United States Patent [19]

Hedstrom et al.

[11] **3,809,089**

[45] **May 7, 1974**

[54] **DIAPER**

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[22] Filed: **May 8, 1973**

[21] Appl. No.: **358,380**

Related U.S. Application Data

[63] Continuation of Ser. No. 146,796, May 26, 1971, abandoned, which is a continuation-in-part of Ser. No. 783,612, Dec. 13, 1968, abandoned.

[52] **U.S. Cl.** **128/287**

[51] **Int. Cl.** **A41b 13/02**

[58] **Field of Search** 128/284, 286, 287, 290, 128/296

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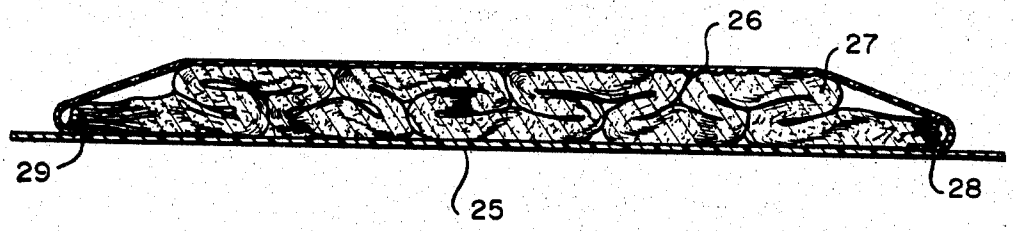
Primary Examiner—Charles F. Rosenbaum

[57] **ABSTRACT**

A diaper including a thin and flexible plastic back sheet or swaddle contoured and dimensioned to enable a person handling an infant to adjust it without requiring a separate fastening means. The back sheet is provided with a lining of liquid penetratable nature, the lining preferably extending over and covering the entire inner fact of the back sheet. An absorbent wadding or pad is interposed between the lining and the back sheet.

3 Claims, 10 Drawing Figures



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SHEET 1 OF 2

FIG. 1.

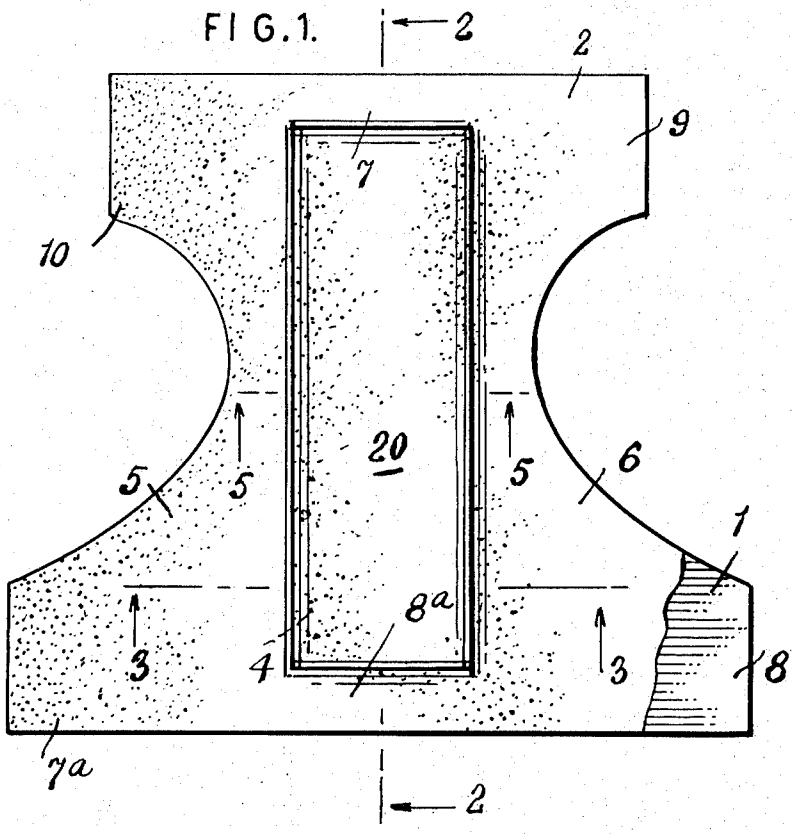

FIG. 2.

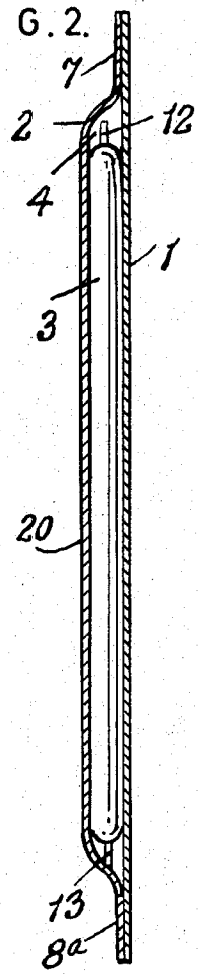

FIG. 3.

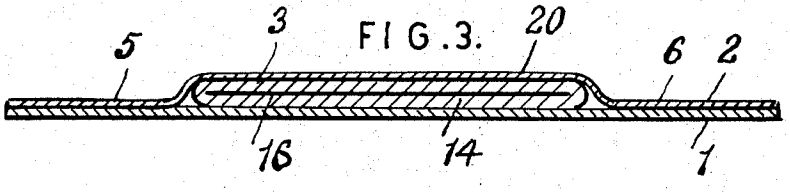

FIG. 4.

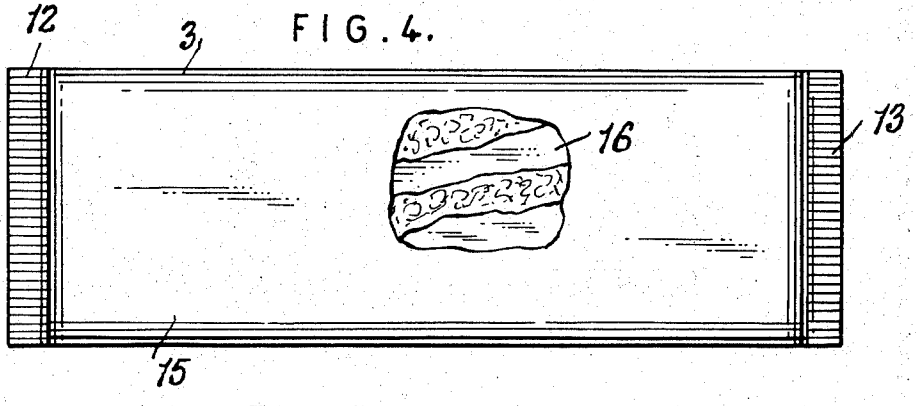

FIG. 5.

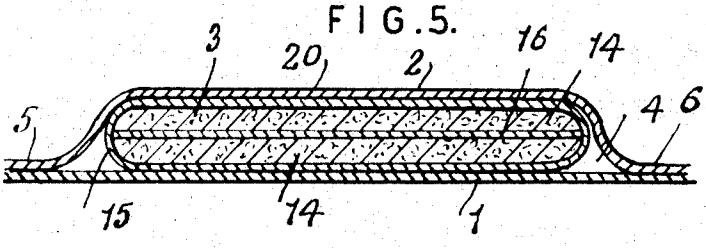

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FIG. 6

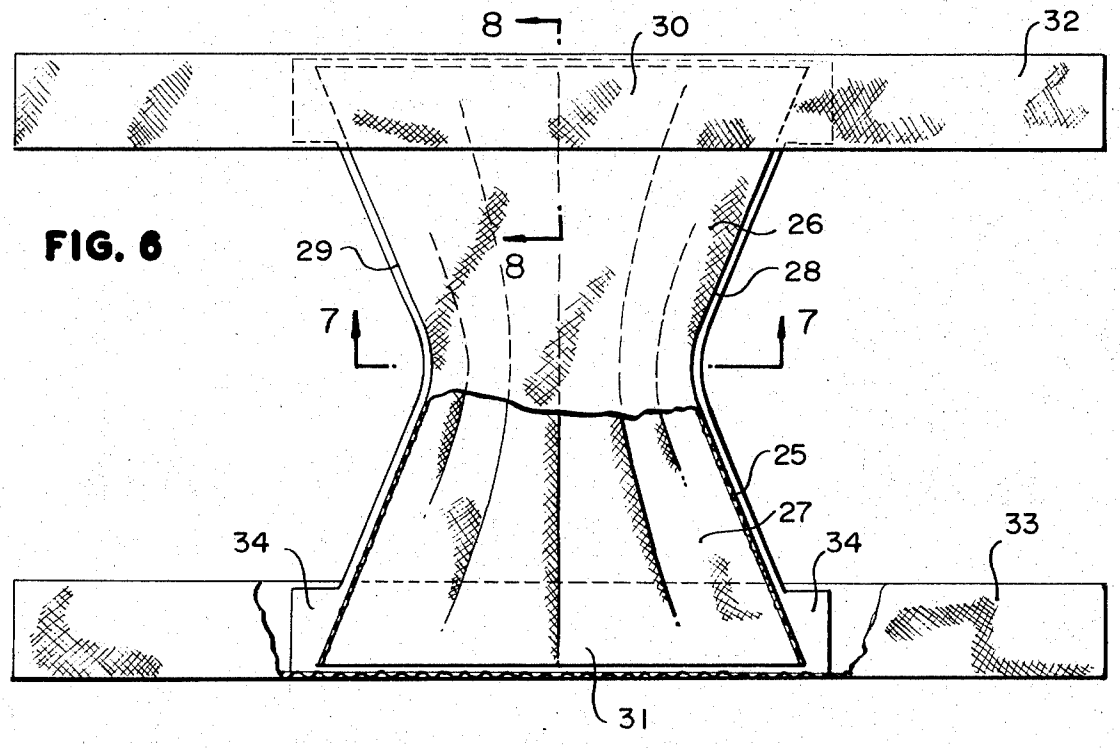


FIG. 7

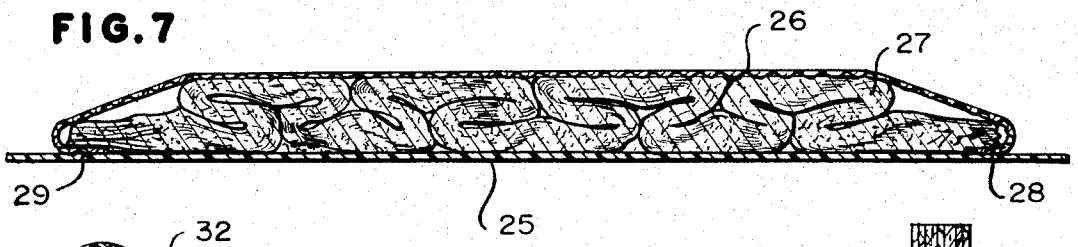


FIG. 8

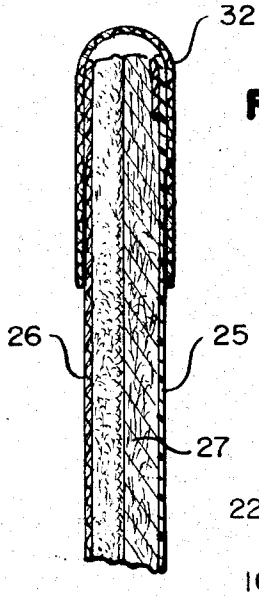


FIG. 9

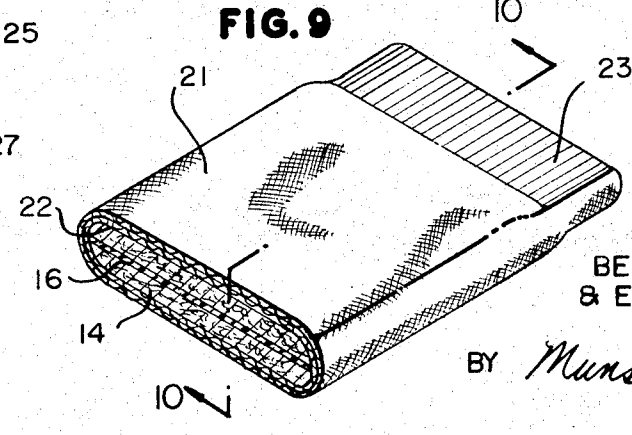
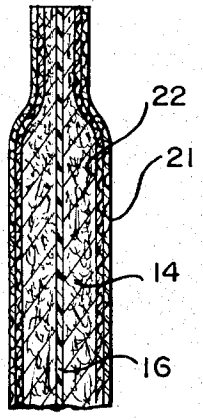


FIG. 10



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DIAPER

This application is a continuation of application Ser. No. 146,796 filed May 26, 1971 which in turn was a continuation-in-part of application Ser. No. 783,612 filed Dec. 13, 1968 both now abandoned.

This invention relates to diapers and more particularly to a type which has its parts or elements composed of such materials that the diaper can be disposed of after soiling.

Many disposable diapers, as previously known, have been relatively expensive because of the materials used in them; because of manufacturing difficulties; and moreover were often so constructed that the full protection required was not always obtained. In addition, some of the materials used, and particularly for the outer covering or back sheet, such as a coated, moisture-resistant paper, were stiff and often relatively heavy and sometimes presented edges or parts which, when unprotected, were likely to cause irritation and injury to the tender skin of the infant.

The absorbent padding used in some prior types often shifted in the outer covering and failed to then properly cover the area required for protection, resulting in the spreading of the body fluids so that leakage occurred and as a result, protective means additional to the diaper were often required and were found uncomfortable, particularly in warm weather.

It is an object of the invention to provide a diaper which can be disposed of as a whole when soiled, since the materials of which it is composed are relatively inexpensive and which materials will not cause irritation or chaffing of the skin of the infant, and which diaper requires no separate fastening devices such as pins or tapes which sometimes cause irritation and injury to the child.

Another object of the invention is to provide a pad-retaining arrangement or pocket for the absorbent pad or wadding employed in the diaper, which pocket is formed by cooperation between an inner lining and the outer sheet or body of the diaper, and without adding bulk to the diaper. The pocket so disposed is effective to definitely retain the pad in one specific protective position and therefore acts to prevent shifting of the pad.

It is still another object of the invention to provide a protective diaper pad which is more liquid absorbent in the central portion thereof where the greatest absorbency is required than along the edges thereof.

A still further object of the invention is to provide a protective diaper pad that includes a liquid-absorbent wadding or "fluff" and a barrier means interposed between layers of the wadding which is effective to insure relatively uniform liquid distribution throughout the pad.

With these and other objects to be hereinafter set forth, we have devised the arrangements of parts and materials to be described and more particularly pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is illustrated,

FIG. 1 is a face view, looking at the inner face of a diaper, while the same is in a flattened position; a pad being shown in full rather than in section and with a portion of the inner lining broken away to expose a part of the outer covering or body;

FIG. 2 is a sectional view, taken substantially on the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a sectional view, taken substantially on the line 3—3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is a face view of the pad, with portions thereof fragmentarily shown;

FIG. 5 is a sectional view, taken substantially on the line 5—5 of FIG. 1, looking in the direction of the arrows;

FIG. 6 is a face view of a further embodiment of the invention, looking at the inner face of the diaper while the same is in flattened position; the pad being shown in full rather than in section and with a portion of the inner lining and the binding tape broken away to expose the pad;

FIG. 7 is a sectional view, taken substantially on the line 7—7 of FIG. 6, looking in the direction of the arrows;

FIG. 8 is a sectional view, taken substantially on the line 8—8 of FIG. 6, looking in the direction of the arrows;

FIG. 9 is a perspective view partly in section of a modification of the pad shown in FIG. 4; and

FIG. 10 is a sectional view, taken substantially on the line 10—10 of FIG. 9, looking in the direction of the arrows.

Referring to the drawing, the diaper therein shown includes a very thin and flexible back sheet or swaddle indicated at 1. The back sheet or swaddle has what might be termed an "hour glass" contour.

The inner fact of the sheet 1 is covered, either partly or wholly for its entire area, by a lining sheet 2 corresponding in shape and size to the back sheet or covering 1. A pad is shown at 3 and the same is disposed transversely of the lined sheets 1, 2 and is confined between the lining sheet 2 and the back sheet 1 in a pocket 4. The lining sheet 2, which contacts with the body of the child, is preferably composed of a thin, soft and flexible as well as a liquid-absorbent material such as paper or other suitable material. The pocket 4 is formed between the lining and the back sheet 1 by leaving the central area 20 of the lining free of its attachment to the inside face of the back sheet 1, which area is of a shape to conform to the pad and is sufficiently large to result in a pocket to snuggly receive and enclose the pad 3. The remainder of the lining in areas shown at 5, 6, 7 and 8 around the four sides of the pad may be adherently attached to the inner face of the back sheet or covering 1. Thus, the pad 3 will be confined in the pocket 4 and cannot shift and will thus be constantly maintained in the required protective position.

In applying the diaper, constructed as above described, the portions shown at 9 and 10 and at 7*a* and 8*a* are tied together about the waist of the child, the flexible nature of the back sheet and its lining readily permitting the adjustment and tieing together of the parts so that the diaper will be properly held about the body of the child without the necessity for additional fastening means.

The back sheet 1 which is described in detail in our application Ser. No. 700,576, filed Jan. 25, 1968, is preferably but not necessarily composed of a thin, low-density, opaque, polyethylene web contoured and di-

mensioned as disclosed, which makes it applicable to infants of different stages of development and size.

The pad **3** may be suitably made of any soft and absorbent material and may be in the form of an elongated flattened roll or tube, closed at its opposite ends by being crimped and/or heat-sealed as shown at **12** and **13.**

The pad **3** is located in the central part of the back sheet **1** and covers the portion of the infant's anatomy from which the emanation of fluid occurs and is captured by the pad. The pad includes a top sheet **15** or envelope which may consist of compliant, soft-feeling, porous, hydrophoric paper or any other non-woven fabric web. An example of a non-woven fabric sheet that is particularly suitable is a rayon fabric of about **1.5** to **3** deniers impregnated with a thermoplastic binder, such as for example, co-polymers of an ester of acrylic acid. For best results, surfactants should be minimal in the binder emulsion and avoided in the final bath. The covering **15** of the pad is liquid permeable and serves to disperse the liquid throughout the pad, thus avoiding the undue collection or pooling of the body fluid in certain parts of the pad, but rather assuring its uniform spread or dispersion through the pad.

Contained within the pad is a wadding or filling **14** which fills the interior of the pad but not to an extent to deform the pad from its desired normally relatively flat condition. The wadding or filling **14** comprises layers confined within the covering **15.** Interposed between the layers of the filling is a barrier sheet **16.** This barrier sheet may consist of a polyvinyl chloride sheet; it may also be a sheet of cellulosic material similar to that of the covering **15.** In the latter case, it should also be impregnated with a plastic or resinous material, such as polyvinyl chloride or melamine, carbamide, or phenyolformaldehyde resins, in a proportion to increase its wet strength without affecting its moisture absorbent characteristics.

The barrier sheet **16,** in addition to serving the purpose of diffusing the liquid throughout the wadding or "fluff," also serves the purpose of reinforcing the wadding or "fluff." The wadding or "fluff" consists of one or more layers, two being shown, of bleached, dry-drained pulp, preferably bleached sulfite pulp. The approximate amount of the "fluff" in each pad may be about 32 to 33 grams. The layers of the filling may be adhesively or otherwise adherently joined to the barrier sheet or the same remain loose between such layers.

In addition to aiding in the spread of liquid throughout the wadding or "fluff," the moisture-resistant barrier sheet **16** also serves to reinforce the wadding to prevent bunching, etc. The crimped ends of the pad may be sealed by compressing the several layers under heat and pressure.

FIGS. **9** and **10** show another form of pad which may be substituted for the pad **3.** The parts of the pad shown in FIGS. **9** and **10** having the same numerical designations as the pad shown in FIG. **5** are identical in the two embodiments and have already been described. The outer tubular covering **21** is a porous, liquid-permeable, non-woven, cellulosic sheet material treated with a hydrophobic substance to increase its wet strength while maintaining its liquid-permeable characteristics. Interposed between the wadding **14** and the outer tubular covering **21** is at least one ply of a moisture-absorbent sheet material. The opposite ends of the pad are crimped and/or heat-sealed as shown at **23.** The pad shown in FIGS. **9** and **10** offers the advantage in that the wadding or filling **14** is surrounded with a moisture-absorbent sheet material to aid in liquid absorbency and then a layer of a hydrophobic substance having a high wet strength but at the same time being liquid-permeable.

A modification of the diaper construction shown in FIGS. **1 – 3** is shown in FIGS. **6 – 8.** This modified diaper comprises a backing sheet **25** similar to the backing sheet **1** of the diaper shown in FIG. **1.** The inner fact of the back sheet **25** is covered almost entirely by a lining sheet **26,** and a pad **27** is confined between the lining sheet **26** and the back sheet **25.** The lining sheet conforms in shape and size substantially to that of the back sheet **25** with the opposite sides passing around the sides of the pad **27** and secured by adhesive at the opposite sides to the back sheet **25.** The lining sheet **26,** which contacts with the body of the child, is preferably composed of a material similar to that of the lining sheet **2** of FIG. **1.**

The pad **27** consists of a wadding or filling which is cut in a rectangular shape. The central portion of the filling is crushed to reduce its width to conform with the shape of the back sheet **25,** and it is retained in this position by the lining sheet **26** when secured at the opposite sides to the back sheet **25.** The opposite ends **30** and **31** of the filling remain extended to substantially the full width of the filling. The fluid absorbency of the pad is greatest in the central narrow portion where the filling is crushed. The filling overlaps itself to obtain the greater absorbency as shown in cross-section in FIG. **7.** At the same time the opposite ends **30** and **31** of the pad remain substantially flat permitting proper fit on the infant.

Wide overlapping tapes **32** and **33** serve a dual function in that they bind the opposite ends **30** and **31** of the diaper and also serve as ties for securing the diaper about the waist of the infant. One side of each elongated tape is secured by adhesive or is heat-sealed to the edge of the back sheet **25** while the opposite edge of each tape is wrapped around the end of the diaper and secured adhesively to the end of the lining sheet **26.** The pad **27** is thus completely enclosed between the back sheet **25** and the lining sheet **26.** The free ends of the tapes **32** and **33** are folded double and bonded to form the ties. Extensions **34** are included in the back sheet **25** to reinforce the diaper at the point where the tapes **32** and **33** extend beyond the back sheet **25.** These extensions secured between parts of the folded sections of each tape serve to reinforce the diaper and prevent tearing while the diaper is being worn by the infant.

Optionally, a pair of tapes similar to tapes **32** and **33** may be used with the diaper construction shown in FIG. **1,** the tapes being folded over the opposite ends of the diaper similarly to the arrangement shown in FIG. **6** and the free ends extending beyond the portions **7***a*, **8***a*, **9** and **10.**

The diaper pad, constructed as above-described, is soft and compliant; the materials employed are relatively inexpensive so that the entire diaper can be discarded when soiled. The material of which the pad is made also disintegrates fairly rapidly when submerged in liquid expediting the disposal process. The maintenance of the pad in position between the outer sheet and lining assures the retention of the pad in the proper location affording full protection.

What we claim is:

1. A diaper comprising:

a. a flat outer sheet of liquid-impervious nature having an hour-glass configuration with the opposite ends thereof being generally straight and the opposite edges extending between said ends being notched to conform about the legs of an infant;

b. an absorbent pad web conforming in shape to and being substantially coextensive with said outer sheet and contiguous to one surface thereof, the opposite edges of said pad web, which has a generally rectangular shape when flattened, being compressed towards each other to conform to the configuration of the notched edges of said outer flat sheet such that the portion of said pad web between said notched edges is crushed and overlaps itself to provide greater bulk and liquid absorbency while the opposite ends thereof are flat, have less bulk, and are coextensive with the ends of said outer sheet, and

c. a flat inner lining web conforming substantially in shape to said pad web and said outer flat sheet, one surface of said lining web being contiguous with the side of said pad web opposite said outer flat sheet, said lining web extending about said opposite edges of said pad web with the surface of said lining web opposite said one surface being bonded to said one surface of said outer sheet to secure and maintain the shape of said absorbent pad web.

2. A diaper according to claim 1 further comprising a pair of elongated tapes, one at each end of said diaper, each tape being folded longitudinally in a generally U-shape about one end of said diaper with the interior surface thereof bonded to the external surfaces of said outer sheet and lining web and with the opposite ends thereof being adapted to secure the diaper on an infant.

3. A diaper according to claim 2 wherein portions of said outer sheet adjacent the ends thereof extend beyond said inner lining, the interior surfaces of said U-shaped tapes being bonded to said extended portions to reinforce said diaper.

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