

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199964417 B2
(10) Patent No. 768305

(54) Title
Absorbent hot melt adhesive

(51) ⁶ International Patent Classification(s)
C09J 011/08 A61L 015/34
A61L 015/24 A61L 015/58
A61L 015/26

(21) Application No: 199964417 (22) Application Date: 1999.12.09

(30) Priority Data

(31) Number	(32) Date	(33) Country
09/217318	1998.12.21	US

(43) Publication Date : 2000.06.22

(43) Publication Journal Date : 2000.06.22

(44) Accepted Journal Date : 2003.12.04

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(56) Related Art
EP 658351
US 5372870
EP 802251

ABSTRACT OF THE INVENTION

5 A hot-melt adhesive containing fluid absorbing
polymers and non-absorbing polymers is optionally
blended with super-absorbent polymers. The resulting
thermoplastic hot-melt adhesive material can be used to
adhesively bond substrates such as polymeric films
together, as well as, to provide additional liquid
10 absorption capacity to non-woven fabrics or absorbent
structures. This adhesively coated material is
particularly useful in the construction of absorbent
products such as catamenial devices, wound dressings,
bandages, and diapers and the like.



AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Invention Title: 'ABSORBENT HOT MELT ADHESIVE'

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

File: 26405AUP00

ABSORBENT HOT MELT ADHESIVE

FIELD OF THE INVENTION

The present invention relates to a novel adhesive and more particularly to a hot-melt adhesive which is capable of absorbing liquids.

5 BACKGROUND OF THE INVENTION

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

Absorbent articles such as catamenial pads, diapers, bandages, nursing pads and
10 the like generally contain an absorbent element. The absorbent element of conventional disposable articles is typically formed from a fiberized wood pulp fluff or absorbent non-woven and/or other synthetic or natural absorbent materials such as peat moss or super-absorbent polymers. The absorbent element is covered with a soft, flexible liquid permeable topsheet which allows body fluid to be absorbed into the fluid retaining
15 absorbent element. Typically a fluid impermeable backsheet is adhesively affixed to the liquid permeable topsheet around a peripheral edge margin to form a flange seal and thereby fully enclose the absorbent element to prevent fluid leakage.

Hot melt adhesives are typically used in the construction of absorbent articles to attach the liquid permeable topsheet to the absorbent element and also to attach the fluid
20 impermeable backsheet to the element. In addition, hot melt adhesives are also used in the construction of the absorbent structures to laminate multiple plies together or to adhesively affix absorbent particles to a non-woven fabric or fibrous pulp.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome or ameliorate at least one of
25 the disadvantages of the prior art, or to provide a useful alternative.

Accordingly, the present invention provides a novel hot-melt adhesive that is capable of absorbing aqueous liquids which comprises:

about 10% to about 50% of a block copolymer;

about 20% to about 80% of a tackifying resin; and

5 about 1% to about 60% of an aqueous liquid-absorbing polymer.

Also provided in accordance with the present invention is an absorbent article, the absorbent article comprising a liquid permeable topsheet, a liquid impermeable barrier sheet, an absorbent element between the topsheet and the barrier sheet, wherein either the topsheet or the barrier sheet is adhered to the absorbent element with a hot
10 melt adhesive that is capable of absorbing aqueous liquids and which further comprises:

about 10% to about 50% of a block copolymer;

about 20% to about 80% of a tackifying resin; and

about 1% to about 60% of an aqueous liquid-absorbing polymer.

Also provided in accordance with the present invention is an absorbent article,
15 the absorbent article comprising a liquid permeable topsheet, a liquid impermeable barrier sheet, an absorbent element between the topsheet and the barrier sheet, wherein at least a portion of the absorbent element contains a hot melt adhesive that is capable of absorbing aqueous liquids and which further comprises:

about 10% to about 50% of a block copolymer;

20 about 20% to about 80% of a tackifying resin; and

about 1% to about 60% of an aqueous liquid-absorbing polymer.

Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the
25 sense of "including, but not limited to".

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top plan view of a sanitary napkin having a pattern coating.

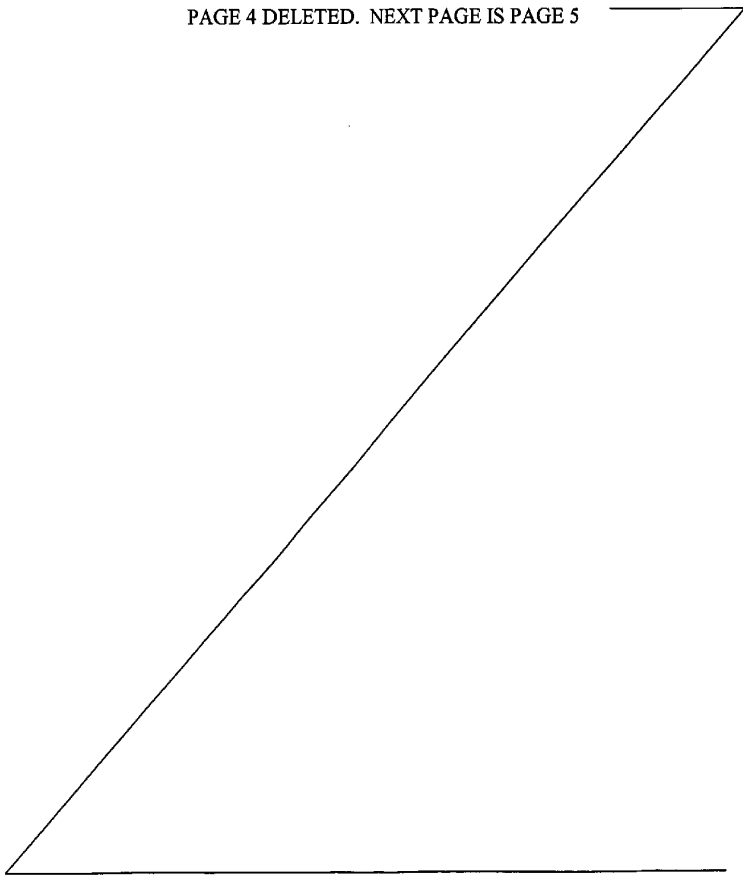
Fig. 2 is a side view of the sanitary napkin in Figure 1 taken through line A-A showing the adhesive applied between a cover layer and an absorbent element.

5 Fig. 3 is a top plan view of a sanitary napkin having a zone coating.

Fig. 4 is a top plan view of a sanitary napkin having a foamed adhesive in a pattern which forms side and end gaskets.

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Also provided in accordance with the present invention is an absorbent article, the absorbent article comprising a liquid permeable topsheet, a liquid impermeable barrier sheet, an absorbent element between the topsheet and the barrier sheet, wherein at least a portion of the absorbent element contains a hot melt adhesive which further comprises:

- about 10% to about 50% of a block copolymer;
- about 20% to about 80% of a tackifying resin; and
- about 1% to about 60% of an aqueous liquid-absorbing polymer.

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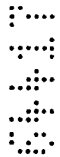
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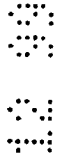
5 Fig. 5 is a side view of the sanitary napkin of Figure 4 taken through line B-B showing the adhesive applied on an upper surface of a cover layer of the napkin.

Fig. 6 is a top plan view of a sanitary napkin having a multi-line adhesive pattern.

10 Fig. 7 is a side view of the sanitary napkin of figure 6 taken through line C-C showing the adhesive applied between a barrier layer and an absorbent element.



15 Fig. 8 is a top plan view of a sanitary napkin having adhesive applied in a curved line pattern adjacent each longitudinal side edge and transverse end region of the napkin.



20 Fig. 9 is a top plan view of a sanitary napkin having adhesive applied in a curved line pattern which forms a closed perimeter around a center region of the sanitary napkin.



25 Fig. 10 is a top plan view of a sanitary napkin having adhesive applied in an hour glass pattern in a central region of the napkin.

Fig. 11 is a top plan view of a sanitary napkin having adhesive applied as a pair of substantially parallel lines adjacent each longitudinal side edge of the napkin.

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Fig. 12 is a side view of the sanitary napkin of Figure 11 taken through lines D-D of Figure 11 showing the adhesive applied between a cover layer and an absorbent element of the napkin.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to hot melt adhesives, and more particularly to hot melt adhesives which are useful in the construction of absorbent articles such as catamenial pads, diapers, breast pads, surgical pads and bandages. Unlike traditional hot melt adhesives that are hydrophobic in nature, the hot-melt adhesives of the present invention readily absorb aqueous fluids such as saline and menstrual fluid. The hot melt adhesives of the present invention are formed from a blend of about 10% to about 50% of a block copolymer; about 20% to about 80% of a tackifying resin; and about 1% to about 60% of an aqueous liquid-absorbing polymer. The hot melt adhesives of the present invention may optionally contain absorbent thermoplastic polymers, super absorbent particles, tackifiers and plasticizers.

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In a preferred embodiment, the hot melt adhesives of the present invention comprise (by weight):

- 5 about 10 - 50% block copolymer;
- about 20 - 80% tackifying resin;
- about 1 - 60% aqueous liquid absorbing polymer;
- about 0 - 40% plasticizer; and
- about 0 - 2.0% antioxidant.

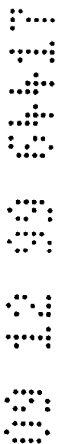
10 Suitable block copolymers for use in the invention include linear or radial co-polymer structures having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and
15 wherein x is an integer greater than or equal to one. Suitable block A polyvinylarenes include, but are not limited to Polystyrene, Polyalpha-methylstyrene, Polyvinyltoluene, and combinations thereof. Suitable
20 Block B poly(monoalkenyl) blocks include, but are not limited to conjugated diene elastomers such as for example polybutadiene or polyisoprene or hydrogenated elastomers such as ethylene butylene or ethylene propylene or polyisobutylene, or combinations thereof. Commercial examples of these types of block copolymers
25 include Kraton™ elastomers from Shell Chemical Company, Vector™ elastomers from Dexco, Solprene™ from Enichem Elastomers and Stereon™ from Firestone Tire & Rubber Co.



Suitable tackifying resins include natural and modified resins; glycerol and pentaerythritol esters of natural and modified resins; polyterpene resins; copolymers and terpolymers of natural terpenes; phenolic modified terpene resins and the hydrogenated derivatives thereof; aliphatic petroleum resins and the hydrogenated derivatives thereof; aromatic petroleum resin and the hydrogenated derivatives thereof; and aliphatic or aromatic petroleum resins and the hydrogenated derivatives thereof, and combinations thereof. Commercial examples of these types of resins include Foral® hydrogenated rosin ester, Staybelite® hydrogenated modified rosin, Poly-pale® polymerized rosin, Permalyn® rosin ester, Pentalyn® rosin ester, Adtac® oil extended hydrocarbon resin, Piccopale® aromatic hydrocarbon, Piccotac®, Hercotac® aromatic modified aliphatic hydrocarbon, Regalrez® cycloaliphatic resins, or Piccolyte® from Hercules, Eselementz® from Exxon Chemical aliphatic hydrocarbon and cycloaliphatic resins, Wingtack® from Goodyear Tire & Rubber Co. synthetic polyterpene resins including aromatic modified versions, Arkon® partially and fully hydrogenated aromatic resins from Arakawa Chemicals, Zonatac® styrenated terpene resin, Zonarez® rosin ester and Zonester® rosin ester from Arizona Chemical and Nevtac® aromatic modified aliphatic hydrocarbon from Neville Chemical Company.



Suitable aqueous liquid absorbing polymers include thermoplastic hydrogels such as superabsorbent materials or thermoplastic polymeric compositions, which are formed from a water-soluble soft segment and one or more hard segments. The hard segment must be melt processable, i.e. at use temperature the hard segments in the polymer are below their melt temperature, and at process temperature, the hard segments are above their melting point temperature and below the decomposition temperature of either the other components of the hot-melt adhesive composition. The hard segment is substantially insoluble in water, and phase separates from the soft segment. Examples of suitable hard segments include, but are not limited to polyurethane, polyamides, polyesters, polyureas, and combinations thereof. Examples of suitable soft segments include, but are not limited to polyethylene oxide, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylamide, polysaccharide, polymaleic anhydride, random copolymers of polyethylene oxide and polypropylene-oxide and combinations thereof. The soft and hard segments may be covalently bonded together by means of urethane, amide, ester, or secondary urea linkages or combinations thereof. Examples of aqueous liquid absorbing thermoplastic polymeric compositions which are commercially available include hydrophilic polyurethane from Tyndale Plains-Hunter Ltd. and Aquacaulk®



thermoplastic polymers from Sumitomo Seika Chemicals Co., Ltd.

5 Suitable superabsorbent materials include any of
the conventional superabsorbent particles or
superabsorbent fibers which are commercially available
today. The superabsorbent material is preferably a
superabsorbent particle having an average particle size
less than 150 microns. An example of which is Aquatech®
10 J-550P from Absorbent Technologies Inc.

 Suitable plasticizers for use in the present
invention generally will include any conventional
15 plasticizers which decrease hardness and modulus,
enhance pressure sensitive tack and reduce melt and
solution viscosity. It is preferred that the plasticizer
be water soluble or water dispersible or alternatively
be a wax-like substance such as polyethylene glycol,
glycerin, glycerol, polypropylene glycol, butylene
20 glycol or sorbitol. An example of a preferred plasticizer
is Carbowax® polyethylene glycol from Union Carbide.

 Suitable anti-oxidants for use in the present
invention include any conventional anti-oxidants, and
25 are preferably hindered phenols such as for example
Ethanox 330™ 1,3,5-trimethyl-2,4,6-tris(3,5-di-tert-
butyl-4-hydroxybenzyl)benzene which is commercially
available from the Ethyl Corporation.

The hot melt adhesives of the present invention may be formed by blending the block copolymer, the tackifying resin and the aqueous liquid-absorbing polymer in a suitable adhesive processing equipment such as a melt mixer or extruder at a temperature above their respective melting points until uniformly mixed. The hot melt adhesive may be applied to substrates using conventional adhesive application equipment such as a hot melt adhesive slot coating head, a hot melt adhesive swirl spray applicator (a commercial example of which is a Nordson Control Fiberization®), using a hot melt adhesive micro fiber applicator (commercial examples of these applicators include Nordson Control Coat®, ITW Dynafiber®, J&M Meltblown, and May Coating's Accufiber®), using a hot melt adhesive rotary screen applicator to create a pattern coating (examples of this equipment include Nordson and Kraemer rotary screen technology).

Referring to Figure 1, there is shown an absorbent article, which for purposes of illustration is a sanitary napkin 1 having opposite longitudinal sides 2, 3 and opposite transverse ends 4, 5. Referring to Figure 2, the sanitary napkin 1 of Figure 1 is shown in cross section, having an upper, body facing, cover layer 10, a lower garment facing, barrier layer 20 and absorbent element 30 between the cover layer 10 and



barrier layer 20. Liquid absorbing hot melt adhesive 40 adheres the cover layer 10 to the absorbent element 30 in a pattern coated absorbency zone 50 in a substantially rectangular pattern. The hot melt adhesive may alternatively be located between the absorbent element 30 and the barrier layer 20 (not shown). Other adhesive patterns and application locations are illustrated in Figures 3 to 12.

For example, Figure 3, shows a top plan view of an absorbent article 301 having cover layer 310, opposite longitudinal sides 302, 303 in an hour-glass configuration and opposite transverse ends 304, 305. Liquid absorbing hot melt adhesive 40 is zone coated in absorbency zone 350 in a substantially rectangular pattern.

In the embodiment of the invention illustrated in Figures 4 and 5, there is shown sanitary napkin 401 having cover layer 401, barrier layer 410, absorbent element 430, transfer layer 470, and aqueous liquid absorbing hot melt adhesive 440 which has been foamed by mixing the adhesive with an inert gas. The foamed adhesive is then metered and dispensed through a nozzle onto a substrate, in this case the cover layer of a sanitary napkin. This technology is commercially available from the Nordson Corporation using their FoamMelt® processors and is disclosed more fully in



Dilnik et al., U.S. Patent No. 5,807,367, which is incorporated herein in its entirety. As shown in Figure 4, the foamed hot melt adhesive 440 has been applied to the body facing cover layer adjacent the longitudinal sides of the sanitary napkin 401 to form side gaskets 450, 451 and end gaskets 460, 461. The hot melt adhesive 440 may alternatively be applied between the cover layer 410 and the subjacent absorbent element 430 (not shown).

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Referring to Figures 6 and 7, there is shown an absorbent article, which for purposes of illustration is a sanitary napkin 601 having opposite longitudinal sides 602, 603 and opposite transverse ends 604, 605.

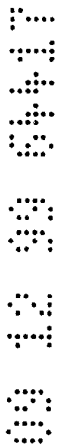
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Referring to Figure 7, the sanitary napkin 601 of Figure 6 is shown in cross section, having an upper, body facing, cover layer 610, a lower garment facing, barrier layer 620 and absorbent element 630 between the cover layer 610 and barrier layer 620. Liquid absorbing hot melt adhesive 640 adheres the barrier layer 620 to the absorbent element 630 in a multi-line coated absorbency zone 650 in a substantially rectangular pattern.

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Figure 8 shows a top plan view of an absorbent article 801 having cover layer 810, opposite longitudinal sides 802, 803 in an hour-glass configuration and opposite transverse ends 804, 805. Liquid absorbing hot melt adhesive 840 is applied in a curved line pattern to form opposite side absorbency



zones 841, 842 and opposite transverse end absorbency zones 843, 844.

5 Figures 9 and 10 show top plan view of absorbent articles 901, 920, respectively, having an adhesive pattern in a substantially hour-glass shape. Figure 9 has cover layer 910, opposite longitudinal sides 902, 903 in an hour-glass configuration and opposite transverse ends 904, 905. Referring again to Figures 9 and 10, liquid absorbing hot melt adhesive 940, 960 is applied to the article to form an hour-glass shaped absorbency zone 950, 965 (respectively).

15 Referring to Figures 11 and 12, there is shown an absorbent article, which for purposes of illustration is a sanitary napkin 1101 having opposite longitudinal sides 1102, 1103 and opposite transverse ends 1104, 1105. Referring to Figure 12, the sanitary napkin 1101 of Figure 11 is shown in cross section, having an upper, body facing, cover layer 1110, a lower garment facing, barrier layer 1120 and absorbent element 1130 between the cover layer 1110 and barrier layer 1120. Liquid absorbing hot melt adhesive 1140 is adhered to the cover layer 1110 and to the absorbent element 1130 in a parallel line coated absorbency zone 1150.



Example 1

5 The aqueous liquid absorbing hot-melt adhesive of
the present invention was evaluated for its melt
viscosity, adhesive strength (peel strength as measured
on a polypropylene nonwoven fabric) and ability to
absorb an aqueous saline solution (absorbent capacity)
relative to a conventional hot melt adhesive. The
conventional hot-melt adhesive was commercially
10 available from the Fuller Company under the tradename
HL-1491™. This is a standard hot-melt adhesive that is
often used in the construction of absorbent articles
such as sanitary napkins, panty liners, diapers and the
like. The formulation of the conventional adhesive is
believed to be in the following approximate proportions:



- 15 15-20% of a styrene-isoprene-styrene block co-
polymer having a 30% styrene content;
- 60 - 70% aliphatic or aromatic modified aliphatic
tackifying resin
- 20 15-20% mineral oil
- < 2% anti-oxidant
- < 2% additional adjuncts (wax and polyethylene)

25 Two examples of the hot-melt adhesive of the
present invention had the following formulas:

- Sample A
- 5.7% block copolymer (Vector DPX-552™)

33.7% tackifying resin (Foral 85™)
10.0% aq. liquid absorbing polymer (Aquacaulk TQU-5™)
40.0% superabsorbent particles (Aquakeep J55-P™)
10.5% plasticizer (Peg 600™) and
0.5% antioxidant (Ethanox 330™).

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Sample B

15.0% block copolymer (Vector DPX-552™)
25.0% tackifying resin (Foral 85™)
0.0% aq. liquid absorbing polymer (Aquacaulk TQU-5™)
45.0% superabsorbent particles (Aquakeep J55-P™)
15.0% plasticizer (Peg 600™) and
0.5% antioxidant (Ethanox 330™).

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The results of the evaluation are provided in the following Table 1.



Table 1.

		Commercial Sample	Sample A	Sample B
5	Viscosity @ 177°C, 101,000 (Centipoise)	1100	10,000	
	Absorbent Capacity (g/g)	none	9.4	10.3
10	Peel Strength (lbs./in. width)	1.1	0.3	1.18

The commercially available hot-melt adhesive exhibited substantially no absorbency while the hot-melt adhesive of the present invention absorbed about 10 grams of liquid per gram of adhesive. Moreover, the adhesive composition of the present invention experienced no diminution of its adhesive strength.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A hot-melt adhesive that is capable of absorbing aqueous liquids which comprises:

- 5 about 10% to about 50% of a block copolymer;
 about 20% to about 80% of a tackifying resin; and
 about 1% to about 60% of an aqueous liquid-
 absorbing polymer.

10 2. The hot-melt adhesive according to claim 1 wherein
 the block copolymer is a linear or radial co-polymer
 structure having the formula $(A-B)_x$ wherein block A is a
 polyvinylarene block, block B is a poly(monoalkenyl)
 block, x denotes the number of polymeric arms, and
15 wherein x is an integer greater than or equal to one.

20 3. The hot-melt adhesive according to claim 2 wherein
 the block A polyvinylarenes is selected from the group
 consisting of Polystyrene, Polyalpha-methylstyrene,
 Polyvinyltoluene, and combinations thereof and wherein
 the Block B poly(monoalkenyl) blocks are selected from
 the group consisting of conjugated diene elastomers,
 hydrogenated elastomers and combinations thereof.

25 4. The hot-melt adhesive according to claim 3 wherein
 the conjugated diene elastomers are selected from the
 group consisting of polybutadiene and polyisoprene and
 wherein the hydrogenated elastomers are selected from

the group consisting of ethylene butylene, ethylene propylene, polyisobutylene and combinations thereof.

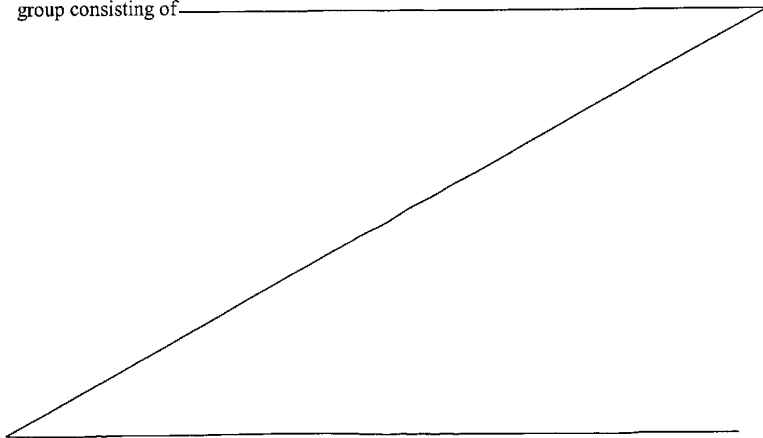
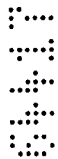
5 5. The hot-melt adhesive according to claim 1 wherein the hot melt adhesive further contains absorbent thermoplastic polymers, super absorbent particles, tackifiers and plasticizers.

10 6. The hot-melt adhesive according to claim 1 wherein the tackifying resins are selected from the group consisting of natural resins, modified resins, glycerol esters of natural resins, glycerol esters of modified resins, pentaerythritol esters of natural resins, pentaerythritol esters of modified resins; polyterpene resins, copolymers of natural terpenes, terpolymers of natural terpenes, phenolic modified terpene resins and hydrogenated derivatives thereof, aliphatic petroleum resins and hydrogenated derivatives thereof, aromatic petroleum resin and hydrogenated derivatives thereof, aliphatic petroleum resins, hydrogenated derivatives of aliphatic petroleum resins, aromatic petroleum resins, hydrogenated derivatives of aromatic petroleum resins, and combinations thereof.

25 7. The hot-melt adhesive according to claim 1 wherein the aqueous liquid absorbing polymers is selected from the group consisting of thermoplastic hydrogels and thermoplastic polymeric compositions which are formed

from a water-soluble soft segment and one or more hard segments.

8. The hot-melt adhesive according to claim 7 wherein the hard segments are selected from the group consisting of polyurethane, polyamides, polyesters, polyureas, polypropylene oxide and combinations thereof.
- 5 9. The hot-melt adhesive according to claim 7 wherein the soft segments are selected from the group consisting of polyethylene oxide, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylamide, polysaccharide, polymaleic anhydride, and random copolymers of polyethylene oxide and polypropylene-oxide.
10. An absorbent article comprising a liquid permeable topsheet, a liquid impermeable barrier sheet, an absorbent element between the topsheet and the barrier sheet, wherein either the topsheet or the barrier sheet is adhered to the absorbent element with a hot melt adhesive that is capable of absorbing aqueous liquids and which further comprises:
- 10 about 10% to about 50% of a block copolymer;
- about 20% to about 80% of a tackifying resin; and
- 15 about 1% to about 60% of an aqueous liquid-absorbing polymer.
11. The absorbent article according to claim 10 wherein the article is selected from the group consisting of _____



sanitary napkins, panty liners, adult incontinence devices and diapers.

5 12. The absorbent article according to claim 10 wherein the block copolymer is a linear or radial co-polymer structure having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and wherein x is an integer greater than or equal to one.

10 13. The absorbent article according to claim 12 wherein the block A polyvinylarenes is selected from the group consisting of Polystyrene, Polyalpha-methylstyrene, Polyvinyltoluene, and combinations thereof and wherein 15 the Block B poly(monoalkenyl) blocks are selected from the group consisting of conjugated diene elastomers, hydrogenated elastomers and combinations thereof.

20 14. The absorbent article according to claim 13 wherein the conjugated diene elastomers are selected from the group consisting of polybutadiene and polyisoprene and wherein the hydrogenated elastomers are selected from the group consisting of ethylene butylene, ethylene propylene, polyisobutylene and combinations thereof.

25 15. The absorbent article according to claim 10 wherein the hot melt adhesive further contains absorbent

thermoplastic polymers, super absorbent particles, tackifiers and plasticizers.

5 16. The absorbent article according to claim 10 wherein
the tackifying resins are selected from the group
consisting of natural resins, modified resins, glycerol
esters of natural resins, glycerol esters of modified
resins, pentaerythritol esters of natural resins,
10 pentaerythritol esters of modified resins; polyterpene
resins, copolymers of natural terpenes, terpolymers of
natural terpenes, phenolic modified terpene resins and
hydrogenated derivatives thereof, aliphatic petroleum
resins and hydrogenated derivatives thereof, aromatic
petroleum resin and hydrogenated derivatives thereof,
15 aliphatic petroleum resins, hydrogenated derivatives of
aliphatic petroleum resins, aromatic petroleum resins,
hydrogenated derivatives of aromatic petroleum resins,
and combinations thereof.

20 17. The absorbent article according to claim 10 wherein
the aqueous liquid absorbing polymers is selected from
the group consisting of thermoplastic hydrogels and
thermoplastic polymeric compositions which are formed
from a water-soluble soft segment and one or more hard
25 segments.

18. The absorbent article according to claim 17 wherein
the hard segments are selected from the group consisting

of polyurethane, polyamides, polyesters, polyureas, polypropylene oxide and combinations thereof.

19. The absorbent article according to claim 17 wherein the soft segments are selected from the group consisting of polyethylene oxide, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylamide, polysaccharide, polymaleic anhydride, and random copolymers of polyethylene oxide and polypropylene-oxide.

20. An absorbent article comprising a liquid permeable topsheet, a liquid impermeable barrier sheet, an absorbent element between the topsheet and the barrier sheet, wherein at least a portion of the absorbent element contains a hot melt adhesive that is capable of absorbing aqueous liquids and which further comprises:

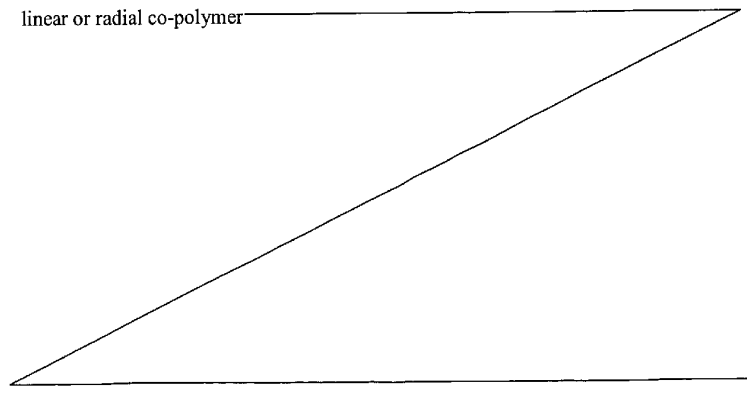
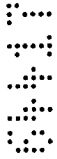
about 10% to about 50% of a block copolymer;

about 20% to about 80% of a tackifying resin; and

about 1% to about 60% of an aqueous liquid-absorbing polymer.

21. The absorbent article according to claim 20 wherein the article is selected from the group consisting of sanitary napkins, panty liners, adult incontinence devices and diapers.

22. The absorbent article according to claim 20 wherein the block copolymer is a linear or radial co-polymer



structure having the formula $(A-B)_x$ wherein block A is a polyvinylarene block, block B is a poly(monoalkenyl) block, x denotes the number of polymeric arms, and wherein x is an integer greater than or equal to one.

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23. The absorbent article according to claim 22 wherein the block A polyvinylarenes is selected from the group consisting of Polystyrene, Polyalpha-methylstyrene, Polyvinyltoluene, and combinations thereof and wherein the Block B poly(monoalkenyl) blocks are selected from the group consisting of conjugated diene elastomers, hydrogenated elastomers and combinations thereof.

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24. The absorbent article according to claim 23 wherein the conjugated diene elastomers are selected from the group consisting of polybutadiene and polyisoprene and wherein the hydrogenated elastomers are selected from the group consisting of ethylene butylene, ethylene propylene, polyisobutylene and combinations thereof.

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25. The absorbent article according to claim 20 wherein the hot melt adhesive further contains absorbent thermoplastic polymers, super absorbent particles, tackifiers and plasticizers.

26. The absorbent article according to claim 20 wherein the tackifying resins are selected from the group consisting of natural resins, modified resins, glycerol

esters of natural resins, glycerol esters of modified resins, pentaerythritol esters of natural resins, pentaerythritol esters of modified resins; polyterpene resins, copolymers of natural terpenes, terpolymers of natural terpenes, phenolic modified terpene resins and hydrogenated derivatives thereof, aliphatic petroleum resins and hydrogenated derivatives thereof, aromatic petroleum resin and hydrogenated derivatives thereof, aliphatic petroleum resins, hydrogenated derivatives of aliphatic petroleum resins, aromatic petroleum resins, hydrogenated derivatives of aromatic petroleum resins, and combinations thereof.

27. The absorbent article according to claim 20 wherein the aqueous liquid absorbing polymers is selected from the group consisting of thermoplastic hydrogels and thermoplastic polymeric compositions which are formed from a water-soluble soft segment and one or more hard segments.

28. The absorbent article according to claim 27 wherein the hard segments are selected from the group consisting of polyurethane, polyamides, polyesters, polyureas, polypropylene oxide and combinations thereof.

29. The absorbent article according to claim 27 wherein the soft segments are selected from the group consisting of polyethylene oxide, polyvinyl alcohol, polyvinyl

pyrrolidone, polyacrylamide, polysaccharide, polymaleic anhydride, and random copolymers of polyethylene oxide and polypropylene-oxide.

5 30. A hot melt adhesive substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying examples.

10 31. An absorbent article substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

DATED this 9th Day of December, 1999

McNEIL-PPC, INC.

Attorney: PAUL G HARRISON
Fellow Institute of Patent Attorneys of Australia
of BALDWIN SHELSTON WATERS



FIG. 1

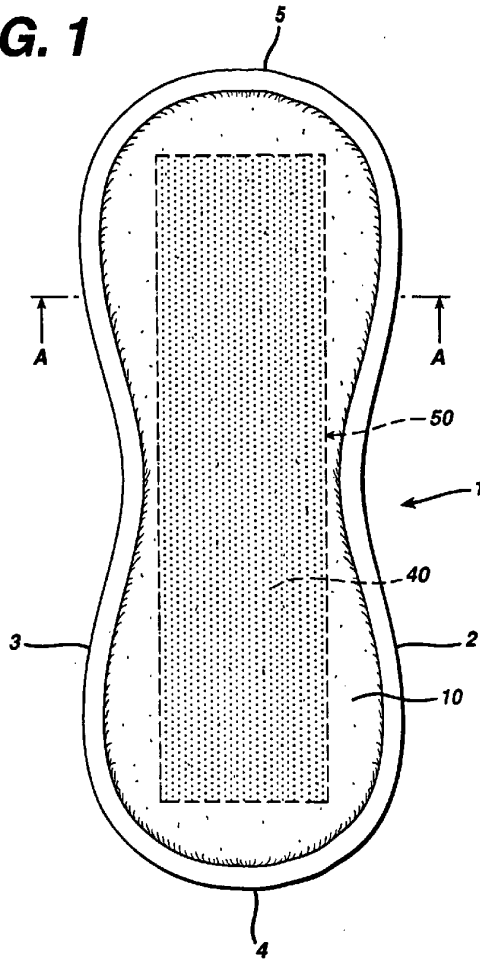
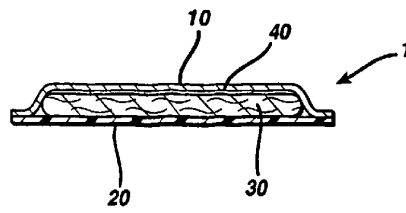
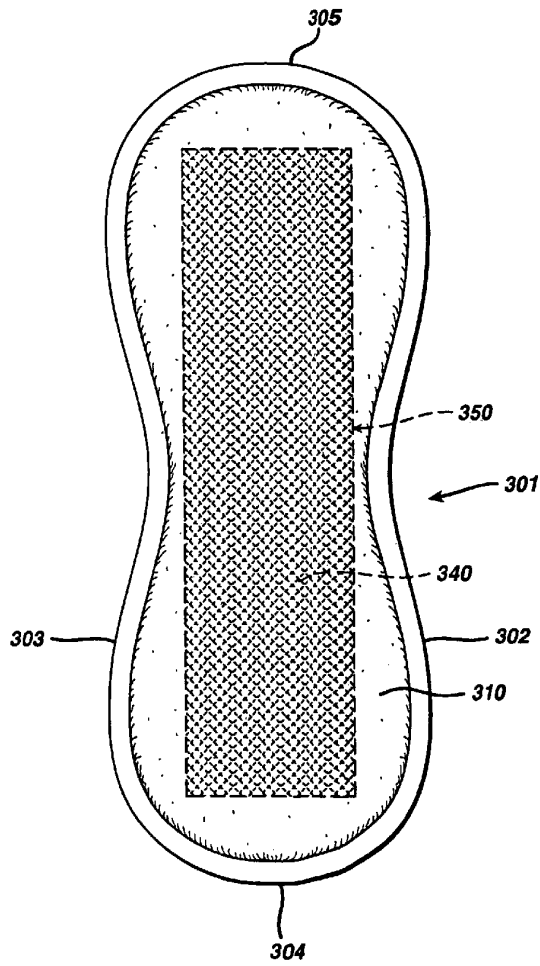


FIG. 2



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4
3
2
1

FIG. 3



5
4
3
2
1

FIG. 4

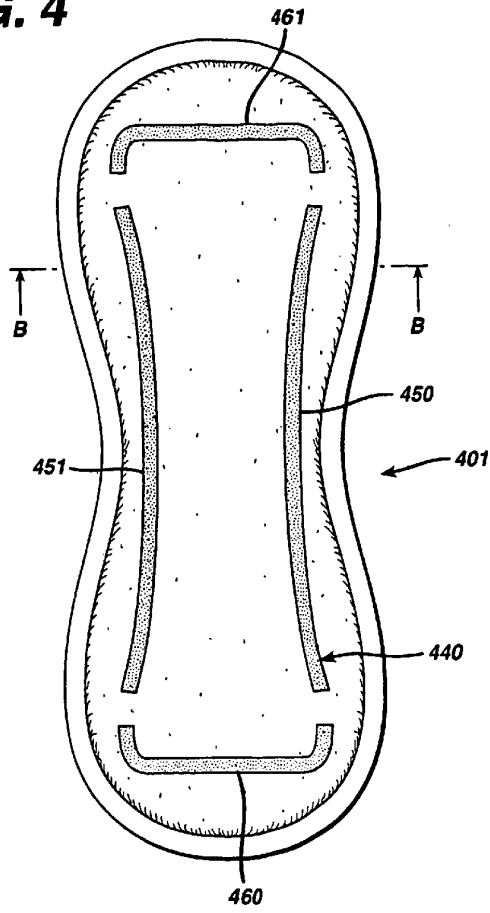


FIG. 5

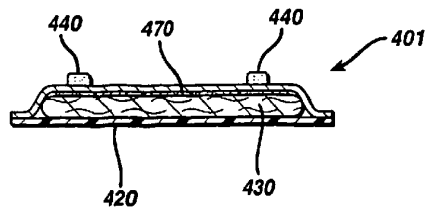


FIG. 4

FIG. 6

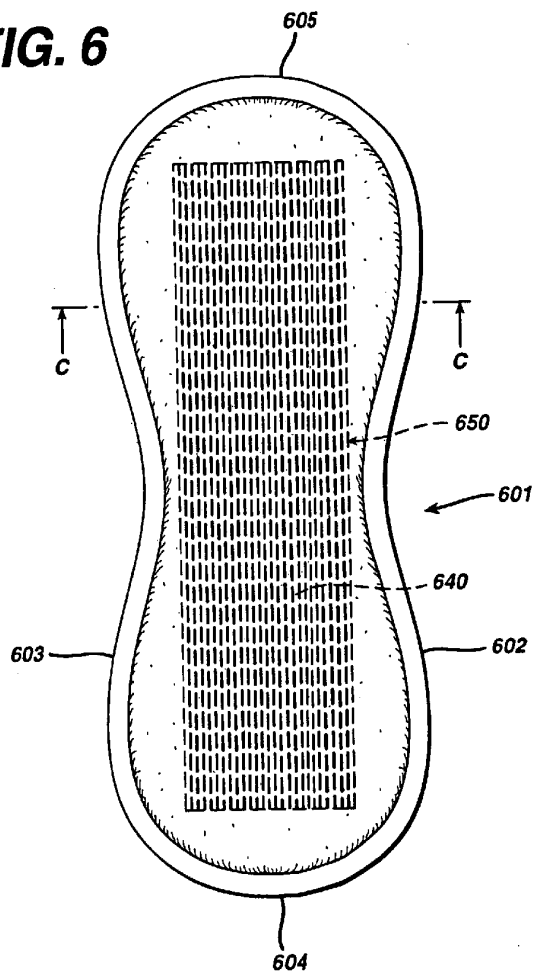
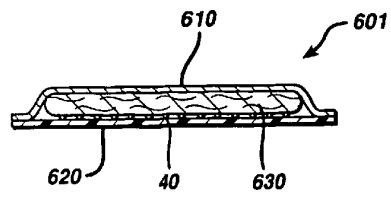


FIG. 7



5
4
3
2
1

FIG. 8

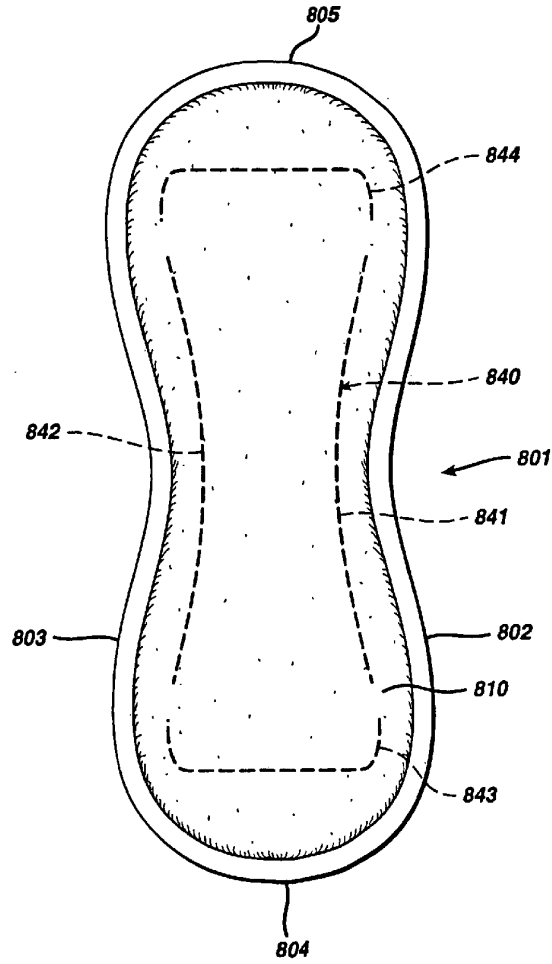
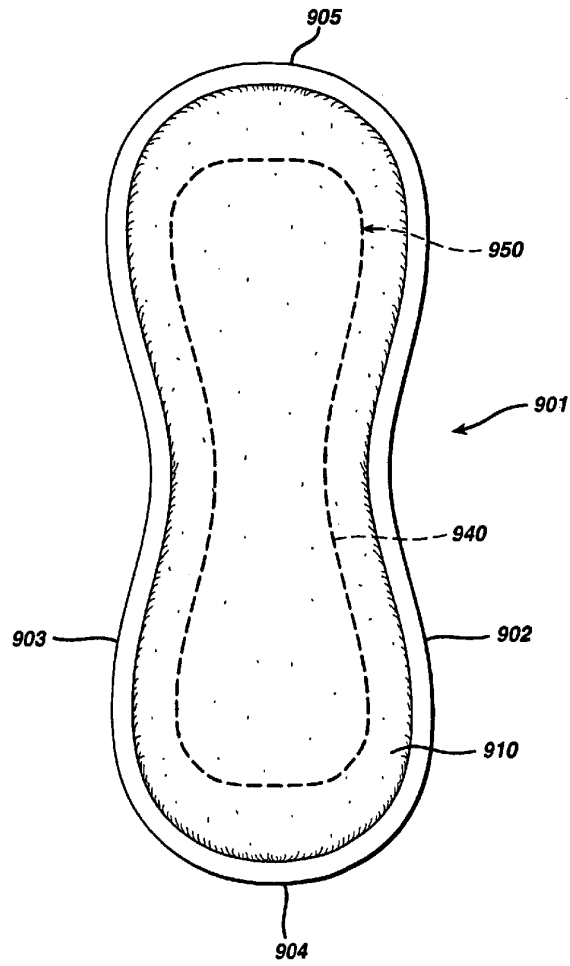


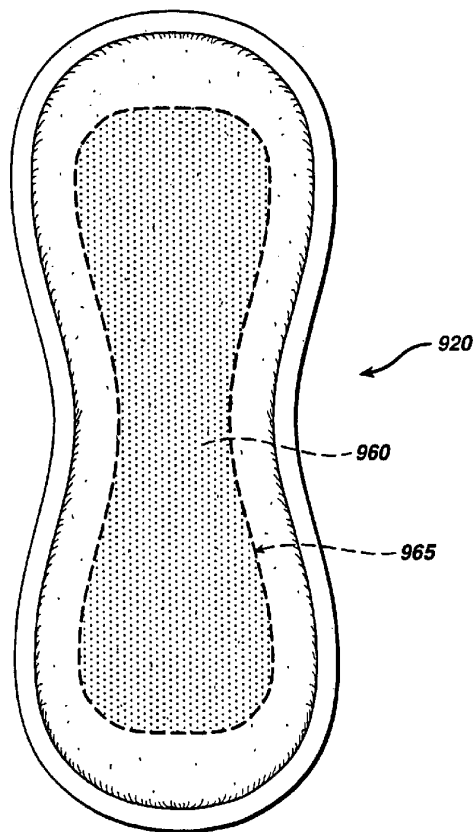
FIG. 8

FIG. 9



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4
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2
1

FIG. 10



17
14
9
2
8

FIG. 11

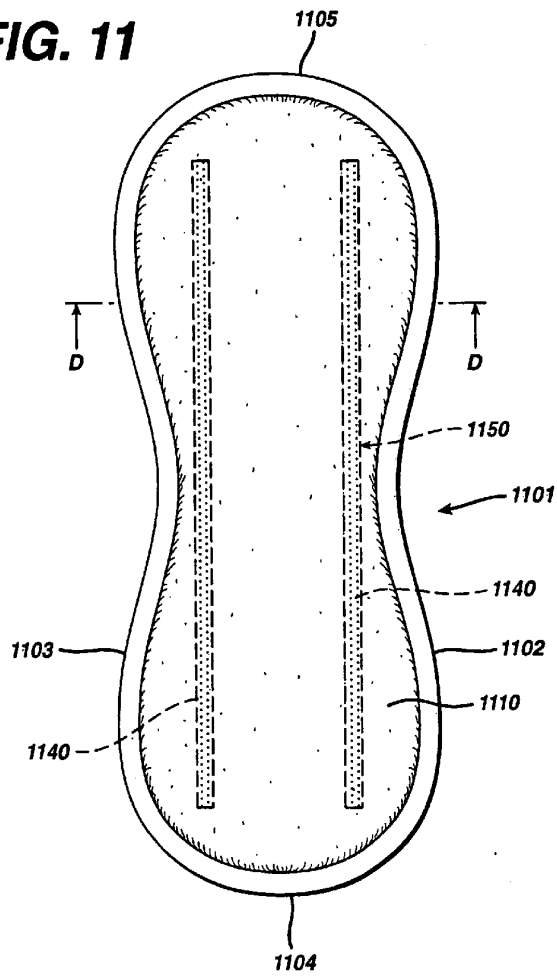


FIG. 12

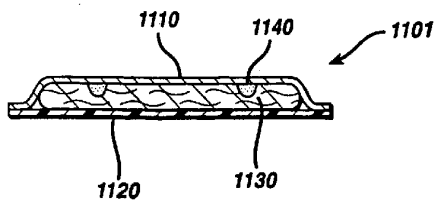


FIG. 11