ABSTRACT

A disposable diaper having rectangular dimensions including an absorbent pad whose central width is less than its end width. The diaper includes compliant spans of superposed backing sheet and cover sheet located on each side of the diaper in the crotch region and adapted to encircle a child's legs and is folded with a plurality of longitudinal folds along each side thereof, the folds incorporating the spans.

5 Claims, 11 Drawing Figures
This invention relates to a diaper of the type intended to be used once and discarded. In general, these diapers are referred to in the art as “disposable diapers.” Disposable diapers have long been known in the art and their commercial acceptance appears reasonably assured. Of the various disposable diapers that have been proposed, many have disadvantages which make them less than completely satisfactory. Accordingly, it is an object of the present invention to provide a disposable diaper which is free of certain of the disadvantages present in prior art diapers of this type. It is a further object of this invention to provide a disposable diaper having elements of unique configurations that provide various functional and other advantages.

Other objects and advantages of the invention will be recognized from the following description, including the drawings in which:

FIG. 1 is a representation of an unfolded diaper embodying various features of the invention;
FIG. 2 is a fragmentary view, partly sectioned, showing a corner of the diaper depicted in FIG. 1;
FIG. 3 is a sectional view taken generally along the line 3—3 of FIG. 1;
FIG. 4 is a sectional view of an alternative embodiment of the disclosed diaper showing an absorbent pad having a constant thickness across its width;
FIG. 5 is a fragmentary sectional view taken generally along the line 5—5 of FIG. 1;
FIG. 6 is a fragmentary sectional view taken generally along the line 6—6 of FIG. 1;
FIG. 7 is a representation of a folded diaper including various of the features of the invention;
FIG. 8 is a fragmentary sectional view taken generally along the line 8—8 of FIG. 7;
FIG. 9 is a fragmentary sectional view of an alternative embodiment of the folded diaper disclosed herein;
FIG. 10 is a fragmentary representation of an absorbent pad suitable for use in the disclosed diaper;
FIG. 11 is a representation of a diaper embodying various features of the invention and showing a portion of the folds of the diaper partly opened.

Briefly stated, the objects of the present invention are accomplished by means of a disposable diaper having rectangular dimensions including an absorptive pad having an hour-glass profile encased between backing and cover sheets. The diaper may be used in a flat condition, but preferably is folded along its opposite side edges to provide longitudinal folds that provide advantages which will be referred to hereinafter.

Referring to the FIGURES, the primary absorptive element of the disclosed diaper 10 comprises an absorbent pad 12. Contrary to the rectangular absorbent pads used in certain prior art disposable diapers, the absorbent pad 12 of the disclosed diaper 10 has an hour-glass profile including a relatively narrow midsection 14 flanked by wider end sections 16 and 18, each of which includes lobular portions 20 and 22 that extend laterally of the longitudinal centerline 21 of the pad and terminate short of the respective side edges 24 and 26 of a backing sheet 28 (See FIGS. 1, 2 and 3).

The absorbent pad 12 is overlaid on a rectangular liquid impervious backing sheet 28 such as a plastic film which preferably is embossed to enhance its appearance and hand. The plastic backing sheet 28 provides a barrier against liquid flow through the thickness of the diaper and is disposed on that side of the absorbent pad 12 which is intended to face away from the child when the diaper is applied. In the present diaper, the backing sheet 28 is rectangular and of a greater length than the pad 12 so that the opposite ends 30 and 32 of the pad terminate short of the ends of the backing sheet (See end 33 in FIG. 2). That side of the backing sheet opposite the side thereof which is in contact with the absorbent pad 12 faces outwardly of the diaper when in use to define an exposed surface 34.

On that side of the absorbent pad 12 opposite the backing sheet 28 there is overlaid a rectangular liquid pervious cover sheet 36. This cover sheet is intended to contact the skin of the child when the diaper is applied and to permit fluid exudate from the child to pass therethrough to be absorbed by the underlying pad. Cover sheets of synthetic nonwoven materials function satisfactorily to pass the fluid exudate, aid in preventing escape of fluff fibers, and simultaneously provide strength to maintain integrity of the diaper.

The cover sheet 36 of the disclosed diaper is generally coextensive in length with the backing sheet so that the ends (see end 38) of the cover sheet overlie the ends of the backing sheet. These overlying ends are bonded to each other as by bond lines 44 and 45 to close the ends 40 and 42 of the diaper and prevent loss of absorbent material. In a similar manner, the cover sheet overlying the backing sheet on opposite sides of the contoured pad is bonded to the backing sheet as by bond lines 41 and 43 which preferentially follow the contour of the pad restrict movement of the pad relative to the cover and backing sheet as well as forming barriers that limit lateral flow of liquid exudate as by wicking.

The bonds at the ends and sides of the pad may be formed by localized application of heat and pressure or through the use of one or more seams of adhesive. Continuous lines of water-insoluble adhesive, such as hot melt adhesive, disposed between the overlying portions of the cover and backing sheets have been found useful to both close the ends and sides of the diaper and provide barriers against transfer of liquid exudate from the pad ends and sides and out of the diaper as by wicking or other fluid flow mechanisms.

In each embodiment of the disclosed diaper, the cover sheet 36 is at least as wide as the backing sheet 28 so that substantially all parts of that surface of the plastic backing sheet which face the child when in use are covered with the relatively soft and pervious cover sheet. In this manner, the child is protected from contact with the relatively harsh and abrasive plastic. Isolation of the child from the plastic backing sheet by means of the interposed porous and soft cover sheet permits at least limited air circulation between the diaper and the child’s legs, keeping these areas relatively dry and free of the moisture which tends to accumulate and cause adverse reactions when the plastic lays flat against the child’s skin for prolonged periods of time and is adhered thereto by moisture. As shown in FIG. 1, the cover sheet preferably is bonded as by spot bonds 47 at spaced apart locations over a major portion of its surface to the underlying pad or to the underlying plastic backing sheet in those regions where there is no pad disposed between the cover and backing sheets to assure continued registry of the diaper components through its period of use. The preferred bonds 47 are spaced apart by a distance, such as about 1—1½ inches and the extent of bonding is kept sufficiently small as
will not deleteriously reduce the flexibility of the backing sheet and cover sheet so that these elements retain good compliancy. Additional spot bonds 46 may be provided between the cover sheet 36 and the pad 12 to secure these elements against movement relative to each other. In the preferred folded diaper, that portion of the cover sheet overlying and covering the upper surface of the plastic backing sheet in that fold facing the child is bonded to the plastic backing to a limited extent, or not bonded at all, to provide for at least limited relative movement between the plastic backing sheet and the cover sheet thereby permitting air circulation into and out of the diaper in the leg and crotch region.

In one embodiment of the diaper, depicted in FIGS. 3, 4, 6 and 8, the cover sheet 36 is substantially wider than the backing sheet 28 and the side edges 48 and 50 of the cover sheet are wrapped about the respective side edges 24 and 26 of the backing sheet 28 to terminate at a location spaced inwardly of the diaper toward its longitudinal centerline. The cover sheet side edges 48 and 50 are bonded to the exposed surface 34 of the backing sheet as by means of longitudinal bond seams 52 and 54. In this manner, the cover sheet is positioned next to the child's skin when the diaper is folded and applied as described hereinafter. The bond seams 52 and 54 and the bonds 44 and 45 at the opposite ends of the diaper effectively seal the cover sheet 36 to the backing sheet 28 around substantially the entire periphery of the cover sheet to assure that these elements remain in position relative to each other and assure that the cover sheet overlays the plastic backing sheet in those portions of the backing sheet which would otherwise be exposed for contact with the child.

A disposable diaper 10 having a rectangular outline and including a profiled absorbent pad 12 encapsulated between a liquid impervious backing sheet 28, having an outer exposed surface 34, and a liquid pervious cover sheet 36 is depicted schematically in the Figures. As shown in FIGS. 1, 7 and 8, the disclosed diaper is folded in the “V” fold which in cross section resembles the Greek symbol sigma (Σ) on one side of the diaper, hence is referred to as a sigma fold. (It will be recognized that the fold on one side of the diaper will be a mirror image of the fold on the other side of the diaper so that one fold will be a “reverse” Σ.) In accordance with this folding feature, each of the side edges 56 and 58 of the flat diaper, (side edge 56, for example) is folded inwardly toward the longitudinal centerline of the diaper along a longitudinal fold line A located inwardly from the respective side edge 56 of the diaper by about one-third of the diaper width, to define a first longitudinal fold 60. The side edge 56 of the diaper is further folded outwardly from the diaper centerline along a second longitudinal fold line B to define a second longitudinal fold 62 overlying the first fold 60. Still further, the diaper side edge 56 is folded inwardly, in the same direction as the first fold, along a third longitudinal fold line C to define a third longitudinal fold 64 that overlies the second fold 62. Upon completion of this third fold on each side of the diaper, the side edges of the pad 12 and the side edges of the backing sheet 28 are disposed inwardly toward the centerline of the diaper, but the cover sheet 36 extends over the top surface 66 of the third fold 64, wraps the pad and backing sheet at the location of the third longitudinal fold line C, and terminates on the underside 68 of the second fold 62.

As noted, in cross section, the central unfolded portion 67 of the diaper and the three folds 60, 62 and 64 on one side of the diaper resemble the Greek symbol sigma (Σ), hence is referred to as a sigma fold (the fold on the opposite side of the diaper resembles a “reverse” Σ). This fold, in combination with the relatively narrow pad midsection 14 permits the diaper to be snugly wrapped about the child's legs with the pad midsection 14 well within the child's crotch to retain the exudate within the confines of the diaper and prevent it from leaking out of the diaper in the leg regions. Because the plastic backing sheet extends the full width of the diaper (in the top fold as well as in the other folds), the exudate is kept from striking through the pad in the crotch region (i.e., centrally of the diaper) where there is normally a greater amount of flexing and working of the diaper due to the child's leg movements. The exudate is thus trapped within the diaper, keeping the child's outer clothing or bedding more free of leaking exudate. Such trapping of the exudate is enhanced in the disclosed diaper by two “V”-shaped troughs 70 and 72 formed on each side of the diaper by the folds (See FIG. 11). Both troughs, and particularly the first trough 70, receive and disperse exudate in a direction longitudinal of the diaper. The second of the troughs 72 further serves to assure the containment for a time sufficient to permit absorption of any exudate that moves past the first trough.

The folds on each side of the diaper are secured in their folded position at points located approximately on the transverse centerline of the diaper, preferably by tack bonds 74 and 76. This is accomplished by placing a small spot of adhesive between selected folds as the folds are being formed. Hot melt adhesive of the ethylene vinyl acetate type available commercially as No. 34-2938, from National Starch Company, serves satisfactorily for this purpose. This adhesive is not water soluble so that it does not dissolve in the presence of fluid exudate, but rather the spot bonds cause the diaper to retain its folded condition in the crotch region throughout its period of use. This same adhesive suitably serves for making the bond lines 44 and 45 at the ends of the pad and the bond lines 41 and 43 at the edges of the pad.

In the depicted diaper, tack bonds 74 and 76 are provided in the folds on each side of the diaper between the underside 78 of the first fold 60 and the central portion 67 of the diaper, and between the underside 80 of the top (third) fold 64 and the upper side 81 of the second fold 62. When the diaper is applied to the child, these tack bonds keep these folds together to insure good fit of the diaper in the crotch region but permit the first and second folds to separate and provide expansion of the diaper to conform to the child's legs. In a preferred tack bond, the facing portions of the cover sheet in the folds are joined so that when the diaper is applied to the child, the cover sheet unfolds to a lesser extent than the absorbent pad and effectively reduces the width of the diaper in the crotch region to provide a better fit on the child.

An alternative manner for folding the diaper is shown in FIG. 9. In this alternative, each of the diaper side edges is formed into a wing fold by bringing the longitudinal side edge portion (only side edge 56' is shown) of the diaper inwardly toward the centerline of the diaper. This folded side edge portion extends inwardly of the diaper a distance less than about one-third the width of the diaper to form a first longitudinal fold 86 along the
side of the diaper. As thus folded, the longitudinal side edge of the diaper overlies the longitudinal central portion 87 of the diaper and extends the length of the diaper. The first fold 86 is next folded back upon itself to form a second fold 88 extending along the length of the diaper and overlying the first fold 86, thereby providing two longitudinal folds 86 and 88 (FIG. 9) in each wing fold, overlying the marginal edges of a central portion 87 of the diaper. As depicted, the first fold 86 is secured to the underlying center portion as by a spot bond 90 to cause the folded diaper to retain its folded form at least while the diaper is being secured to the child's body thereby insuring that the accumulated configuration of the central portion of the diaper comfortably and snugly resides within the child's crotch and in position to efficiently receive body exudate. The spot bond 90 preferably is located generally centrally of the fold, i.e., medially of both the longitudinal and transverse dimensions of each fold. Spots of hot melt adhesive suitably hold the folds 86 and 88 in place.

It will be recognized that the diaper is applied to a child in the usual manner, that is, by fanning out one end 82 of the diaper, laying the child on the opened end and bringing the opposite end 84 of the diaper up between the child's legs. This opposite end 84 is also fanned out and the corners of the two ends joined to fasten the diaper about the child's waist. In this operation, the folds remain closed (folded) in the immediate region of the transverse centerline of the diaper but gradually increasingly expand in the direction away from the transverse centerline toward the ends of the diaper. In the present diaper the layers of backing sheet and core on each of the three folds on each side of the diaper are maintained in their relative positions within each fold and can be pulled tight about the child's legs thereby imparting excellent conformability of the diaper to the child in the leg region, hence a better fit on the child. This feature is due also in part to the number of folds which increase the expansibility of the diaper in a direction generally perpendicularly to the diaper proper, that is, as that the ends of the diaper are fanned open, such action does not place such stresses on the diaper in the crotch region as cause it to buckle and fall away from a good fit about a child's waist.

In the disclosed diaper, adhesive strips 92 and 94 are provided on opposite corners 96 and 98 of one end 84 of the diaper with a portion of each strip projecting from the side edge of each corner. When the two ends of the diaper are in place about the child's waist, these strips provide a means for releasably joining the diaper ends together to secure it in position on the child in a manner well known heretofore.

In accordance with one embodiment of the present invention, the contoured pad (e.g., having an hourglass profile) is generally centered on the rectangular backing sheet with the more narrow midsection 14 of the pad generally aligned with the transverse centerline of the backing sheet. In this position, the pad ends 30 and 32, including the lobular portions 20, 20' and 22, 22' on each end extend across respective ends of the diaper to provide substantial absorbent material in those parts of the diaper which encircle the child's waist when the diaper is in use. The diaper is thus fully padded around the child's waist to avoid the discomfort of the ledges found in the diapers having rectangular pads that are substantially more narrow than those elements which hold the pad in place on the child. Importantly, the absorptive capacity added to the diaper ends by the lobular portions 20, 20' and 22, 22' aids in preventing the escape of fluid exudate from the diaper ends as when a child is in a prone position and the exudate tends to migrate to the diaper ends.

While providing the advantages of a full width pad in the ends of the diaper, the disclosed diaper provides a good fit on the child, especially in the crotch region. This is due to the pad profile which is chosen to provide reduced width of the absorbent pad in the crotch region so that the diaper enters the crotch well without excessive bulkiness. In the present diaper, the pad is flanked in the crotch region by substantial spans 100 and 102 (FIG. 1) of backing sheet overlaid by the cover sheet and which do not include pad therein between so that they are thin and flexible. As described hereinbefore, the diaper is folded with longitudinal folds. The spans 100 and 102 are disposed within such folds so that the compliant folded spans fit snugly about the girth of the child's legs to securely retain the pad midsection 14 in position within the crotch. Importantly, the spans 100 and 102 include portions of the water-imperious backing sheet so that in combination with the pad midsection, the spans aid in forming a pocket in the child's crotch which receives both liquid and solid exudate. The pocket functions to ensure retention of the liquid exudate within the confines of the diaper for a time sufficient for its absorption by the pad. Moreover, the pocket functions to retain solid exudate and reduce the likelihood of its escape from the diaper in the leg regions. Retention of the cover and backing sheets in their superposed position is assured by the spot bonds 47 referred to hereinbefore.

As noted hereinbefore, that portion of the cover sheet 36 overlying and covering the plastic backing sheet 28 in the top fold 64 of the diaper is provided with at least limited freedom of movement with respect to the underlying portion of the plastic backing sheet so that these elements are free to work relative to each other when the diaper is applied to a child and the child moves his legs. In this manner, air circulation into and out of the diaper in the crotch region is enhanced. Further, this relative freedom of movement permits the cover sheet to slide to at least a limited extent relative to the plastic backing sheet in the event the diaper is binding against the child's legs which develops undue stresses in the diaper and discomfort to the child.

Referring particularly to FIG. 10, one suitable absorbent pad 12 comprises defiberized wood fibers, i.e., pulp, referred to in the art as fluff. In a common method of manufacturing the pad, the fluff 104 is deposited on a tissue web or sheet 106 which is of substantially the same width as the fluff and thereafter overlaid with a second tissue 108 of equal width with the fluff to sandwich the fluff between the two sheets of tissue. For purposes of the present discussion, the term "absorbent pad" is intended to include this embodiment as well as other variations and combinations of absorptive materials suitable for use in disposable diapers. One such other material comprises multiple plies of creped wadding die cut or otherwise contoured as disclosed herein. One system for the manufacture of contoured pads using air laying techniques is disclosed in pending application Ser. No. 174,092 filed Aug. 23, 1971, now U.S. Pat. No. 3,717,905.

As desired, the fluff may be formed with a constant thickness as depicted in FIG. 4. A pad having additional thickness of fluff in the region of its longitudinal center provides additional absorptive capacity in such
Films of various plastics provide acceptable liquid impervious backing sheets. Polyethylene film, embossed with a taffeta pattern, is particularly suitable because of its appearance and availability at low cost. Films of about one mil thickness provide sufficient strength when combined with a suitable cover sheet to provide integrity to the diaper. Such relatively thin films more closely resemble a cloth material so that the diaper is pleasing in appearance and feel. These thinner films also are flexible to the extent that the diaper is permitted to conform to the contour of the child's body and provide a good fit on the child. Films having a thickness of greater than about 3 mils are excessively harsh, displeasing in appearance and more expensive so that their use in the present diaper is not desired.

One particularly suitable nonwoven material for the cover sheet 36 comprises a web formed from synthetic, hydrophobic fibers, such as rayon fibers alone or mixed with wood fibers, that have been stabilized in web form as by an adhesive which bonds adjacent fibers one to another. Fiber lengths of about one-half inch formed into a web about 5 mils thickness provide sufficient interfiber bonding to develop good tensile strength in the web so that when the web is incorporated, with a plastic backing sheet, into a disposable diaper, the diaper resists tearing or other destructive forces such as are present when the diaper is applied to an active child. Nonwoven material comprising rayon fibers and known as Dryfil 300-205 and available from Nonwoven Products Division of International Paper Company, New York, N.Y., has been successfully used as the cover sheet in a disposable diaper having a 1-mil thick polyethylene backing sheet. In webs about 5 mils thick and weighing about 0.624 ounces per square yard, this nonwoven material possesses a toughness such that adjacent folds of the cover sheet can be tucked to each other so that the diaper remains in its folded condition when in use as referred to hereinafter. Spunbonded, continuous, nylon filaments stabilized in web form and available from Monsanto Company, St. Louis, Mo., under the trademark Cerex, also provide a suitable cover sheet material.

In one embodiment of the disclosed diaper intended for "daytime" use on children weighing approximately 22 pounds, the diaper measures about 14 inches in width and 18 inches in length. The pad in such diaper is about 15 inches long, about 12½ inches wide at its widest points, and about 5 inches wide in its midsection. These dimensions provide a diaper wherein each of the side edges of the diaper will adequately encircle a child's leg having a girth of up to about 15 inches. It will be recognized that various dimensions and combinations of dimensions of the diaper elements are suitable depending on the size of the person for which the diaper is intended. In this diaper, the absorbent pad includes about 39 grams of fluff and about 6 grams of tissue web disposed on opposite sides of the fluff.

Diapers for incontinent adults obviously are larger than diapers for newborn babies. In any event, the width of the more narrow midsection of the pad element of the diaper is chosen to be sufficiently narrow as to permit the diaper to readily fit within the child's crotch without excessive bulkiness. This width is in part limited by the absorptive capacity and rate of the diaper (the fluff and cover sheet) but when using a dry-laid nonwoven cover sheet and wood fiber fluff, the pad midsection is at least about 4 inches in width to accommodate the anticipated exudate discharge without leakage. In any event, the width of the absorbent pad at its midsection is not greater than the width of the central longitudinal unfolded portion 67 of the diaper plus the widths of the first folds 60 and 60' on opposite sides of such unfolded portion 67, thereby assuring that the pad midsection does not extend laterally into more than the first folds of the diaper. Preferably, the pad, at its most narrow width, is no wider than the width of the unfolded portion 67.

The width of the pad at its ends preferably results in the pad extending fully around the child's waist when the diaper is applied. This is normally accomplished by providing a pad that is not less than about ½ inches more narrow at its ends than the backing sheet so that when the diaper ends are pinned, the pad corners slightly overlap. The transition in pad width from its ends toward its narrow midsection may be continuously curving or more abruptly changing as desired.

The rectangular configuration of the disclosed diaper affords advantages in manufacture that is not more readily and economically made than is a nonrectangular diaper. Particularly, it is less costly to fold the present rectangular diaper. More importantly, however, the rectangular configuration, in combination with the contoured pad, provides diaper portions in the crotch region for distributing exudate within the diaper and for retaining exudate inside the diaper for a time sufficient to ensure absorption of the exudate by the pad. Such diaper portions in the crotch region also serve to circumscribe the child's legs and securely position the more narrow pad portion well within the child's crotch without the pad itself being required to possess sufficient strength and integrity to maintain its position in the crotch. The good wrap of the diaper about the child's legs provides a good-fitting diaper which functions well in retaining exudate and inspires confidence in the diaper by the mother.

While a preferred embodiment has been shown and described, it will be understood that there is no intent to limit the invention by such disclosure, but rather, it is intended to cover all modifications and alternate constructions falling within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A disposable diaper comprising in combination, a liquid impervious backing sheet having rectangular dimensions, a liquid pervious cover sheet, substantially coextensive in length with said backing sheet and at least as wide as said backing sheet, disposed in superposed relation to said backing sheet and covering said backing sheet to isolate said backing sheet from the skin of a person to whom the diaper is applied, a continuous absorbent pad of generally hour-glass profile having a midsection and opposite end portions disposed between said backing sheet and said cover sheet, said pad in its end portions extending laterally substantially to the side margins of said backing sheet, whereby said pad at its ends substantially encompasses the waist of a person to whom the diaper is applied but is more narrow than said backing sheet, portions of said cover sheet overlying said backing sheet in the crotch region of said diaper and laterally of said pad midsection to
define a span of diaper that is substantially free of said pad on each side of said diaper. continuous bond line means joining said backing sheet to said cover sheet along lines disposed on opposite sides of said pad immediately adjacent to and aligned with the respective contours of said side margins, said lines being substantially coextensive in length with the longitudinal dimension of said pad and defining a substantially liquid impervious barrier against lateral migration of liquid exudate from said pad.
said diaper being folded with a plurality of longitudinal folds along each side edge thereof, said folds incorporating said spans therein whereby when said diaper is applied with said narrow midsection of said pad disposed in the crotch of said person, said spans at least partially encircle the legs of said person to securely position said diaper about said legs and maintain said pad positioned within said crotch.

2. The disposable diaper of claim 1 wherein said cover sheet is substantially equal in width with said backing sheet and each of the opposite side edges of said diaper is folded inwardly toward the longitudinal centerline of said diaper to define a first longitudinal fold, and folded back upon itself to define a second longitudinal fold.

3. The disposable diaper of claim 1 wherein said cover sheet is wider than said backing sheet and side margin portions thereof are wrapped around the side margins of said backing sheet, and each of the opposite side edges of said diaper is folded inwardly toward the longitudinal centerline of said diaper to define a first longitudinal fold, is folded back upon itself to define a second longitudinal fold, and further folded inwardly toward said longitudinal centerline of said diaper to define a third longitudinal fold overlying said second longitudinal fold, said cover sheet being sufficiently wider than said backing sheet so that those portions of said cover sheet wrapped around said side margins of said backing sheet cover substantially all of the exposed surface of said third longitudinal fold.

4. The disposable diaper of claim 1 wherein said cover sheet is bonded in spaced apart locations to said backing sheet in the regions where there is no portion of said pad interposed therebetween.

5. The disposable diaper of claim 1 and including an elongated bond between said backing sheet and said cover sheet extending across each of the opposite ends of said diaper at locations outwardly from the opposite ends of said pad and laterally past the opposite side margins of said pad, said bond means on said side of said pad intersecting said bond at each opposite end of said diaper to define a substantially continuous liquid exudate migration barrier about the periphery of said pad.