used herein, the "absorbing area" refers to the area which is surrounded by the dotted lines in Figs. 1(B) and 1(C) and the area of the absorbent core **23**.

25 The urine-absorbent pad **20** has elastic members **24** which are disposed between the facing layer **21** and the backing layer **22** and extend in the lengthwise direction (**Y** direction) of the urine-absorbent pad **20**. The elastic members **24** exist in side areas where the absorbent core **23** is absent (i.e., outside of the absorbing area in the widthwise direction (**X** direction) of the urine-absorbent pad **20**). The elastic members **24** are bonded to the facing layer **21** and the backing layer

22 in its stretched state in the **Y** direction (with a certain per cent elongation). In their free state, they shrink in the **Y** direction, causing the facing layer **21** and the backing layer **22** to form gathers **25** on both the side areas of the urine-absorbent pad **20** in the **X** direction.

5 As shown in **Fig. 1(C)**, the backing layer **22** is made of a liquid-impermeable resin sheet and has openings **22a**, through which openings the absorbing sheet **23a** (e.g., tissue) covering the absorbent core **23** is exposed. In this embodiment, the openings **22a** constitute liquid-passing areas indicated by (a).

10 The openings **22a** (or the liquid-passing areas (a)) are arranged side by side approximately at the center of the absorbing area in the widthwise direction (**X** direction) and are elongated parallel to each other in the lengthwise direction (**Y** direction). In other words, they are situated substantially at the center of the absorbing area. The area of the openings **22a** is smaller than that of the absorbing area.

15 The backing layer **22** has an adhesive layer **26** as an adhesive means. The adhesive layer **26** is formed on the backing layer **22** in such a way as to surround the openings **22a** individually. This adhesive layer **26** aids in fastening a covering sheet **27** to the outside of the backing layer **22**, as shown in **Fig. 1(B)**. Thus the covering sheet **27** closes the openings **22a**. In other words, the adhesive layer **26** surrounds the openings **22a** completely, and the covering sheet **27** is bonded to this adhesive layer **26**. Therefore, with the covering sheet **27** attached, the liquid-passing areas (a) are closed and the backing layer **22** of the urine-absorbent pad **20** prevents liquid from passing through.

20 The covering sheet **27** is made of a liquid-impermeable and breathable sheet of resin such as polyolefin, like the backing layer **22**. The adhesive layer **26** is formed from a gum adhesive or acrylic resin, to permit the covering sheet **27** to be removed at any time from the backing layer **22**, and retains a certain adhesive power even after the covering sheet **27** has been removed. When the urine-absorbent pad **20** is used in combination with a disposable diaper, the adhesive layer **26** (with the



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covering sheet **27** removed) adheres to the inside of the disposable diaper, thereby preventing the urine-absorbent pad **20** from slipping out of place. In addition, because the urine-absorbent pad **20** is in contact with the disposable diaper, the passage of urine to the disposable diaper is secured.

5 The covering sheet **27** has a tab **27a** formed at its end. This tab **27a** is not bonded to the backing layer **22**.

The urine-absorbent pad **20** is used in combination with a disposable diaper **1** (shown in Figs. 2 and 3) one over the other, with the former placed inside of the latter. The disposable diaper **1** has the shape of an hourglass and consists of a front part **1A** (faces the abdomen of the wearer in use), a rear part **1B** (faces the hip or back of the wearer in use), and a middle part **1C** (faces the groin in use).

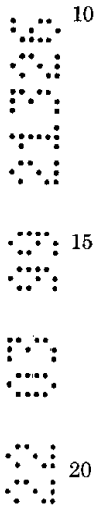
10 The disposable diaper **1** has a liquid-permeable inner layer **2** and a liquid-impermeable outer layer **3**, with an absorbent body **4** interposed between them. The absorbent body **4**, which has the shape of an hourglass, is formed from crushed pulp or a mixture of crushed pulp and SAP and is enclosed with an absorbing sheet such as tissue.

15 The middle part **1C** of the disposable diaper **1** has longitudinally extending elastic bodies **5** at its side edges and between the inner layer **2** and the outer layer **3**, so that the elastic bodies **5** form gathers **6** when they shrink.

20 The inner layer **2** of the rear part **1B** has fasteners (hooks) **7** at its edges. The outer layer **3** of the front part **1A** also has fasteners (piles) **8**. To wear the disposable diaper **1**, the fasteners **7** and **8** are engaged with each other around the waist of the wearer.

25 Although the disposable diaper **1** described herein is an example of the open type, the urine-absorbent pad **20** of the invention may also be used in combination with a disposable diaper of the pants type in which the front part **1A** and the rear part **1B** are bonded together at their edges.

If the user can frequently change the absorbent pad, for example, during the daytime, the urine-absorbent pad **20** is used with the covering sheet **27**

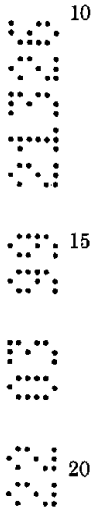


attached. In this embodiment, as shown in **Fig. 1(B)**, the openings **22a** in the backing layer **22** remain closed by the covering sheet **27** which is fixed by the adhesive layer **26** formed around the openings **22a**. Therefore, the openings **22a** (liquid-passing areas (a)) are completely closed and urine does not leak from the urine-absorbent pad **20** through the openings **22a**.

The urine-absorbent pad **20** is placed on the inner layer **2** of the disposable diaper **1**, with the backing layer **22** facing the disposable diaper **1**, as shown in **Figs. 2** and **3**. In this embodiment, to prevent the urine-absorbent pad **20** from slipping out of place, the backing layer **22** may be provided with another adhesive layer **28** as another adhesive means which does not face the covering sheet **27**, as shown in **Fig. 1(B)**, and adheres to the inner layer **2** of the disposable diaper **1**. Alternatively, the adhesive layer **28** may be formed on the covering sheet **27**. In this case, the adhesive force by the adhesive layer **28** between the covering sheet **27** and the inner layer **2** should be weaker than the force by the adhesive layer **26** between the backing layer **22** and the covering sheet **27**, so that the covering sheet **27** will not accidentally be removed from the urine-absorbent pad **20** when the urine-absorbent pad **20** is removed from the disposable diaper **1**.

The urine-absorbent pad **20**, with the covering sheet **27** attached, functions in the same way as a conventional urine-absorbent pad. If the absorbent core **23** has a capacity to absorb about 300 cc of urine, there will be little leakage from the urine-absorbent pad **20** after urinary incontinence (one or two episodes), assuming that about 150 cc of urine is excreted each time. If the urine-absorbent pad **20** is replaced whenever incontinence occurs, little or no urine reaches the absorbent body **4** of the disposable diaper **1**. Thus, the disposable diaper **1** can be used continuously without being soiled.

Alternatively, when the ability to change the urine absorbent pad is limited, for example, during periods of sleep, the urine-absorbent pad **20** is placed on the disposable diaper **1** (as shown in **Figs. 2** and **3**), with the covering sheet **27** removed (as shown in **Fig. 1(C)**). The covering sheet **27** can be removed easily by

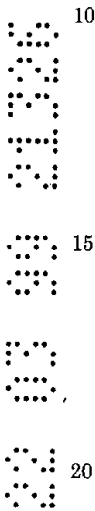


pulling the tab **27a** projecting from it as shown in **Fig. 1 (B)**. After the covering sheet **27** has been removed, the adhesive layer **26** on the backing layer **22** is exposed and adheres to the inner layer **2** of the disposable diaper **1**, thereby preventing the urine-absorbent pad **20** from slipping out of place. Incidentally, if the adhesive layer **28** is
 5 formed on the backing layer **22**, it also helps the urine-absorbent pad **20** to adhere to the disposable diaper **1**.

When the covering sheet **27** is removed, the openings **22a** in the backing layer **22** open to form the liquid-passing areas (**a**), and the absorbent core **23** is exposed through these openings **22a**. Therefore, when the urine-absorbent pad **20** is placed on the disposable diaper **1** as shown in **Fig. 3**, the absorbent core **23** faces the inner layer **2** of the disposable diaper **1** through the openings **22a**.

The flow of urine in the embodiment described above is illustrated in **Fig. 4**, which is a sectional view taken along the line IV-IV in **Fig. 3**. The absorbent core **23** of the urine-absorbent pad **20** absorbs a large portion of urine but permits any remaining urine to pass through the openings **22a** (liquid-passing areas (**a**)) in the backing layer **22** to be absorbed by the absorbent body **4** of the disposable diaper **1**. Assuming that the amount of urine is about 150 cc when incontinence occurs once, about 100 cc will be absorbed by the absorbent core **23** of the urine-absorbent pad **20** and the remaining 50 cc will be absorbed by the absorbent body **4** of the disposable diaper **1**. Upon passing through the openings **22a**, the urine moves mostly to the center of the absorbent body **4** where it is absorbed. Therefore, urine will not leak at the sides or the gathers **6** of the disposable diaper **1**.

In the case where incontinence occurs several times (e.g., more than two times) and the total amount of urine is greater than 300 cc, e.g., about 450 cc, the absorbent core **23** of the urine-absorbent pad **20** absorbs about 300 cc of urine and the absorbent body **4** of the disposable diaper **1** absorbs the remaining 150 cc of urine. Even if incontinence is more frequent, excess urine will move to the absorbent body **4** of the disposable diaper **1**. Therefore, side leakage of urine can be effectively prevented even in the case of frequent incontinence.



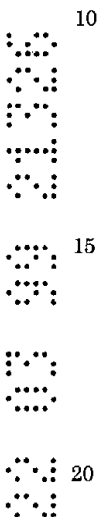
The absorbent core **23** of the urine-absorbent pad **20** becomes almost saturated with urine after incontinence has occurred two or three times. If the urine-absorbent pad **20** is replaced at this stage, the disposable diaper **1** is still usable because the absorbent body **4** of the disposable diaper **1** has not yet absorbed urine to its full capacity. Therefore, frequent replacement of the disposable diaper **1** can be prevented.

Two or more urine-absorbent pads **20** (with the covering sheet **27** removed) may be placed on the inner layer **2** of the disposable diaper **1**, as indicated by dotted lines in **Fig. 4**. In this embodiment, urine is absorbed by each absorbent core **23** of the urine-absorbent pad **20**. Thus, it is possible to increase the capacity for absorbing urine and to prevent soiling of the disposable diaper **1** by the urine even where there is frequent incontinence.

The urine-absorbent pad **20** described above is designed to be used in a stretched form, having a slight curve. However, it may be so folded as to enclose a penis as shown in **Fig. 5**. In this embodiment, the urine-absorbent pad **20** is folded into a cone shape with the facing layer **21** inside and the lengthwise edges overlapped. This embodiment may be accomplished by bonding the outside of one lengthwise edge of the urine-absorbent pad **20** to the inside of the other lengthwise edge of the urine-absorbent pad **20** using an adhesive layer **28** (such as double-sided adhesive tape). The penis is inserted into the conically folded pad, which pad is subsequently covered with the disposable diaper **1**.

If the pad can be changed frequently, the urine-absorbent pad **20**, which has been folded for males, is used with the openings **22a** closed by the covering sheet **27**.

When frequent changing of the pad is not available, the urine-absorbent pad **20** thus folded for males is used with the covering sheet **27** removed so that the openings **22a** of the backing layer **22** are exposed. In this case, the urine-absorbent pad **20** should be positioned such that the openings **22a**, face the inner layer **2** of the disposable diaper **1**. The result is the same as that explained above with



reference to **Fig. 4**. The excess urine which is not absorbed by the absorbent core **23** of the urine-absorbent pad **20** passes through the openings **22a** to be absorbed by the absorbent body **4** of the disposable diaper **1**. Thus, it is possible to cope with frequent episodes of incontinence.

5 In another embodiment of the absorbent article of the invention, the urine-absorbent pad may be modified as shown in **Figs. 6(A)** and **6(B)**. **Fig. 6(A)** is a plan view of the urine-absorbent pad, as viewed from the backing layer. **Fig. 6(B)** is a plan view of the urine-absorbent pad, with the covering sheet removed.

A urine-absorbent pad **30** shown in **Fig. 6(A)** is similar in structure to the urine-absorbent pad **20** shown in **Fig. 1(A)**. It has a facing layer and a backing layer, with an absorbent core interposed between them, and has gathers (formed by elastic members extending in the **Y** direction) on both of the side areas thereof. Therefore, it is made of the same materials and is used in the same manner as the absorbent pads described above.



The urine-absorbent pad **30** has a backing layer **31** which is made of liquid-impermeable resin film (such as polyolefin), similar to the backing layer **22** of the urine-absorbent pad **20**. The backing layer **31** has a number of openings **31a** which cover the absorbent core (or absorbing area) almost entirely, as shown in **Fig. 6(B)**. In other words, this embodiment is constructed such that the liquid passing area (**b**) coincides substantially with the absorbing area (the area containing the absorbent core). Incidentally, the openings **31a** may be formed in the entire area of the backing layer **31** although they are confined to the absorbing area in the this particular embodiment.

Each of the openings **31a** are preferably circular, with a diameter larger than 0.5 mm, preferably larger than 1 mm. The openings **31a** are preferably arranged with a pitch greater than 1 mm, preferably greater than 1.5 mm. The advantage of establishing the size and pitch of the openings **31a** as described above is that the liquid-passing area (**b**) of the urine-absorbent pad **30** can be recognized visibly. This avoids the possibility of mistaking an ordinary urine-absorbent pad, in which the

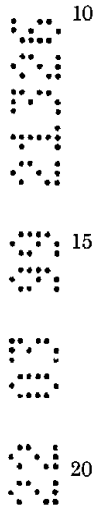
backing layer does not have the liquid-passing area, for one of the invention.

In the case of the urine-absorbent pad **30** in which the openings **31a** are so formed as to cover the absorbent core (or the absorbing area) almost entirely, it is necessary to provide an adhesive layer **32** as described below to ensure proper adhesion between the backing layer **31** of the urine-absorbent pad **30** and the inner layer **2** of the disposable diaper **1**. Thus, the adhesive layer **32** is preferably formed in the absorbing area (or the area in which the absorbent core exists). Assuming that the area in which the adhesive layer **32** is formed has dimensions of **L1** by **W1**, the length **L1** (**Y** direction) should be equal to or smaller than the length **L0** of the absorbent core but greater than 50% of the length **L0**. In addition, it is preferred that the total area of the adhesive layer **32** is less than 60% of the area of the absorbent core in order to ensure the smooth flow of urine from the backing layer **31** to the disposable diaper **1**.

When the urine-absorbent pad **30** is used in combination with a disposable diaper **1** for adults, it is preferred that the area (**L1** by **W1**) of the adhesive layer **32** includes the center of the urine-absorbent pad **30** (in the widthwise direction) and the width **W1** is within the range of 40 to 50 mm. The adhesive layer **32**, formed as described above, prevents the urine-absorbent pad **30** and the disposable diaper **1** from displacing each other when they shrink in the widthwise direction (**X** direction) in the wearer's groin. In addition, the adhesive layer **32** has little tendency to stick to the wearer's skin and hair.

It is preferable for the area (**L1** by **W1**) in which the adhesive layer **32** is formed to have a distance **W2** of at least 30 mm from the edges of the adhesive layer **32** to the edge of urine-absorbent pad **30**, and a length **L2** of at least 30 mm from the edge of the adhesive layer **32** to the edge of the urine-absorbent pad **30**. The adhesive layer **32** formed in this manner has little tendency to stick to the wearer's skin and hair when the edges of the urine-absorbent pad **30** are turned up to the groin.

Incidentally, in the embodiment of the urine-absorbent pad **20** shown in Fig. 1(C), it is preferable for the adhesive layer **26** to be formed in the same region as for the adhesive layer **32**.



The openings may be positioned and shaped as shown in **Figs. 7(A)** and **7(B)**. In **Fig. 7(A)**, comparatively large round (or elliptic) holes **31b** are formed in line extending in the lengthwise direction (**Y** direction) and approximately at the center of the urine-absorbent pad. In **Fig. 7(B)**, one large hole **31c** is formed almost equal to the absorbing area (or the area in which the absorbent core exists).

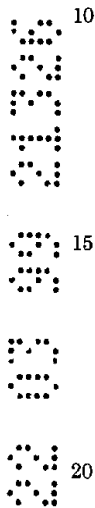
Figs. 8(A) and **8(B)** show another embodiment of the absorbent article according to the present invention embodied in a urine-absorbent pad. **Fig. 8(A)** is a plan view of a urine-absorbent pad as viewed from the backing layer thereof, with the covering sheet attached. **Fig. 8(B)** is a plan view of the urine-absorbent pad as viewed from the backing layer thereof, with the covering sheet removed.

A urine-absorbent pad **40** shown in **Fig. 8(A)** is similar in structure to the urine-absorbent pad **20** shown in **Fig. 1(A)**. Thus, it contains a liquid-permeable facing layer and a backing layer, with an absorbent core interposed between them, and has gathers (formed by elastic members extending in the **Y** direction) on both of the side areas thereof. It is used in the same manner as described above.

The urine-absorbent pad **40** has a backing layer **41** which is made of liquid-permeable fiber-interlaced nonwoven fabric of hydrophobic fibers and/or hydrophilic fibers with or without water-absorbing fibers such as rayon fibers. Therefore, the backing layer **41** as a whole is permeable to liquid and constitutes the liquid-passing area.

On the backing layer **41** strips are formed of a first adhesive layer **42** which extend parallel in the lengthwise direction (**Y** direction) at certain intervals in the widthwise direction (**X** direction), as shown in **Fig. 8(B)**. The first adhesive layer **42** as a first adhesive means is formed at the center of the backing layer **41** in the widthwise direction, so that it is positioned within the absorbing area in the widthwise direction. Preferably, the total area of the first adhesive layer **42** is adequately established relative to the area of the backing layer **41** so that it will not adversely affect the liquid passing function of the backing layer **41**.

Incidentally, the coating pattern of the first adhesive layer **42** is not



limited to a striped pattern, but may take on any shape, such as, for example, dots or spirals.

In addition, the backing layer **41** has second adhesive layers **43**, as a second adhesive means, which are formed at the side areas thereof (gathers are included in the side areas) and extend in the lengthwise direction (**Y** direction). The first adhesive layer **42** and the second adhesive layers **43** allow a single covering sheet **44** to be attached to and cover the entire surface of the liquid-permeable backing layer **41**, as shown in **Fig. 8(A)**. The covering sheet **44** is formed from a liquid-impermeable, breathable resin sheet such as polyolefin. Since the side portions of the covering sheet **44** in the widthwise direction are attached to the backing layer **41** by the second adhesive layers **43**, the covering sheet **44**, together with the backing layer **41** and the facing layer, form gathers by the shrinking force of the elastic members.

The first adhesive layer **42** preferably exhibits a prescribed adhesive force when the covering sheet **44** is removed. To accomplish this, the first adhesive layer **42** is formed by coating with a gum adhesive or acrylic resin. In contrast, the second adhesive layers **43** should have a moderate adhesive force, such that the covering sheet **44** can be removed easily by hand and should exhibit very little adhesive force once the covering sheet **44** has been removed. To accomplish this, the second adhesive layers **43** are formed from a hot-melt adhesive of EVA or polyolefin. Thus, the second adhesive layers **43** are stronger than the first adhesive layer **42** in adhering to the covering sheet **44**, but exhibit a weaker adhesive force than the first adhesive layer **42** once the covering sheet **44** has been removed.

The first adhesive layer **42** and the second adhesive layers **43**, as described above, prevent the covering sheet **44** from inadvertently being removed or peeling off, because the side portions of the covering sheet **44** are attached to the backing layer **41** by the second adhesive layers **43**. When the covering sheet **44** is removed from the backing layer **41**, the first adhesive layer **42** (in a striped pattern) appears at the center (in the widthwise direction) of the backing layer **41** and adheres to the inside of the disposable diaper **1**, thereby preventing the urine-absorbent pad

from slipping out of place. In this case, the second adhesive layers **43** exhibit very little adhesive force and therefore do not adhere to the wearer's skin or hair even when the side areas of the urine-absorbent pad **40** are facing the groin.

A third adhesive layer **45** as a third adhesive means may be formed on the covering sheet **44** as shown in Fig. 8(A). When the urine-absorbent pad **40** is used with the covering sheet **44** attached, and in combination with the disposable diaper **1**, the inner layer **2** of the disposable diaper **1** is fastened (bonded) to the third adhesive layer **45** so that the urine-absorbent pad **40** stays in position. It is important that the adhesive force of the third adhesive layer **45**, when applied to the inner layer **2**, is weaker than that of the second adhesive layers **43** applied to the covering sheet **44**. This embodiment aids in preventing the covering sheet **44** from inadvertent removal from the backing layer **41** when the urine-absorbent pad **40** is removed from the disposable diaper **1**.



Another embodiment of the urine-absorbent pad **40a** is shown in Fig. 9, which is a plan view showing the pad with the covering sheet removed. The urine-absorbent pad **40a** is identical in structure to the urine-absorbent pad **40** described above, except that the backing layer **41** has side layers **46** which are formed from a liquid-impermeable resin sheet or from a hydrophobic, highly water-resistant nonwoven fabric and the second adhesive layers **43**, formed on the side layers **46**. That is, the side layers **46** are disposed on both side areas of the backing layer **41** in the widthwise direction and between the backing layer **41** and the covering sheet. The side layers **46** are bonded to the backing layer **41** by a hot-melt adhesive. With the covering sheet removed, the side layers **46** appear on both the side areas of the urine-absorbent pad **40a** including the gathers.

When this embodiment of the urine-absorbent pad **40a** is used with the covering sheet removed, and in combination with the disposable diaper **1**, the liquid-impermeable side layers **46** prevent urine from flowing to the disposable diaper **1**, at both side areas of the urine-absorbent pad **40a**. Consequently, urine passing through the absorbent core of the urine-absorbent pad **40a** reaches the center of the

absorbent body 4 of the disposable diaper 1. Thus, urine has little or no tendency to leak from the sides of the disposable diaper 1.

While the invention has been described in detail in its preferred embodiments, it should be understood that other embodiments may be prepared within the scope of the claims.

For example, an adhesive layer is not the only means that can be used to fasten together the urine-absorbent pad and the inner layer of the disposable diaper. It may be replaced by a mechanical means such as hooks attached to the backing layer, which engage with the nonwoven fabric of the inner layer of the disposable diaper to prevent the urine-absorbent pad from slipping out of place.

In the embodiment of the urine-absorbent pad for males only, the pad may be pre-formed in the shape of a cone or cylinder during the production process, with the liquid-passing area formed on the outside thereof.

The absorbent article of the present invention is not limited to the urine-absorbent pad, but also includes other absorbent articles, including sanitary napkins and may be used in combination with one another.

As used herein, "comprises" and all its grammatical forms specifies the presence of stated features, integers, steps or components, but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

"Comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A urine-absorbent pad to be worn inside of a disposable diaper, including:
 a liquid-permeable facing layer to face the wearer in use,
 a backing layer to be directed toward the diaper in use, said backing layer being formed of a liquid-impermeable sheet and having a plurality of openings made therein,
 an absorbent core interposed between the facing layer and backing layer,
 and
 a removable, liquid-impermeable covering sheet to close the openings, said covering sheet being attached to the backing layer through an adhesive means for maintaining the covering sheet in place and providing an adhesive force to the surface of the diaper after the covering sheet is removed,
 wherein the openings are arranged to form a liquid-passing area in substantial communication with an absorbing area where the absorbent core exists, and the adhesive means is applied to the backing layer within the absorbing area in such a manner that the adhesive means occupies less than 60% the absorbing area and the adhesive means is in a striped pattern to extend along the lengthwise direction of the absorbing area in a range of from more than 50% to 100% the length of absorbing area.

2. The urine-absorbent pad of claim 1,
 wherein the adhesive means is arranged away from each edge of the urine-absorbent pad by at least 30 mm.

3. A urine-absorbent pad to be worn inside of a disposable diaper, including:
 a liquid-permeable facing layer to face the wearer in use,
 a liquid-permeable backing layer to be directed toward the diaper in use,
 an absorbent core interposed between the facing layer and backing layer,
 and



a removable, liquid-impermeable covering sheet to cover the entire surface of the backing layer, said covering sheet being attached to the backing layer through an adhesive means for maintaining the covering sheet in place and providing an adhesive force to the surface of the diaper after the covering sheet is removed,

wherein the adhesive means includes a first adhesive means and a second adhesive means, the second adhesive means being located on both sides of the urine-absorbent pad and the first adhesive means being located inwardly from the second adhesive means, and

wherein the second adhesive means exhibits a stronger adhesive force to the covering sheet than the first adhesive means, but the first adhesive means exhibits a stronger adhesive force to the surface of the diaper than the second adhesive means after the covering sheet is removed.

4. The urine-absorbent pad of claim 3,

wherein the first adhesive means is a gum adhesive or acrylic resin coated in a striped pattern, and the second adhesive means is a hot-melt adhesive of EVA or polyolefin.

5. The urine-absorbent pad of claim 3,

wherein liquid-impermeable side layers are disposed on both sides of the backing layer, and

wherein the first adhesive means is disposed on the backing layer and the second adhesive means is disposed on the side layers.



6. The urine-absorbent pad of claim 3,
wherein the covering sheet is provided with a third adhesive means for exhibiting an adhesive force to the diaper when the urine-absorbent pad is applied to the diaper through the covering sheet, and
wherein the adhesive force of the third adhesive means to the diaper is weaker than the adhesive force of the second adhesive means to covering sheet.

DATED this 20th day of February, 2001

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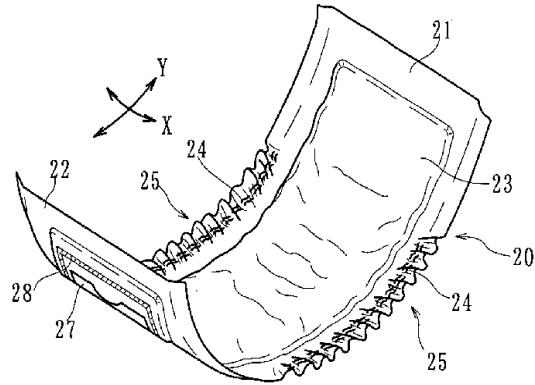


Fig. 1(A)

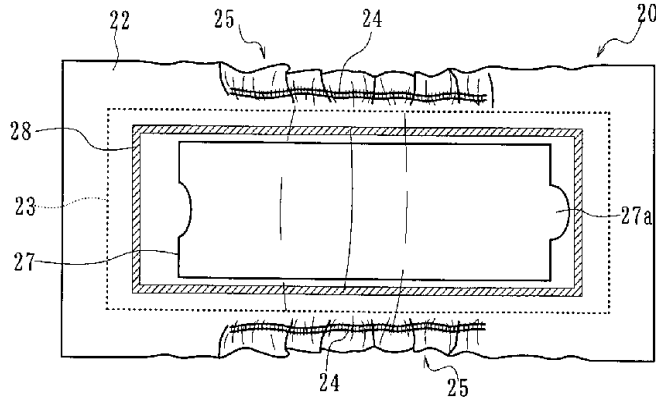


Fig. 1(B)

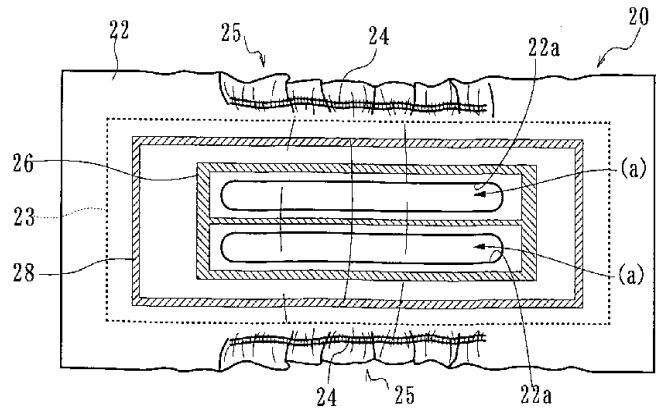


Fig. 1(C)



Fig. 2

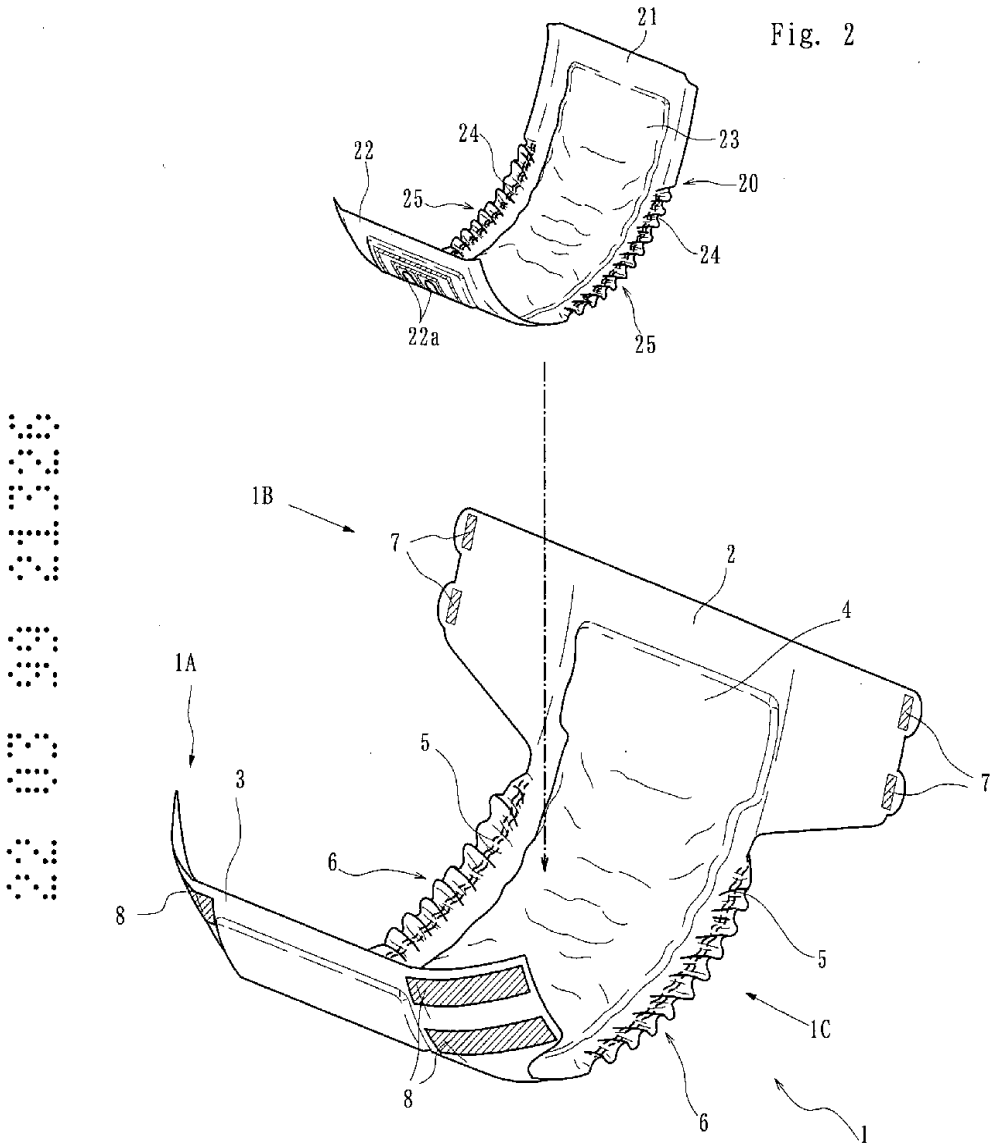


Fig. 3

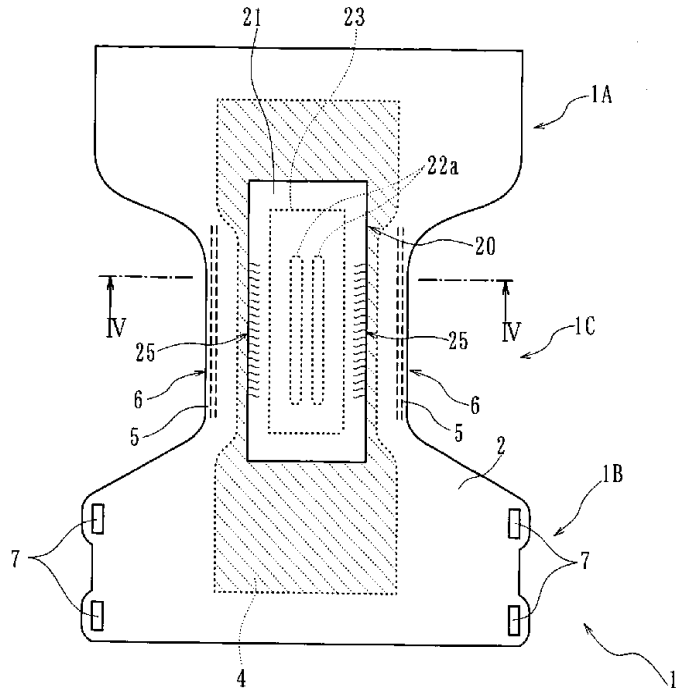


Fig. 4

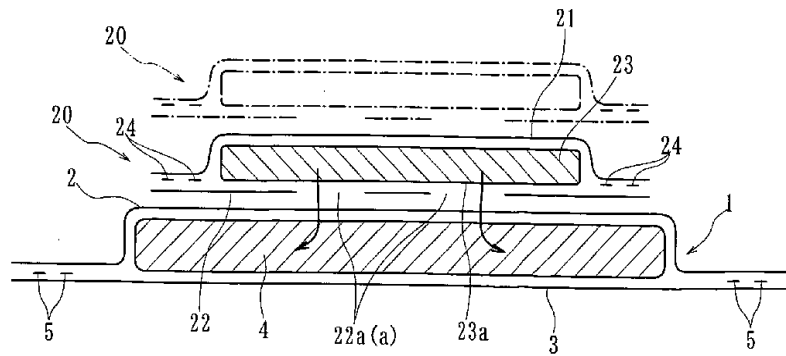


Fig. 5

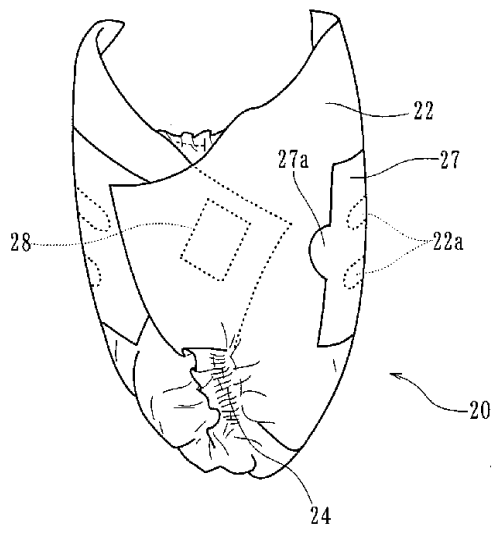


Fig. 6(A)

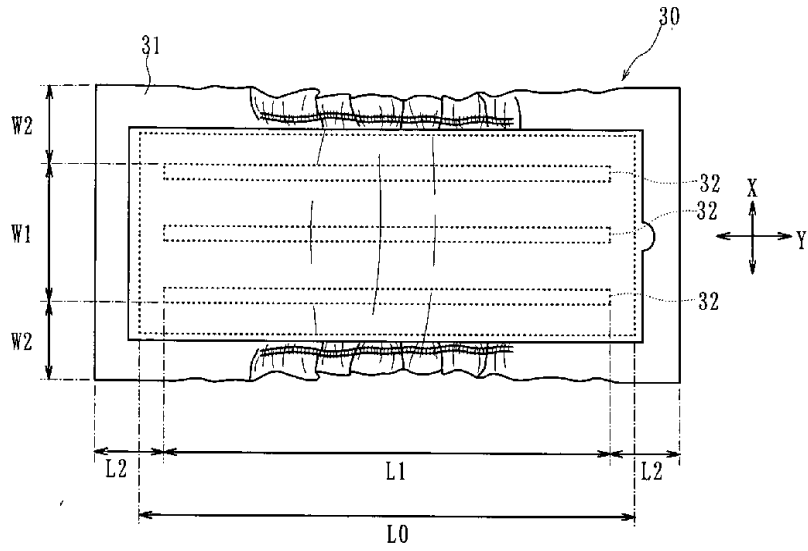


Fig. 6(B)

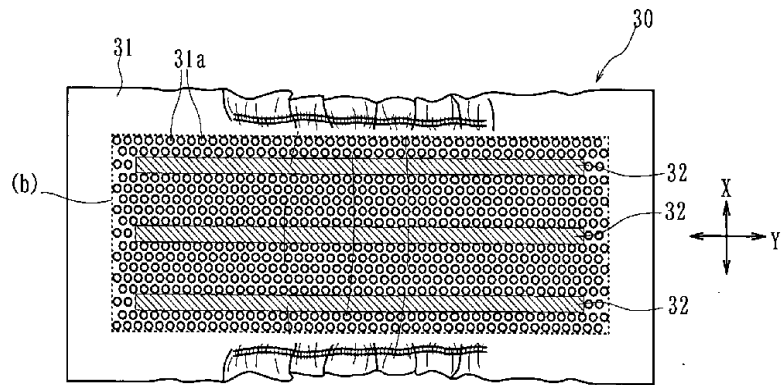


Fig. 7(A)

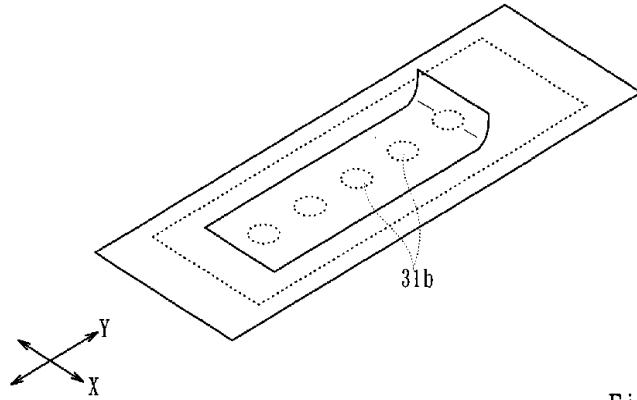


Fig. 7(B)

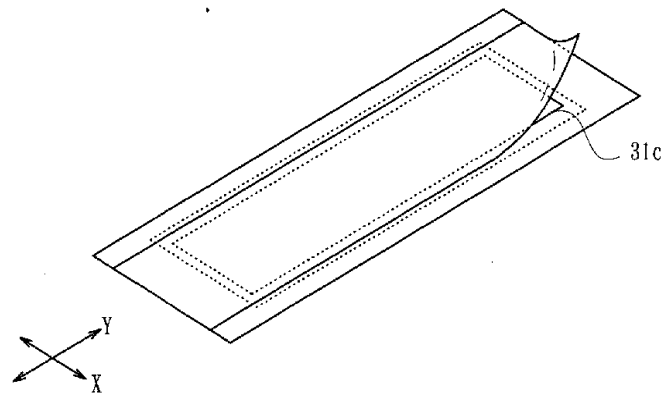


Fig. 8(A)

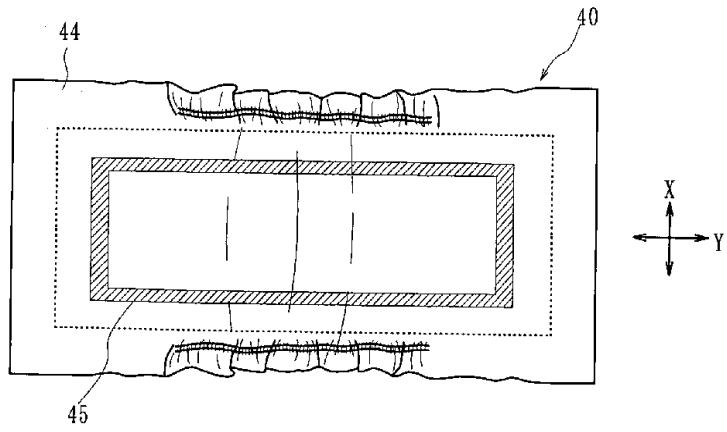


Fig. 8(B)

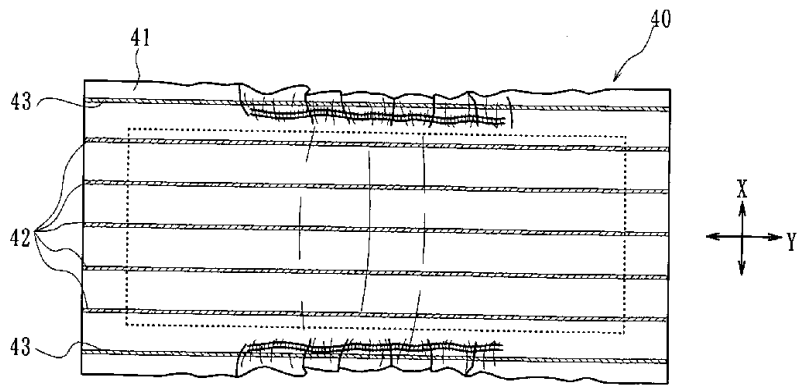


Fig. 9

