

[54] **DIAPER**  
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 [73] Assignee: **Colgate-Palmolive Company**, New York, N.Y.  
 [22] Filed: **Sept. 4, 1973**  
 [21] Appl. No.: **394,259**

|           |         |             |         |
|-----------|---------|-------------|---------|
| 3,688,767 | 9/1972  | Goldstein   | 128/287 |
| 3,731,688 | 5/1973  | Litt et al. | 128/287 |
| 3,750,669 | 8/1973  | DeLuca      | 128/287 |
| 3,776,233 | 12/1973 | Schaar      | 128/287 |

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 Murray M. Grill; Norman Blumenkopf

[52] **U.S. Cl.** ..... 128/287  
 [51] **Int. Cl.** ..... A61f 13/16  
 [58] **Field of Search** ..... 128/287, 286, 284, 290

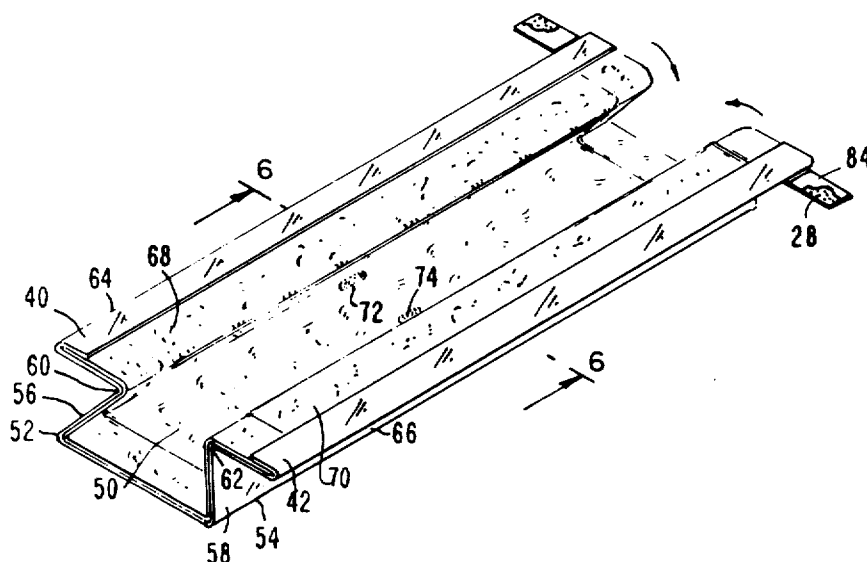
[56] **References Cited**  
**UNITED STATES PATENTS**

|           |        |                |         |
|-----------|--------|----------------|---------|
| 3,585,998 | 6/1971 | Hayford et al. | 128/287 |
| 3,586,000 | 6/1971 | Ness           | 128/287 |
| 3,636,952 | 1/1972 | George         | 128/287 |
| 3,658,063 | 4/1972 | Schaar         | 128/287 |

[57] **ABSTRACT**

A disposable diaper comprising a waterproof back sheet, a hydrophobic sheet, and an absorbent pad sandwiched between the back sheet and the face sheet. The diaper is folded to define a box pleated configuration having a central panel, inwardly extending panels and outwardly extending panels with the inner edges of the inwardly extending panels being in abutting or substantially abutting relationship.

**2 Claims, 11 Drawing Figures**



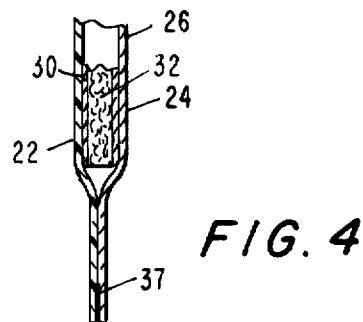
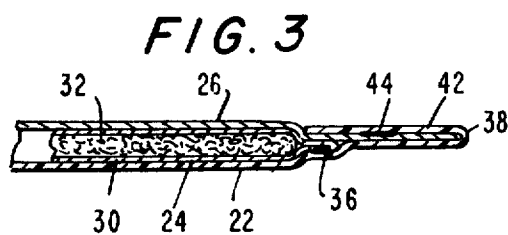
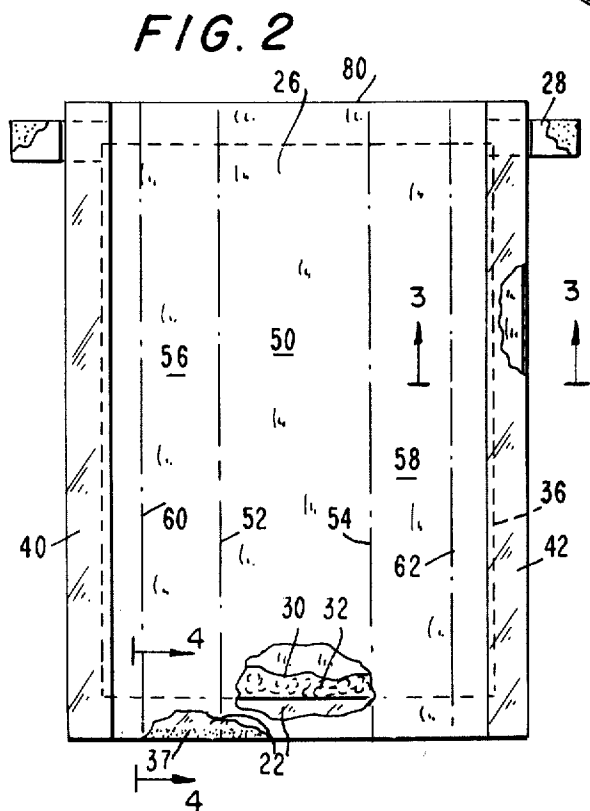
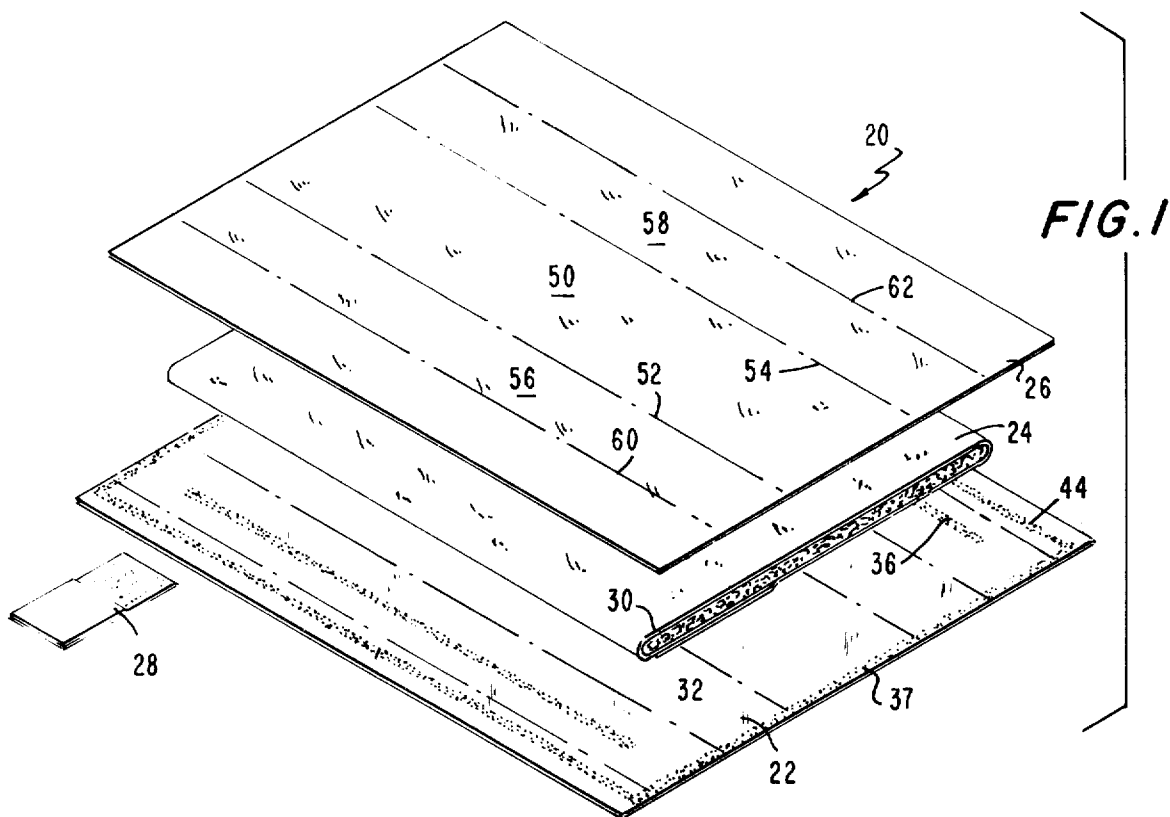


FIG. 5

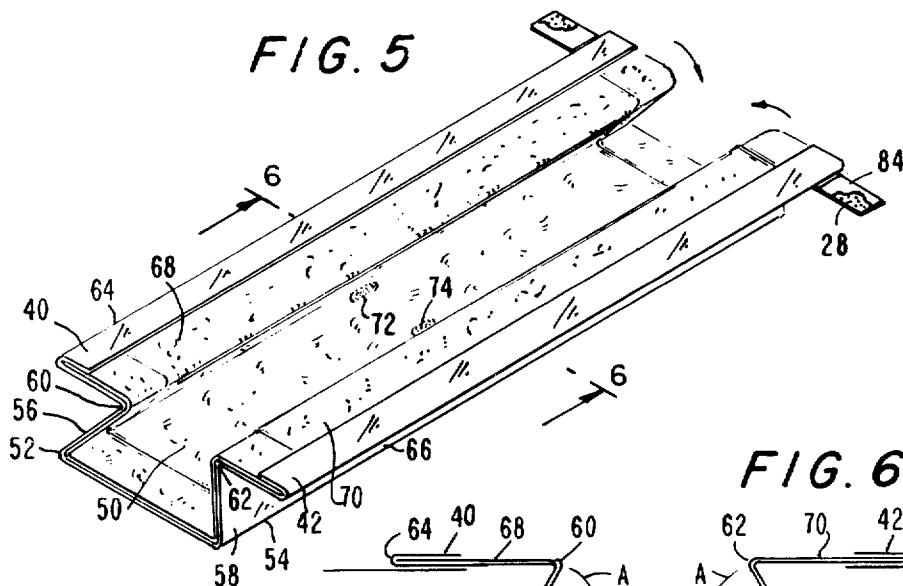


FIG. 6

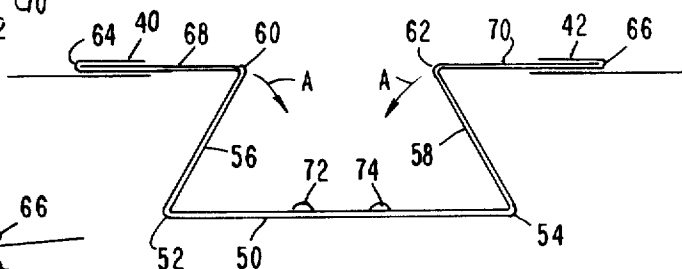


FIG. 7

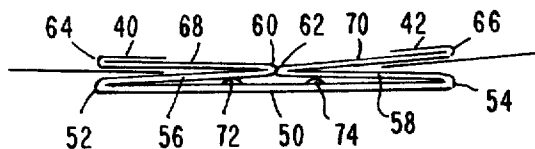


FIG. 8

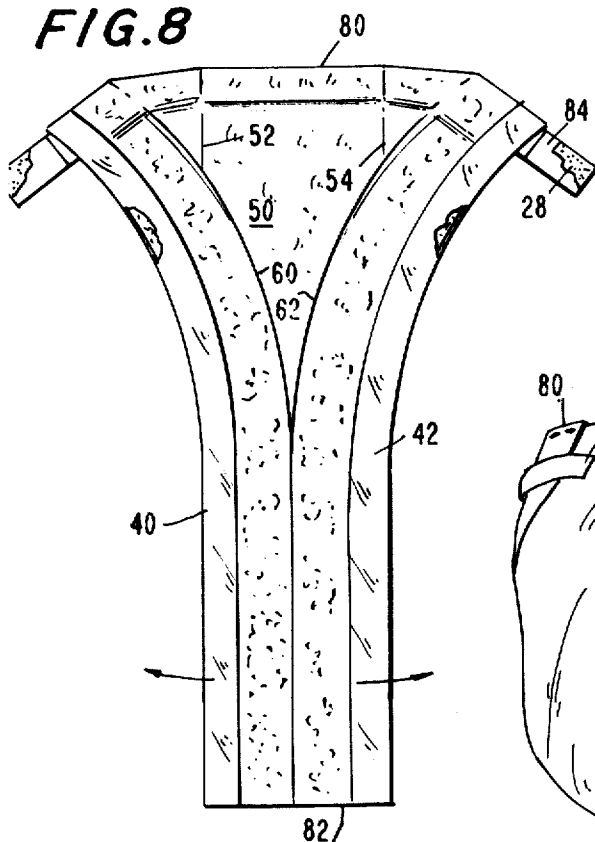


FIG. 9

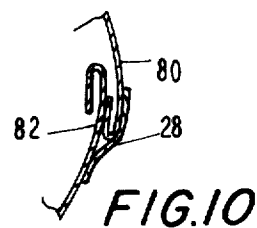
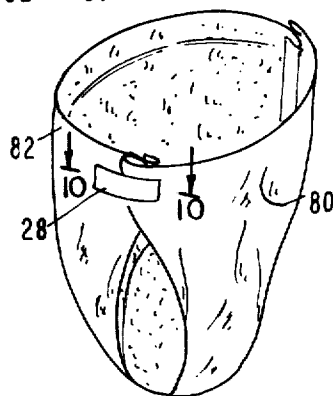
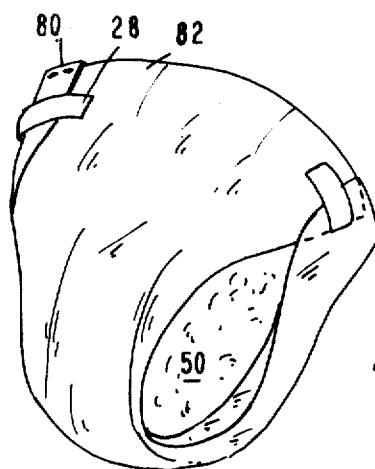


FIG. 11



## DIAPER

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to disposable diapers and more particularly to those of a rectangular configuration.

## 2. Description of the Prior Art

Disposable diapers presently being used in quantity are for the most part of the rectangular type because of the economy of manufacture and hence lower cost to the consumer. These rectangular diapers provide for a considerable amount of absorptive material in the crotch area of the diaper but have failed to take full advantage of the full absorptive capabilities of the rectangular diapers.

A rectangular diaper is disclosed in the U.S. Pat. No. 3,592,194 issued to Robert C. Duncan on July 13, 1971 for DIAPER HAVING IMPROVED WICKING AND DRYNESS. This rectangular diaper is folded in a box pleat such as also disclosed in British Pat. No. 1,011,888 of Dec. 1, 1965. However, the panels defined by the box pleated diaper are spaced substantially from each other requiring that the central panel behind the pleated panels receive most of the urine while the spaced apart panels also permit chaffing.

Further, in order to provide the desired absorptive capacity, the rectangular diaper with the spaced apart panels is of an undue width which allows the legs to force the diaper down so that it tends to sag away from the trunk of the body thus preventing proper utilization of the absorptive capabilities of the diaper.

In addition, in the prior art rectangular diapers because of the spaced-apart position of the folded panels of the diaper, surface wetness of the hydrophobic face sheet of the central portion or panel of the diaper resulting from the inefficient transfer of waste fluids from the center into the total mass of absorbent material is prevalent because of the space-apart position of the folded panels which results in a wetting of the face sheet adjacent the skin of the infant, thus reducing the advantages otherwise inherent in the use of a hydrophobic face sheet because instead of small areas which have been wet while permitting passage into the hydrophilic or absorbent pad, substantially the entire surface area of the hydrophobic sheet becomes wet and the chaffing on an infant is increased due to the wetness and the spaced-apart position of the folded panels.

## OBJECTS OF THE INVENTION

It is an object of the present invention to provide a disposable diaper which includes an arrangement of parts for providing for improved surface dryness in the crotch area of the diaper and wherein the surface of the hydrophobic face sheet adjacent an infant's skin is rendered less subject to flooding by fluids not yet absorbed or retained within the absorbent material.

Another object of the invention is to provide a narrower, more comfortable and better fitting diaper in which the wicking of fluids is enhanced.

## SUMMARY OF THE INVENTION

The present invention is a disposable diaper formed of a back sheet which is of a waterproof material and a hydrophobic face sheet having a fluid absorbent pad sandwiched therebetween. The diaper is folded in a box pleat and in a manner whereby the inwardly extending panels form by the box pleat substantially abut each

other. In this manner, by limiting the space between the panels, the entire diaper is made narrower without sacrificing absorptive capabilities and the absorptive area of the diaper. Further, by utilizing a pad which is of less dimensions than either the outer sheet or face sheet, an arrangement is had whereby a waterproof edging is provided along the sides of the diaper, yet the edging is thinner and more flexible than the portions where the pad is located, thereby permitting ease and convenience of fastening and lack of chaffing.

Another great advantage of the invention is that when the pad is impregnated with perfume or the like material, the fact that the panels abut or substantially abut each other eliminates the channel or passageway between the panels of the prior art rectangular diaper thereby reducing the amount of evaporation of perfume especially in the crotch areas where the perfume is most needed.

## BRIEF DESCRIPTION OF THE DRAWING

The foregoing together with the various ancillary objects and features of this invention which will become apparent as the following description proceeds, are attained by this disposable diaper, a preferred embodiment of which is shown in the accompanying drawings wherein:

FIG. 1 is an exploded perspective view of a diaper constructed in accordance with the concepts of the present invention;

FIG. 2 is a plan view of a disposable diaper according to the invention with parts thereof being broken away to show details of construction of other parts of the invention;

FIG. 3 is an enlarged vertical sectional view taken along the plane of line 3—3 in FIG. 2;

FIG. 4 is a vertical sectional view in an enlarged scale taken along the plane of line 4—4 in FIG. 2;

FIG. 5 is a perspective view showing a diaper constructed in accordance with the concepts of the present invention in an intermediate state of folding;

FIG. 6 is a schematic view of the diaper, not illustrating the absorbent pad used therein while showing the manner in which the diaper is box pleated and folded and showing the parts in an intermediate state of folding;

FIG. 7 is a view similar to FIG. 6 but showing the diaper in its completely folded position;

FIG. 8 is a plan view illustrating the diaper and the manner of use thereof;

FIG. 9 is a perspective view illustrating the manner in which a diaper is secured in position for use;

FIG. 10 is a sectional detailed view taken along the plane of 10—10 in FIG. 9; and

FIG. 11 is another perspective view further illustrating the diaper as arranged for use.

## DETAILED DESCRIPTION OF THE INVENTION

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral 20 is used to generally designate a disposable diaper constructed in accordance with the concepts of the present invention. The diaper 20 is constructed of three main parts, a waterproof back sheet 22, a hydrophilic pad 24, and a hydrophobic face sheet 26.

The back sheet 22 is made of any thin waterproof material such as a film of plastic material including

polyethylene, polypropylene, polyvinylchloride or other suitable flexible material. Secured to the back sheet are pressure sensitive adhesive coated tabs 28 for use as fasteners when clothing an infant with the diaper 20.

The pad 24 is of a suitable hydrophilic material or of a composite construction so as to have a substantially uniform absorptive capacity and is preferably made of a paper envelope 30 filled with a fibre fluff such as wood fluff, cotton fluff or the like. This envelope can be formed after blowing the absorbent fluff material as a coating onto the paper. Other absorbent material can be utilized including a plurality of plies of paper having a fluff coating thereon or of plies of creped cellulose wadding or the like.

The face sheet 26 is of a hydrophobic paper. The terms hydrophilic and hydrophobic used herein relate to relatively high and relatively low critical surface tensions of the materials. The face sheet 26 is hydrophobic as evidenced by its lack of affinity for waste fluids since the fluid waste does not spread to any appreciable amount as it absorbed by the hydrophilic pad. Hence, when the face sheet 26 is placed next to an infants skin, its waste fluids pass therethrough and absorbed by the pad 24 leaving the face sheet 26 adjacent the infant's skin relatively dry.

The pad 24 is both substantially narrower in width than the back sheet 22 and is shorter in length. The face sheet 26 is of the same length as the back sheet, is of greater width than the pad 24 but of less width than the back sheet 22. The pad is positioned on the back sheet 22 and may be bonded at 36 thereto using an adhesive. As shown in FIG. 2, the face sheet 26 overlies the pad and is bonded thereto at 37 outwardly of the periphery 38 of the pad as shown in dotted lines. The back sheet is then folded about the edge 38 of the face sheet 26 to form side flap portions 40,42 which overlie the face sheet 26 but do not overlie the pad 24. The side flap portions are bonded at 44 to the face sheet 26.

The assembled diaper 20 is folded in the manner of a box pleat to form a central portion in the form of a central panel 50 defined by fold lines 52 and 54. Inwardly extending portions or panels 56 and 58 are defined by fold lines 52, 60, and 54, 62. A pair of opposed portions defined by fold lines 60,62 and the side edges 64 and 66 of the diaper 20 are formed by the box pleating as outwardly extending panels 68 and 70.

The inwardly extending panels 56 and 58 are bent inwardly in the direction indicated by arrows A so that panels 58 and 60 abut each other along the fold lines 60 and 62. The panels 56 and 58 are folded from the position as shown in FIG. 6 to the position shown in FIG. 7. Suitable amounts of adhesive as indicated at 72 and 74 are provided on the central panel 50 and bond the inwardly extending panels 56 and 58 at the crotch portions of the diaper 20 to the central panel 50. By doing so the crotch portion is maintained in its relatively narrow configuration.

The pad 24 is impregnated with a suitable perfume or the like. When the diapers according to the invention are packaged by being stacked one diaper upon the other, the impervious waterproof back sheet 24 of each diaper will suffice to maintain the perfume against evaporation by overlying the exposed portions of face sheet 26 of the diaper therebelow. The uppermost diaper in a package is preferably turned face downwardly.

In previous box pleated diapers where the inwardly extending panels are spaced apart, channels, or passageways are formed which would lead to evaporation of perfume if the pad of such diapers had been impregnated. Evaporation would occur especially at the crotch location where the perfume would have done the most good. However, in the embodiments where the inwardly extending panels abut at the fold lines 60 and 62, no such air channel or passageway is formed whereby evaporation is lessened and shelf life is enhanced for a package of diapers which have their pads impregnated with perfume.

In use, the diaper 20 is laid on a surface in preparation for positioning of an infant thereon and one end 80 is fanned out as shown in FIG. 8. An infant is then positioned on the diaper with the infant's buttocks being centered over the adhesively secured crotch portion thereof with the opposite end 82 from the end 80 fanned out extending downwardly toward the legs of the infant. Then the downwardly extending end is brought up between the infants legs to a position approximately even with the infants waist and that end 80 is then fanned out. The diaper is then secured to the child by positioning the corners of the end 80 into overlapping relationship with respect to the corners of the end 82 which fastens by means of the fasteners 28. The corners may be folded back as necessary to best fit and conform to the waist size of the infant as shown in FIG. 10. The pressure sensitive adhesive of the fasteners 28 is preferably selected as to be least irritating to the infant's skin and the fastener 28 may be paper back or of a plastic backing such as polyethylene. The pressure sensitive tapes fasteners 28 as packaged as provided with removable protective sheets 84 which are removed prior to the use of the fastener. It is to be noted that because of the pleats maintained by the adhesive 72 and 74 in the crotch portion of the diaper, the diaper fits more closely adjacent the trunk of the infant than heretofore found possible especially because the crotch portion is narrower since the panels 58 and 60 abut at fold lines 62 and 64. The abutting panels will eliminate any channel as formed by pleated diapers where the panels are spaced apart thereby preventing such edges from chaffing the infant as occurs when the inwardly extending panels have their inner edges spaced apart.

While it is preferred to have panels 58 and 60 in abutting relationship it is within the purview of this invention that they be substantially abutting i.e., with a maximum spacing of about  $\frac{3}{8}$  inch, and preferably with a maximum spacing of  $\frac{1}{4}$  inch.

A latitude of modification, substitution and change is intended in foregoing disclosure, and in some instances some features of the invention will be employed without a corresponding use of other features.

I claim:

1. A disposable diaper comprising a waterproof back sheet, a hydrophobic face sheet, and an absorbent pad impregnated with a volatile material sandwiched between said back sheet and said face sheet, said back sheet, said face sheet and said pad being formed into a pleated configuration in at least the crotch region thereof by means of a plurality of longitudinal folds, said longitudinal folds defining a pair of opposed portions extending inwardly into abutting relationship thereby reducing the loss of said volatile material especially in the crotch area, said pad being of less width

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than said back sheet, said face sheet being of greater width than said pad but less than said back sheet, said back sheet having oppositely disposed side flap portions overlying the side edges of said face sheet and terminating outwardly of said pad.

2. A disposable diaper according to claim 1, wherein said pad is smaller in length than said back sheet and

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said face sheet so that said back sheet and said face sheet abut each other about the periphery of said pad adhesive means securing said face sheet to said back sheet outwardly of the periphery of said pad, and means bonding said inwardly extending panel to said central panel in at least the crotch region of the diaper.

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