



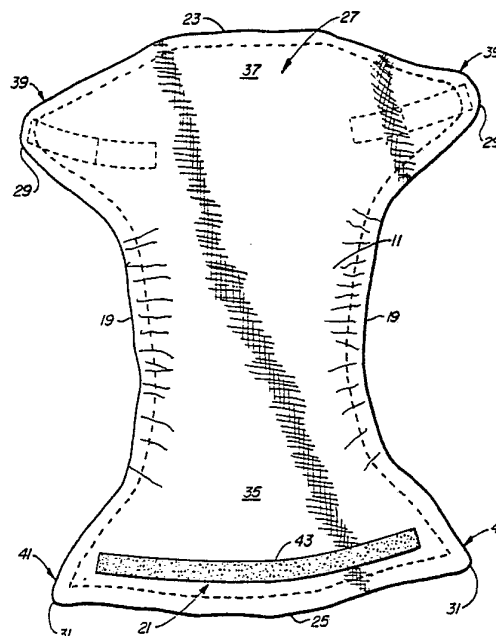
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>4</sup> :  A61F 13/16	A1	(11) International Publication Number: WO 86/ 02263 (43) International Publication Date: 24 April 1986 (24.04.86)
<p>(21) International Application Number: PCT/US85/01952</p> <p>(22) International Filing Date: 9 October 1985 (09.10.85)</p> <p>(31) Priority Application Number: 660,062</p> <p>(32) Priority Date: 12 October 1984 (12.10.84)</p> <p>(33) Priority Country: US</p> <p>(71) Applicant: McCOY, Ernest, H. [US/US]; One Kaiser Plaza, Suite 2385, Oakland, CA 94612 (US).</p> <p>(72) Inventor: MITCHELL, Debra, J. ; 185 Vista Grande, Greenbrae, CA 94904 (US).</p> <p>(74) Common Representative: McCOY, Ernest, H.; One Kaiser Plaza, Suite 2385, Oakland, CA 94612 (US).</p>		<p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: A FORMED AND WASHABLE DIAPER

## (57) Abstract

A formed and washable diaper comprised of multiple layers of material including an inner layer of soft nonirritating absorbent washable fabric, an absorbent and moisture retentative mildew-resistant washable felt layer, and an outer moisture barrier layer of fabric, diaper being formed with an hourglass shape with an upper end (27) longer in length than the bottom end (35) such that when placed on the wearer, with the upper end (27) forms the back of the diaper and the bottom end is pulled up between the wearer's legs and disposed on the front, with top and bottom edges (23) and (25) curved slightly convex upward and downward respectively.



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TITLE OF THE INVENTION

A Formed and Washable Diaper

CROSS-REFERENCES TO RELATED APPLICATIONS

5 The present invention is related to U.S. Patent  
Application S.N. 06/365,157 filed April 5, 1982, for  
a Reusable Fluid Absorption Pad, and assigned to Art  
Unit 336, and is a continuation-in-part of U.S.  
Patent Application S.N. 06/588,349, filed March 12,  
1984, and issued as U.S. Letters Patent No. 4,516,975  
10 on May 14, 1985.

BACKGROUND OF THE INVENTIONFIELD OF THE INVENTION

15 The present invention relates to diapers and  
more particularly to a formed and washable diaper  
having multiple layers of different types of material  
for different functions which is reusable and  
conforms to the body of the wearer.

DESCRIPTION OF THE PRIOR ART

20 There are numerous multiple layer fabric diapers  
on the market such as those described in U.S. Patent  
Nos.: 3,646,937; 3,848,594; 3,860,003; and 4,041,951.  
The problem with these diapers is that all of them  
are made of disposable materials which cannot be  
washed and reused because they cannot stand the  
25 stress of the washing procedure and the high  
temperatures of tumble drying which occur in clothes  
washing and drying machinery. Disposable diapers are  
very expensive when compared with reusable diapers  
which are more expensive initially but can be washed  
30 and reused many times.

A further problem results if a person wants to  
undo a disposable diaper to check it for deposits:  
it is almost always necessary to replace the diaper

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because disengaging the adhesive securement strips usually results in tearing the diaper so it cannot be refastened.

There are other problems with disposable  
5      diapers. The chemicals utilized in the fragrances  
put into the diapers have proven to cause skin  
irritation and bronchial infection and irritation.  
Numerous cases of infant deaths have been reported  
which have been determined to have been due to  
10     inhalation of particles and pieces of disposable  
diapers which were apparently torn or picked off the  
diaper by the infants when the diapers became wet and  
lost their tensile strength. Additional deaths been  
determined to have occurred from suffocation when the  
15     diapers became wet and the securement means tore off  
and the diaper ended up covering the infant's face.  
The present invention has been designed to at least  
minimize but in most cases eliminate these problems.

#### SUMMARY OF THE INVENTION

20      The present invention is a formed and washable  
diaper comprised of a multiplicity of layers of  
material including an outer layer forming a moisture  
barrier cover, a moisture absorbent felt layer  
forming the frame of the diaper, and a soft inner  
25     facing layer made of a non-irritating absorbent  
washable fabric.

The diaper has a particular body enclosing  
configuration due to its unique construction which  
includes an hour-glass outline with each of the  
30     hour-glass shaped sides forming a continuous sculpted  
crescent shaped concave curve. The top and bottom  
edges are generally curved slightly convex upward and  
downward respectively. The upper end of the diaper  
is slightly longer in lateral length than the bottom

end whereby when the diaper is placed on the wearer with the top end disposed at the back of the body and with the bottom end pulled up between the wearer's legs and disposed with the bottom end in front on the stomach of the wearer's body, the two edges of the top end of the diaper will wrap around the wearer's body from behind and overlap the two edges at the bottom end of the diaper disposed on the wearer's stomach.

The lateral curved vertically disposed edges of the diaper are provided with a stretched elastic edging which is secured to the material for a portion of the length of the curved edges whereby when the elastic is released, and allowed to retract, the diaper is pulled into a U-shaped configuration.

The outer edges of the inner and felt outer layers of the material are formed generally co-extensive throughout the extent of the configuration of the diaper. The outer layer extends peripherally outward beyond the edges of said co-extensive inner and felt layers to provide a moisture barrier border which extends beyond the edges of the absorbent layers of the diaper.

The tabs formed by the top and bottom lateral edges or corners of the diaper are provided with adjustable strip and grip fasteners for securing the overlapping edges together to hold the diaper on the wearer's body.

#### OBJECTS OF THE INVENTION

It is therefore an important object of the present invention to provide a formed diaper which conforms to a wearer's body.

It is another object of the present invention to provide a washable diaper which can withstand both

the stress of washing in automatic clothes washers and the high temperatures of hot air clothes dryers.

It is a further object of the present invention to provide a reusable diaper which provides a felt  
5 absorbent layer for retaining greater amounts of moisture than disposable diapers.

It is yet another object of the present invention to provide a diaper which is safe, non-irritating, mildew-resistant, and does not require  
10 any pins to hold it on the wearer.

It is yet a further object of the present invention to provide a diaper which is adjustable in size and can be easily arranged in a non-snagging configuration for washing.

15 Other objects of the present invention will become apparent when the description of the preferred embodiment thereof is considered in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 FIG. 1 is a side elevation of the formed and washable diaper of the present invention;

FIG. 2 is a rear elevation of the diaper of the present invention;

25 FIG. 3 is a front elevation of the diaper of the present invention;

FIG. 4 is a bottom plan view of the diaper of the present invention in a stretched out configuration showing the outside thereof;

30 FIG. 5 is a top plan view of the diaper of the present invention showing the inner side thereof in a stretched out configuration;

FIG. 6 is a partial cross-section of the diaper of the present invention taken along lines 6-6 of FIG. 1; and

FIG. 7 is a partial cross-section of the diaper of the present invention taken along lines 7-7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of the formed and washable diaper of the present invention has a natural body-enclosing configuration which is due to its unique form of construction. It is substantially form-fitting to a wearer's body. It's primary use is for infants, but with proper sizing it can be used equally well for any incontinent person and geriatric patients. The material utilized in the construction of the diaper of the present invention permits it to be reused through an average of between 30 to 50 and up to 85 washings.

The present invention includes a non-allergenic moisture barrier outer layer 11 which prevents excreted fluids retained by the absorbent layers from passing through the diaper covering to the garments or bedclothes of the wearer. In the preferred embodiment, the outer layer is made of urethane coated 100% nylon taffeta.

The absorbent layer 15 is constructed of felt made from a needle punched rayon and polyester blend. This layer is of uniform thickness but is considerably thicker than the inner and outer layers. It functions as a frame for the diaper to hold its shape and maintain its formed configuration once the construction of the diaper has been completed. It supports the other materials which are attached to both sides of it.

The inner layer 17 of the diaper is a soft non-irritating absorbent washable fabric that is disposed next to the skin of the wearer to absorb the excreted fluids and permit them to wick through to the absorbent layer. In the preferred embodiment, it is comprised of 100% cotton, but it has been found that a blend of up to 50% polyester with the cotton will



also work satisfactorily.

The diaper has a particular body enclosing configuration due to its construction. This is created by forming the diaper in an outline described as somewhat of an hourglass but with the pinched in sides actually being formed by a continuous sculpted crescent shaped concave curve on each of the lateral edges 19. These edges are narrowed more towards the bottom end 21 of the diaper which end forms the front thereof. The top and bottom edges 23, 25, respectively, of the diaper are also generally curved slightly convex upward and downward respectively. In actual practice, the flat top and bottom edges are tapered slightly toward the center of the diaper to provide the convex configuration.

The upper end 27 of the diaper is slightly longer in lateral length than the bottom end, whereby, when the diaper is placed on the wearer with the top end disposed at the back of the body, and with the bottom end 21 pulled up between the wearer's legs and disposed at the front of the wearer's body on the stomach, the two lateral edges 29 or corners of the top end of the diaper will wrap around the wearer's body from behind and overlap the two lateral edges 31 or corners formed by the bottom end of the diaper when it is disposed on the wearer's stomach. This configuration reduces the bulk of material that must be disposed between the wearer's legs.

In addition to providing a configuration which allows uniformity of thickness be disposed on the wearer's body without the bunching up of material, the unique construction of the diaper also causes it to be formed into a body enclosing configuration. This is done by providing the curved lateral vertically disposed edges 19 of the diaper with a



stretched elastic edging 33 which is secured to the material of the diaper with an overlock stitch for that portion of the length of the curved edges which is disposed around the wearer's legs. This elastic 33 is stretched during the sewing operation whereby when the elastic is released and allowed to retract to its normal state of rest, the diaper is pulled into a U-shaped configuration. The resulting opposed portions of the U-shaped configuration are the front and rear flaps 35, 37, respectively, of the diaper.

The outer edges of the inner and felt layers, 11, and 17, respectively, of the material forming the diaper are generally co-extensive throughout the extent of the configuration of the diaper. The absorbent layer 15 may not extend fully to the corners of the diaper and yet function fully. The outer layer extends peripherally outward beyond the edges of the co-extensive inner and absorbent felt layers to provide a moisture barrier border which extends beyond the edges of the absorbent layers of the diaper. This border has been found necessary to prevent the sewn edges of the diaper, which are particularly susceptible to wicking moisture from the absorbent felt layer to the edges of the diaper, from contacting the wearer's skin.

The tabs 39, 41 that are formed by the top and bottom lateral edges or corners of the diaper, 19 and 21, respectively, are provided with strip and grip fasteners 43 for securing the overlapping edges together to hold the diaper on the wearer's body. In the preferred embodiment, Velcro brand or similar fasteners are used which when positioned as shown in the drawings provide an adjustable perfect body-fitting securement means which is on the front of the diaper so that the wearer can be laid on his or her

back to fasten the diaper. The wearer's legs are lifted, the top or rear of the diaper is slid underneath, the wearer's legs are allowed to drop on both sides of the diaper, the front flap is pulled up, the two tabs from the rear flap wrap over and press on those that lie on the front, and the diaper is automatically secured to the wearer with no further effort and particularly without pins that could possibly be stuck into the wearer by accident.

A stick strip, that interwoven mass of fabric element of the fastener which is engaged by the hooks of the grip element, is disposed on the outward side of the front of the diaper proximate the top peripheral edge. This allows a large range of adjustment of the size of the diaper. On the corners of the other end of the diaper, aligned mating pairs of strip and grip tabs are provided with the grip tabs at the outer ends of the corners and the strip tabs adjacent thereto. These pairs of tabs allow the corners of the diaper to be folded over to engage themselves. This keeps the grip portion from snagging any other engagable surface and is particularly helpful during washing of the diapers to keep them from entangling with and snagging each other.

The present invention is 10 to 15 times more expensive per unit than disposable diapers presently on the market, but since it can be reused between 30 to as many as 85 times it is in effect between  $1/2$  and  $2/17$  as expensive as a disposable diaper in overall cost. The benefits of the comfort and safety of having a non-allergenic, pinless diaper, which always retains its tensile strength so it cannot fall or be picked apart when it becomes wet, are self-evident. These advantages are not obtainable

from disposable diapers.

Thus, it will be seen from this description of the preferred embodiment of the present invention that the formed and washable diaper disclosed and described herein achieves the objects and advantages  
5 attributable thereto, and while the invention has been described in considerable detail, it is not to be limited to such details as set forth except as may be necessitated by the appended claims.

I CLAIM:

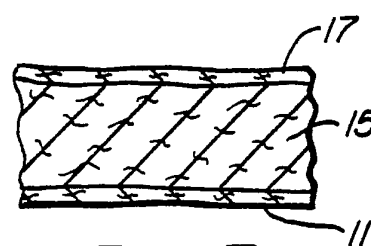
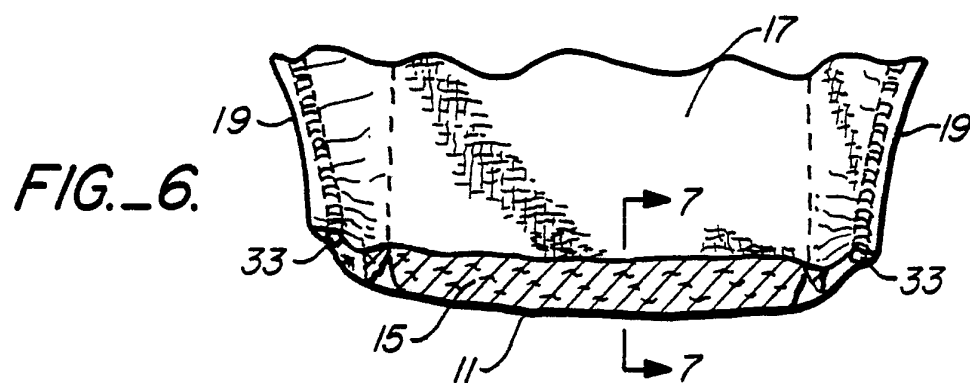
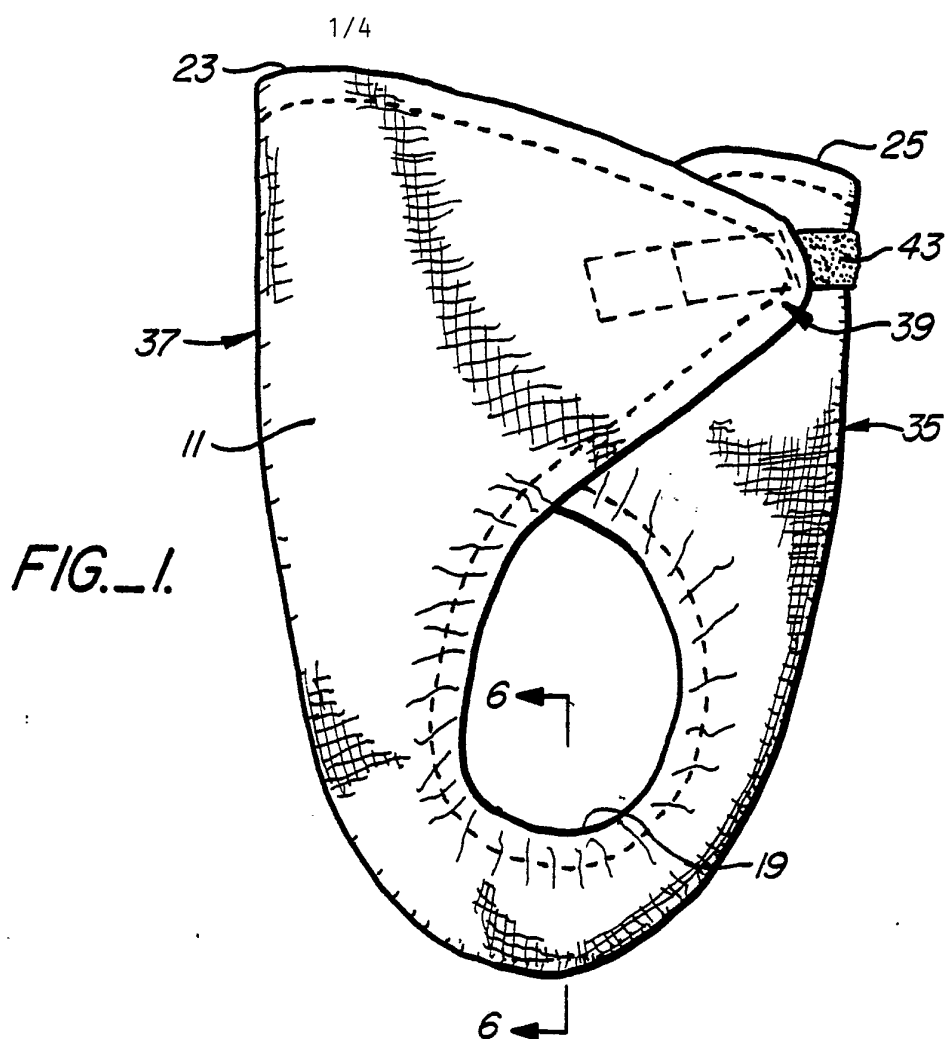
1. A formed and washable diaper comprised of  
a multiplicity of layers of material including a  
5 non-allergenic outer layer forming a moisture barrier  
cover,  
a moisture retentive mildew resistant washable  
felt layer, and  
an inner facing layer of soft non-irritating  
10 absorbent washable fabric, said diaper having a  
particular body enclosing configuration due to its  
construction which includes an hour-glass outline  
with each of the hour-glass shaped sides forming a  
continuous sculpted crescent shaped concave curve  
15 with the top and bottom edges of the diaper being  
generally curved slightly convex upward and downward  
respectively, the upper end of said diaper being  
slightly longer in lateral length than the bottom end  
whereby when the diaper is placed on the wearer with  
20 the top end disposed at the back of the wearer's body  
and with the bottom end pulled up between the  
wearer's legs and disposed on the front of the  
wearer's body on the stomach, the two lateral edges  
of the top end of the diaper will wrap around the  
25 wearer's body from behind and overlap the two lateral  
edges at the bottom end of the diaper disposed on the  
wearer's stomach, the laterally curved vertically  
disposed edges of the diaper being provided with an  
elastic edging which is secured to said material for  
30 a portion of the length of the curved edges which  
surround the wearer's leg when the diaper is disposed  
in operative position whereby when the elastic is  
released after being secured to the diaper in a  
stretched condition along the edge of said diaper and  
35 allowed to retract, said diaper is retracted into a

U-shaped configuration with the resulting opposed portions being the front and rear flaps of said diaper, the outer edges of said inner and felt layers of said material being generally co-extensive throughout the extent of the configuration of the diaper, said outer layer being disposed to extend peripherally outward beyond the edges of said co-extensive inner and felt layers to provide a moisture barrier border which extends beyond the edges of the absorbent layers of said diaper, and

tabs formed by the top and bottom lateral edges or corners of said diaper being provided with adjustable strip and grip fasteners for securing said overlapping lateral edges together to hold the diaper on the wearer's body.

2. The formed and washable diaper of claim 1 wherein said outer layer is made of urethane coated 100% nylon taffeta; said absorbent felt layer is made of needle punched rayon and polyester; and said inner layer is made of cotton or a cotton blend.

3. The formed and washable diaper of claims 1 or 2 wherein two corners at the same end of the diaper are provided with mating pairs of strip and grip tabs so that the corners of the diaper having the mating pairs of strip and grip tabs can be folded over to engage themselves and keep the grip portion of the tab from snagging any other engagable surface, the other end of said diaper being provided with an elongated strip tab disposed across the front of said diaper to adjustably engage the grip tabs.



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FIG.\_2.

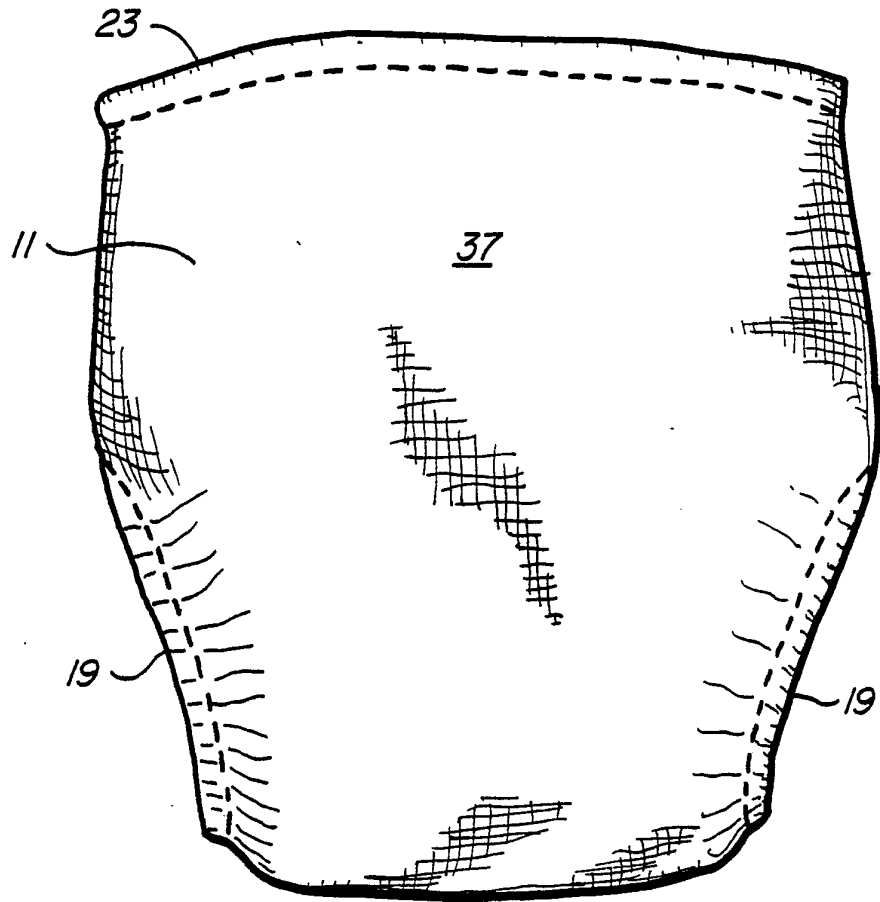
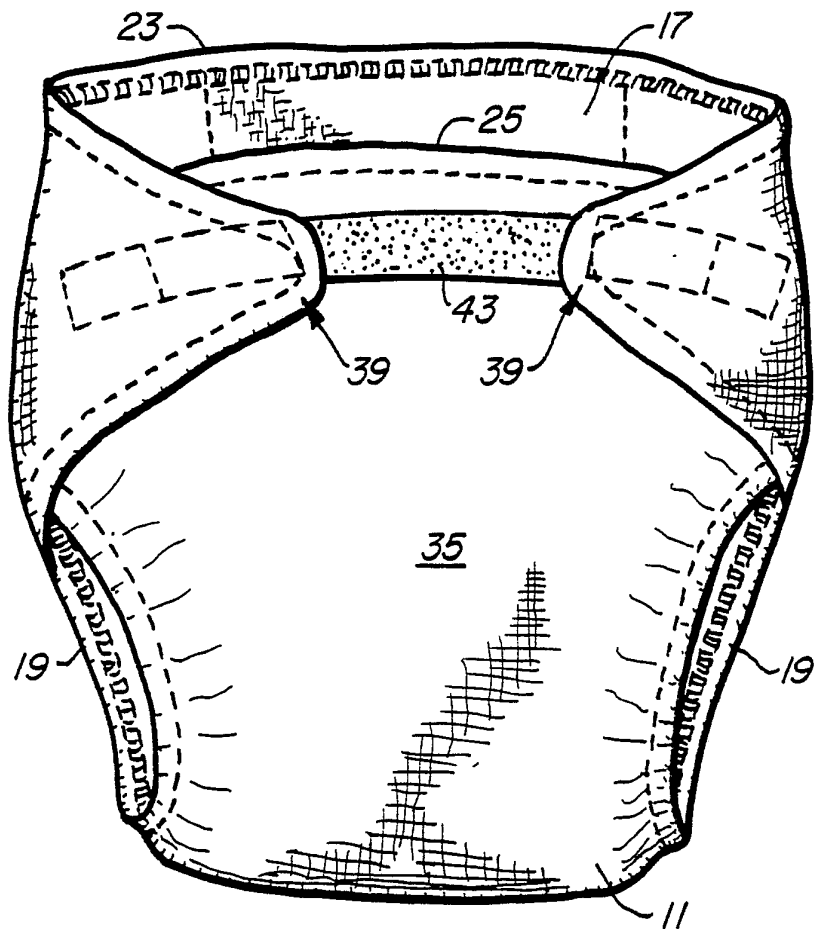
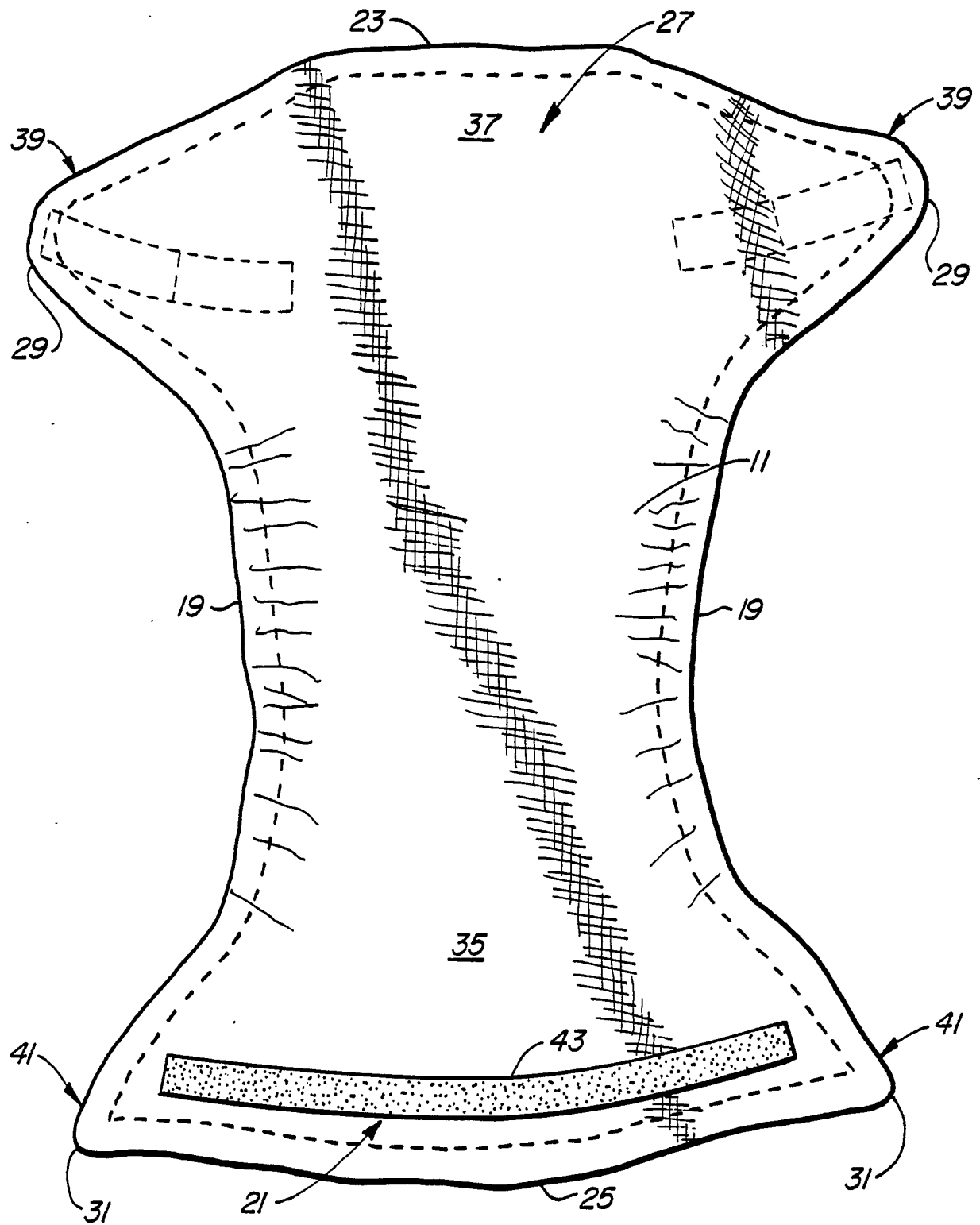


FIG.\_3.





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**FIG. 4.**

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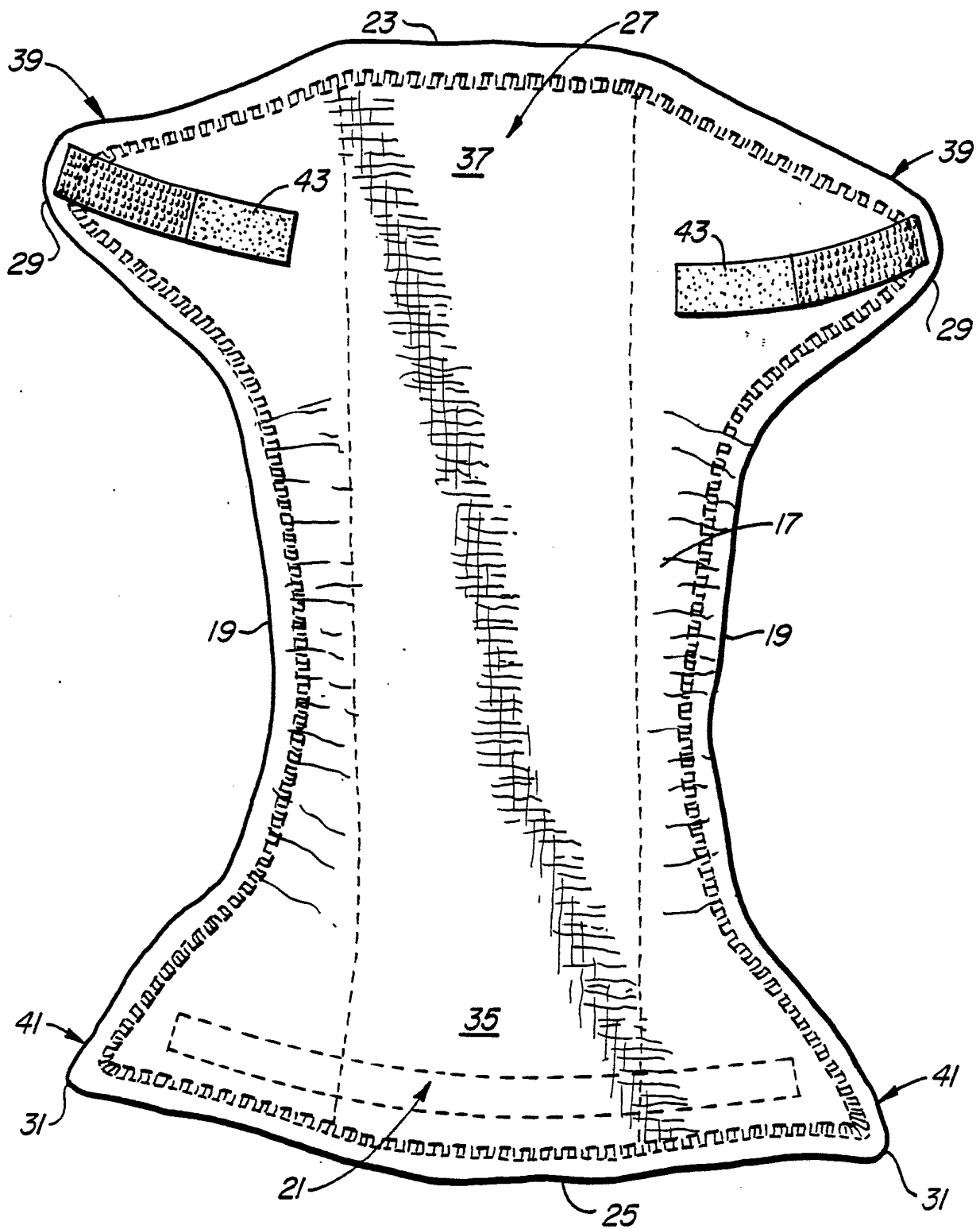


FIG. 5.

# INTERNATIONAL SEARCH REPORT

International Application No **PCT/US85/01952**

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>IPC4 A61F 13/16</span> <span>US 604/391</span> </div>																							
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched <sup>4</sup></div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width: 20%;">Classification System</th> <th>Classification Symbols</th> </tr> <tr> <td style="text-align: center; vertical-align: middle;">US</td> <td>604/391, 385 A, 389</td> </tr> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup></div>			Classification System	Classification Symbols	US	604/391, 385 A, 389																	
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%;">Category *</th> <th style="width: 60%;">Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 30%;">Relevant to Claim No. <sup>18</sup></th> </tr> </thead> <tbody> <tr> <td>X, P</td> <td>US, A, 4,516,975 I4 May 1985 MITCHELL</td> <td>1-3</td> </tr> <tr> <td>Y</td> <td>US, A, 4,410,327 18 October 1983 BAGGALEY</td> <td>1-3</td> </tr> <tr> <td>Y</td> <td>US, A, 3,481,337 02 December 1969 RUFFO</td> <td>1-3</td> </tr> <tr> <td>Y</td> <td>US, A, 4,338,938 13 July 1982 SEAVITT</td> <td>1-3</td> </tr> <tr> <td>Y</td> <td>US, A, 4,397,646 09 August 1983 DANIELS et al</td> <td>1-3</td> </tr> <tr> <td>A</td> <td>US, A, 3,141,461 21 July 1964 FARRIS,</td> <td>1-3</td> </tr> </tbody> </table>			Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	X, P	US, A, 4,516,975 I4 May 1985 MITCHELL	1-3	Y	US, A, 4,410,327 18 October 1983 BAGGALEY	1-3	Y	US, A, 3,481,337 02 December 1969 RUFFO	1-3	Y	US, A, 4,338,938 13 July 1982 SEAVITT	1-3	Y	US, A, 4,397,646 09 August 1983 DANIELS et al	1-3	A	US, A, 3,141,461 21 July 1964 FARRIS,	1-3
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																							
<b>IV. CERTIFICATION</b> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 50%; padding: 5px;">           Date of the Actual Completion of the International Search <sup>2</sup>  <div style="text-align: center; font-size: 1.2em;">14 November 1985</div> </td> <td style="width: 50%; padding: 5px;">           Date of Mailing of this International Search Report <sup>2</sup>  <div style="text-align: center; font-size: 1.5em;">26 DEC 1985</div> </td> </tr> <tr> <td style="width: 50%; padding: 5px;">           International Searching Authority <sup>1</sup>  <div style="text-align: center; font-size: 1.2em;">ISA/US</div> </td> <td style="width: 50%; padding: 5px;">           Signature of Authorized Officer <sup>20</sup>  <div style="text-align: center;">             K. Kaechele  </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <sup>2</sup> <div style="text-align: center; font-size: 1.2em;">14 November 1985</div>	Date of Mailing of this International Search Report <sup>2</sup> <div style="text-align: center; font-size: 1.5em;">26 DEC 1985</div>	International Searching Authority <sup>1</sup> <div style="text-align: center; font-size: 1.2em;">ISA/US</div>	Signature of Authorized Officer <sup>20</sup> <div style="text-align: center;">             K. Kaechele  </div>																	
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