

[54] **CONTRACTABLE SIDE PORTIONS FOR DISPOSABLE DIAPER**

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[22] Filed: **Nov. 21, 1973**

[21] Appl. No.: **418,147**

2,675,805	4/1954	Trimble	128/284
2,969,065	1/1961	Farnsworth	128/284
3,000,381	9/1961	Mulhole	128/284
3,744,494	7/1973	Marsan	128/287
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[52] U.S. Cl. 128/287
 [51] Int. Cl. A61f 13/16
 [58] Field of Search..... 128/284, 287

[57] **ABSTRACT**

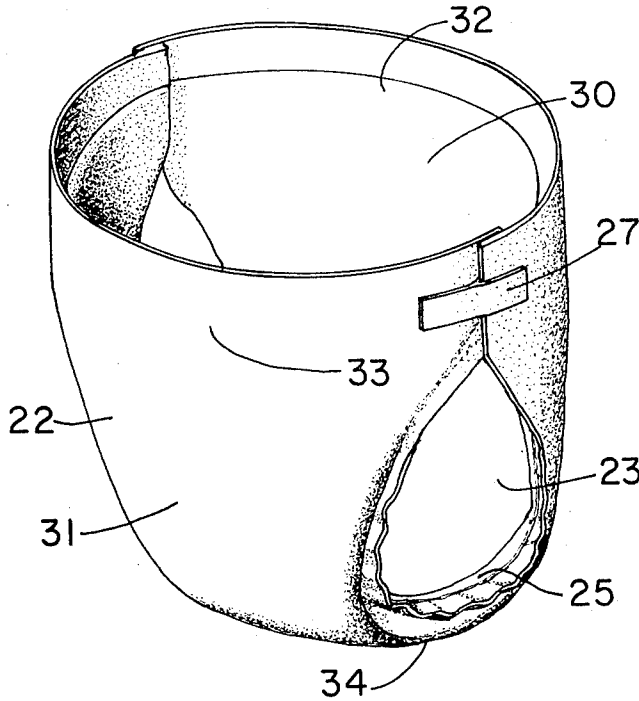
An elastically contractable, flexible side position for an integral disposable diaper. The side portion extends along the lateral edge of the diaper and an elastic contracting member is attached to the side portion adjacent the outer lateral edge of the side portion to elastically contract the outer edge of the side portion.

[56] **References Cited**

UNITED STATES PATENTS

2,419,867	4/1947	Woodman.....	128/284
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17 Claims, 9 Drawing Figures



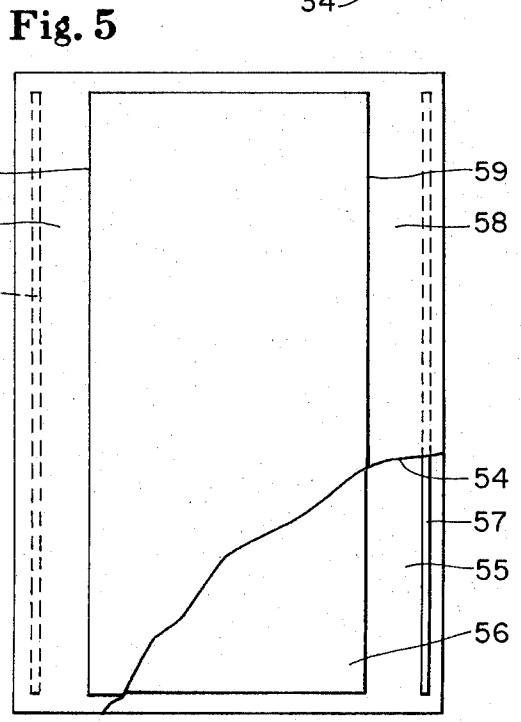
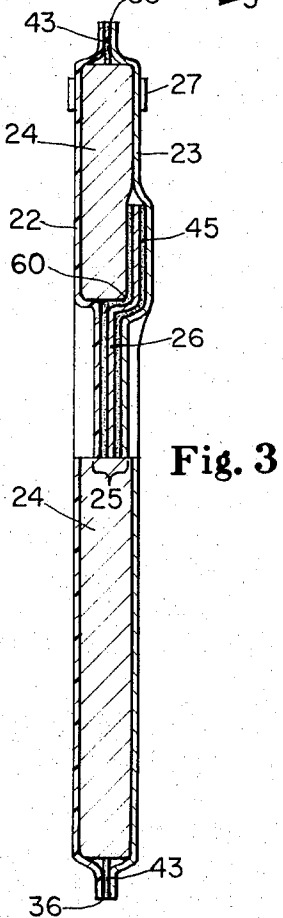
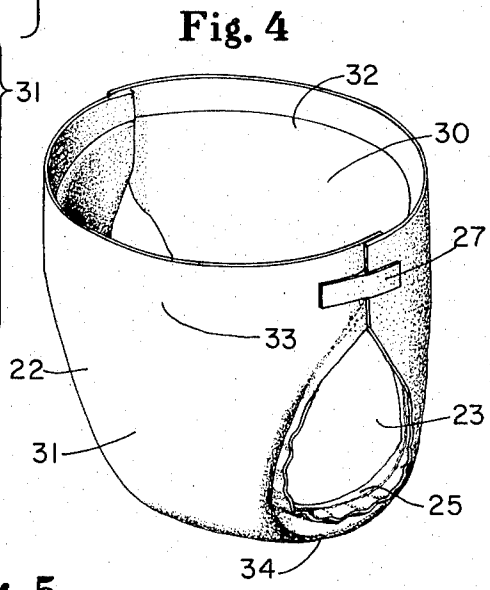
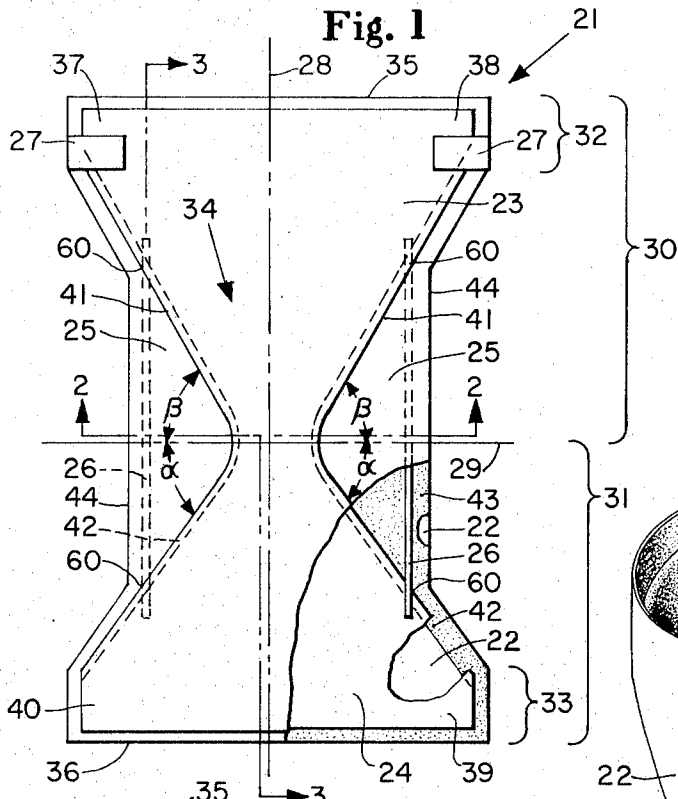


Fig. 6

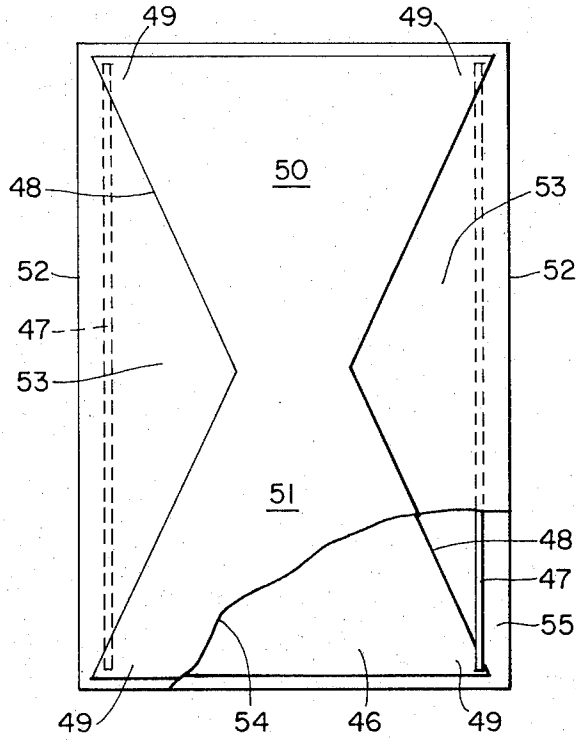


Fig. 7

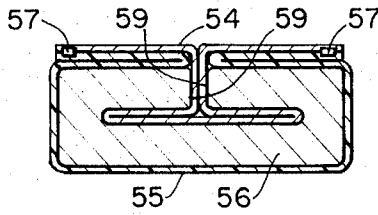


Fig. 2

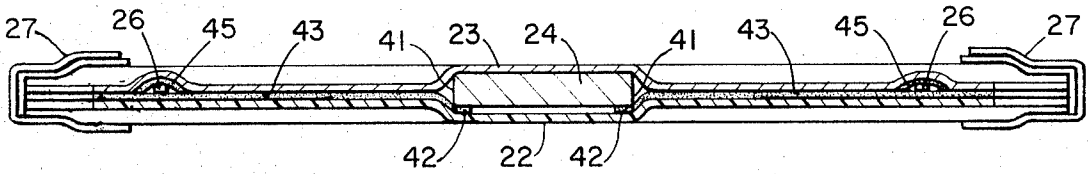


Fig. 8

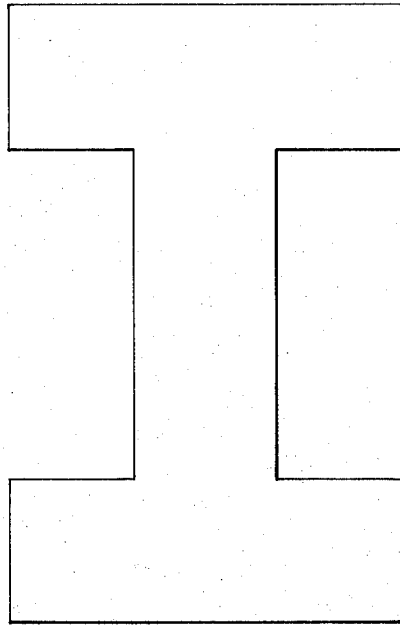
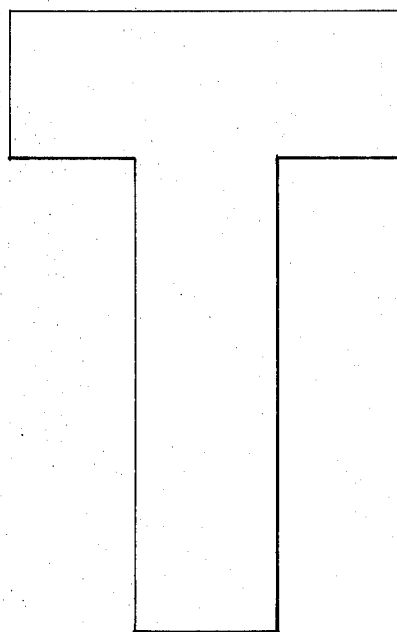


Fig. 9



CONTRACTABLE SIDE PORTIONS FOR DISPOSABLE DIAPER

BACKGROUND OF THE INVENTION

This invention relates generally to receptors comprising portable appliances intended to be used to receive or tending to receive discharge from the body and in particular relates to disposable diapers, incontinence pads, and the like designed to be worn on the body and having a contractable portion which conforms to the contours of the body and permits movement of the body while maintaining contact with the body in motion.

DESCRIPTION OF THE PRIOR ART

Absorbent devices such as disposable diapers are well known in the art. These devices are used to absorb liquid from the human body and retain that liquid. Present disposable diapers are generally flat composite sheets which are fitted to a baby in the flat state or incorporate geometrical folding to achieve a suitable "baby shape." A major in-use problem with all of these diapers is that gaps between the diaper and a baby's leg tend to develop due to the semi-rigid nature of the absorbent body, especially after the diaper has been worn for some time. These gaps permit leakage from a disposable diaper, thereby creating damp or absolutely wet outer clothing and bedding around a baby.

Disposable diapers, relative to cloth diapers in plastic pants, generally involve single-pinned attachments at the waist. Single taping each side or single pinning tends to force the mother into choosing between leg leakage or waist leakage. Mothers can pin or tape a disposable diaper "low" so that the edge wraps tightly around the thigh and thus minimizes leg leakage but only at the cost of encouraging the front of the diaper to blossom or pouch outward as though it were trying to form a damp apron. When the child is expected to be sleeping, she can avoid this by taping or pinning "high" along the waistline which is not only aesthetically more acceptable but also minimizes waist leakage, albeit at the expense of increased leakage at the legs.

The above disadvantage has been overcome with cloth diapers in plastic pants because the legs and waist of plastic pants are usually elasticized and they generally employ either multiple snaps on both sides (at the waist closure, the leg closure, and an intermediate position) or a "pull-on" style which needs no snaps at all. One of the problems facing disposable diaper designers, then, is to develop a diaper in which a single closure along each side can successfully effect closure both along the thigh and waist without excessive use of expensive tape or use of multiple pins or tape. If disposable (i.e., single use) diapers could be made from compliant woven materials, this would not be a serious problem. It does become a serious problem, however, when one recognizes that paper-based diapers are considerably less compliant than cloth and do not, therefore, stretch and conform readily to body movements. The solution of this inherent problem associated with a single use absorbent pad integrally formed with single-use plastic pants is not obvious from the prior art teaching independent, non-attached, multiple use plastic pants.

The prior art teaches elasticization of leg openings for diaper covers and diaper holders such as is shown in U.S. Pat. Nos. 3,000,381, 2,969,065, 2,675,805,

2,509,674, and 2,468,445. All of this prior art is concerned with and teaches elastic leg openings for devices which are not part of an integral disposable diaper, but does not teach the problems and advantages of an elastically contractable side flap on an integral disposable diaper. The above prior art is concerned with a separate plastic pant device which is put over a diaper already applied to an infant or a separate carrier member for detachable absorbent pads held in place by the carrier.

Thus, the prior art shows separate devices which require separate application by the user rather than an integral absorbent device having elastically contractable leg openings, and it does not teach how to overcome the problems associated with combining elastically contractable side flaps with a semi-rigid absorbent body.

OBJECTS OF THE INVENTION

It is one object of the present invention to provide an integral disposable diaper having elastically contractable leg openings.

It is another object of this invention to provide a disposable diaper having integral elastically contractable leg openings having a side flap which is of the necessary width and flexibility to provide continued non-slipping contact with the wearer's body, thereby providing improved containment.

It is a further object of this invention to provide an integral disposable diaper having a uniquely elastically contractable side flap.

It is an additional object of this invention to provide an integral disposable diaper of the above object wherein the ends of the elastic member overlap the absorbent body.

It is another object of this invention to provide an integral disposable diaper having elastically contractable leg openings wherein bunching of the absorbent body in the crotch area is retarded.

It is a further object of this invention to provide an integral disposable diaper having elastically contractable leg openings wherein the elastic member is positioned laterally between the edge of the back portion and the edge of the crotch area of the absorbent body.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an improvement for an integral disposable diaper having a backsheet and a semi-rigid absorbent body superposed and associated with the backsheet, the improvement comprising: a flexible side flap extending outwardly from and along each lateral edge of the absorbent body, the side flap being in the crotch area of the diaper; an elastic member secured to the side flap in an elastically contractable condition, the elastic member being effective to gather the side flap thereby providing an elasticized contractable line through the side flap; the portion of the elasticized contractable line in the crotch area being spaced outwardly from the lateral edge of the semi-rigid absorbent body at least $\frac{3}{4}$ inch; whereby effective elastic side flaps are formed on the integral diaper and the side flaps being compliant and forming effective seals about an infant's leg.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims partic-

ularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description taken in connection with the accompanying drawings in which the thickness of some of the materials are exaggerated for clarity and in which:

FIG. 1 is a plan view of a disposable diaper of this invention in an unfolded configuration and partially fragmented;

FIG. 2 is a cross-sectional view of the diaper of FIG. 1 taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view of the diaper of FIG. 1 taken along line 3—3 of FIG. 1;

FIG. 4 is a perspective view of the diaper of FIG. 1 in its configuration as applied to an infant;

FIG. 5 is a plan view, partially fragmented, of another embodiment of a diaper having the improvement of this invention;

FIG. 6 is a plan view, partially fragmented, of another embodiment of a diaper having the improvement of this invention;

FIG. 7 is a transverse cross-sectional view of the diaper of FIG. 5 in a "Z" folded configuration; and

FIGS. 8 and 9 are alternate embodiments of absorbent bodies.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. 1, 2, 3 and 4, there is shown a preferred embodiment of an integral disposable diaper having a semi-rigid absorbent body and the elastically contractable flexible side portions (hereinafter referred to as side flaps) of this invention. Although "flap" may generally mean a thin member, hereinafter it is also intended to encompass any portion having the requisite flexural rigidity, whether it is thick or thin. The integral disposable diaper 21, i.e., a unitary diaper which does not require separate manipulatable parts like a separate holder and liner, has a backsheet 22, a topsheet 23, an absorbent body 24, and a side flap 25 on each side of the diaper. For the purpose of providing an elasticized contractable line within the side flap 25, an elastic member 26 is associated with each side flap 25 thereby providing an elastically contractable portion in each side flap 25. A fastening tape 27 is shown as one means for attaching such a disposable diaper to an infant.

The elasticized portion of each side flap 25 should be positioned sufficiently remote from the semi-rigid absorbent body 24 to permit the elasticized contractable line through the side flap to maintain a good fit about the leg during normal in-use leg/diaper movements. The minimum desirable width, i.e., transverse distance, of flexible side flap at each location along the edge of the diaper, the width being the distance from the elastically contractable line to the nearest edge of the semi-rigid absorbent body, should be dimensionally equivalent to one-half of the maximum anticipated longitudinal displacement of the elastic contractable line at that point as experienced during normal in-use wearing. Since the maximum in-use displacements normally occur in the wearer's crotch area, a preferred side flap design would maximize the side flap width in this region. In addition, since the relative leg movements in the upper leg pivot/thigh region are considerably lower, the side flap width may be narrower in that region with-

out reducing the fit/containment attributes of the side flaps.

The disposable diaper 21 has a longitudinal center line 28, a lateral center line 29, a back portion 30, a front portion 31, a back waist portion 32, a front waist portion 33 and a crotch area 34.

The back portion 30, in general, is that part of the diaper from the lateral center line 29 to the back end 35 of the diaper. The front portion 31, in general, is that portion of the diaper from the lateral center line 29 to the front end 36 of the diaper. The back waist portion 32 is that width across the diaper adjacent to and parallel with the front end 35. The front waist portion 33 is that width across the diaper adjacent to and parallel with the front end 36. The waist portions 32 and 33 cooperate with each other when the diaper is fitted and attached to an infant to encircle the waist and hold the diaper on the infant. The width of the waist portions on a diaper can vary, but in general are approximately 1 inch to 2½ inches wide and extend transversely across the diaper at each end. Their effective in-use width is established primarily by the diaper fastening means, e.g., fastening tape 27.

The crotch area 34 of the diaper is that area of the diaper which is generally located directly between the legs and around the lower portion of an infant when the diaper is fitted to an infant and is approximately centered on the lateral center line 29.

The preferred embodiment of a diaper having the improvement of this invention is shown in FIGS. 1, 2 3 and 4. This diaper has an hour-glass shaped absorbent body 24 wherein the absorbent body in the waist portions 32 and 33 is wider than the absorbent body in the crotch area 34, thereby forming ears 37, 38, 39 and 40 at each edge of the waist portions. The absorbent material can be any of the absorbent materials known to those of ordinary skill in the bandage art, for example, a multiplicity of plies of creped cellulose wadding, fluffed cellulosic fibers or wood pulp — wood pulp sometimes known as airfelt —, textile fibers or other absorbent materials. An acceptable absorbent body 24 made from creped cellulose wadding would comprise ten plies of tissue having a basis weight (air dried) of 13 to 15 pounds per ream of 3,000 sq. ft. before creping. The plies of wadding may have a 60 percent, or greater, crepe — the percent crepe being equal to 100 times the quotient of the reduction in length caused by the creping of a piece of tissue divided by the length of the piece of tissue in uncreped form. Another, and presently preferred, absorbent body is made of airfelt and is generally faced on each the top and the bottom surface by a layer of tissue. The airfelt and tissue combination for such an absorbent body in a "daytime size" diaper which is intended to fit infants ranging from 14 to 28 pounds ordinarily has a basis weight of approximately 0.33 grams per square inch.

Absorbent bodies in disposable diapers are semi-rigid in nature due to the absorbent material used therein. A measure of the rigidity of such absorbent bodies is Taber Stiffness per TAPPI standard T489 OS-70 and for the purposes of this disclosure, an absorbent body having a Taber Stiffness of 7 gram-centimeters or greater is considered as semi-rigid.

The absorbent body provides flexural rigidity in the diaper and the ears, so that the ears are resistant to inward forces, whereby the ears are maintained in an outwardly extending position when subjected to moderate

inwardly contracting forces. This flexural rigidity of the ears of the integral diaper is from about 20 to 200 grams per inch of width to produce a 90° bend as measured on a packaging industry standard test machine, i.e., a *PCA Score Bend Tester*, manufactured by Thwing-Albert Instrument Company, Philadelphia, Pa., in accordance with the standard published instructions for conducting tests on that machine.

The greatest advantage is realized for the improvement of this invention when absorbent body 24 is a semi-rigid body. The absorbent body is held relatively immobile with respect to the side flaps 25, that is, the backsheet does not slide back and forth over the absorbent body as is possible with the combination of a separate diaper and conventional plastic panties. The absorbent body can be rendered immobile with respect to the side flaps when part of the backsheet is in the side flap in many ways, for example, bonding the backsheet and absorbent body together, bonding the absorbent body to a topsheet and the topsheet to the backsheet, or merely tightly sandwiching the absorbent body between a topsheet and the backsheet.

As shown in FIG. 1, the lateral edges 41 of the absorbent body 24 are directed inwardly from the diaper ends toward the diaper center to form an hour-glass shaped absorbent body. The lateral edge 41 of the absorbent body 24 in the front portion 31 forms a side flap angle α with the lateral centerline 29. The lateral edge 41 of the absorbent body 24 in the back portion 30 forms a side flap angle β with the lateral centerline 29. Angle α should be between 20° and 65° and preferably about 52°. Angle β should be between 20° and 70° and preferably about 58°. If α and β are adjacent as shown in FIG. 1, as contrasted to being separated by a substantially linear segment in the crotch area, then the minimum of α plus β should be about 90°. The lateral edges 41 of the absorbent body 24 may be either linear or curvilinear. If the edges 41 are curvilinear, the angle α or β is the angle between the chord of the arc in the front portion 31 or back portion 30, respectively, and the lateral centerline 29.

The width of the absorbent body 24 along the back end 35 or the front end 36 is generally about 8 and 13 inches, preferably about 11 inches. The width of the absorbent body 24 along the lateral centerline 29, which is generally the narrowest portion of an hour-glass shaped pad, is between 1 inch and 6 inches, preferably 2 to 3 inches. The length of the absorbent body 24 is typically from 11 to 18 inches long, preferably about 16 inches. The narrowest portion of the absorbent body 24, i.e., the width along the lateral centerline 29, is preferably displaced from 0 to 3 inches, and more preferably displaced about ½ inch, toward the front of the absorbent body from the longitudinal center of the absorbent body.

The absorbent body 24 is superposed on backsheet 22 and preferably attached thereto by attachment means such as those as are well known to those of ordinary skill in the art, for example, double sided pressure sensitive adhesive tapes, hot melt glues, or other adhesives. The absorbent body 24 can be secured to the a 22 by a uniform continuous layer of adhesive, patterned layer of adhesive, or a number of separated spots of adhesive. In addition, it has been found to be advantageous to secure the lateral edges 41 of the absorbent body 24 to the side flap, for example, through the backsheet by a pad-edge attachment means 42. The

pad-edge attachment means 42 ultimately provides an attachment means between the side flap 25 and its corresponding lateral edge of the absorbent body through the backsheet.

The backsheet 22 is a flexible moisture impermeable sheet desirably being a low density, opaque polyethylene web which is about 0.001 inches thick, for example, a polyethylene web available from Monsanto Chemical Company and identified by them as film No. 8020. In this embodiment, the backsheet 22 has a modified hour-glass configuration and extends beyond the periphery of the absorbent body around the entire periphery thereof. At each end, the backsheet extends beyond the absorbent body approximately ½ inch. Along the lateral edges, the backsheet extends beyond and is parallel to the lateral edges 41 of the absorbent body from each end for a distance. As the absorbent body gets narrower and towards the crotch area 34, the backsheet periphery is substantially linear and parallel to the longitudinal centerline 28, such as edge 44 as shown in FIG. 1, so the backsheet is wider than the absorbent body and the side flap 25 becomes increasingly wider until the transverse centerline 29 is reached. This linear portion of the backsheet periphery forms the contractable edge 44 of the side flap 25. The linear portion of the lateral edge of the backsheet 22 is generally between 5 inches and 12 inches long and for a daytime size diaper about 9 inches long. The backsheet 22 preferably is embossed and/or matte finished.

The portion of the backsheet extending beyond the lateral edges 41 of the absorbent body in the crotch area 34 of the diaper forms part of the side flap 25.

The "modified" hourglass shape described above and shown in FIG. 1 for the backsheet 22 provides a diaper wherein the length of the diaper edge is longer than the length of the longitudinal center of the diaper, i.e., the longitudinal centerline. This difference in length provides a potential for a better fit as can be appreciated by considering the anatomy of a human, whether infant or adult. The length covered by the edge is longer than that covered by the longitudinal centerline of a diaper.

The topsheet 23 in this embodiment is coextensive with and superposed on the backsheet 22 with the absorbent body 24 disposed therebetween. The topsheet 23 is attached to the backsheet 22 where their surfaces meet, that is in the areas beyond the periphery of the absorbent body 24, by a topsheet-backsheet attachment means 43, said attachment means being highly flexible, especially in the side flap 25. Thus the side flap 25 in this preferred embodiment comprises portions of the backsheet and the topsheet and the coextensive attachment means therebetween.

The topsheet 23 may be any compliant, soft feeling, porous, paper or non-woven fabric web. One example thereof is an unwoven fabric sheet comprising 1.5 to 3.0 denier rayon and containing approximately 20 to 35 percent binder (for example, copolymers of an ester of acrylic acids such as is sold by the Rohm & Haas Company and identified as Rhoplex, HA-8), and having a weight of about 15 to 19 gm. per sq. yd. Another example of a topsheet which has been found to work well is a non-woven fabric sheet comprising 35 to 64 percent of 1.5 to 3.0 denier polyester fibers, 14 to 40 percent of 1.5 to 3.0 denier rayon fibers, and approximately 20 to 30 percent of binder, for example, the above-mentioned Rhoplex HA-8; the fabric having a

weight of about 25 to 35 grams per sq. yd. and a caliper of 0.016 to 0.020 inches.

Each side flap 25 in the diaper of this preferred embodiment is essentially triangular and can roughly be defined as being bound by the lateral edge 41 of the absorbent body in the back portion 30 of the diaper, the lateral edge 41 of the absorbent body in the front portion 31 of the absorbent body, and the elasticized contractable line through the side flap which is established by the elastic member 26 and in this embodiment is the outside contractable edge of elastic member 26. The side flap 25 should be highly flexible and thus contractable. Thus it should have a flexural rigidity of no greater than about 6 gram-centimeters, preferably less than about 3 gram-centimeters, and most preferred less than 0.5 gram-centimeters, as measured using a Taber Stiffness instrument in accordance with TAPPI standard T489 OS-70. In this embodiment the side flap comprises the backsheet material, the topsheet material, and the topsheet-backsheet attachment means. Thus, the topsheet-backsheet attachment means must also be of highly flexible material.

The elastic member 26 is operatively associated with the side flap 25 in an elastically contractable condition so that in a normally unrestrained configuration, the elastic member 26 effectively contracts or gathers the side flap material thereabout to provide an elasticized-contractable line through the side flap, generally near and adjacent to the outward lateral edge 44 of the side flap.

The elastic member can be operatively associated with the side flap in an elastically contractable condition in at least two ways, i.e., stretch the elastic member to its stretched condition and fix it to the side flap while the side flap is in an uncontracted or stretched condition, or contract the side flap—for example, by pleating it—and fix the elastic member to the contracted side flap while the elastic member is in its relaxed or unstretched condition.

The elastic member within the flexible side flap of this invention preferably develops a skin contact pressure of from 0.2 to 2.5 pounds per sq. in. A skin contact pressure within that range is acceptable to provide continued contact with the infant's thigh without exerting a pressure which detrimentally indents or marks the skin. An elastic member to provide the proper skin contact pressure in a suitable flexible flap should have a tensional force therewithin in its prestretched condition in the range of from 35 to 150 grams and preferably in the range of 60 to 100 grams. The elastic member should provide such a tensional force and thus establish its prestretched condition at an elongation from its relaxed state in the range of from 25 to 200 percent and preferably in the range of from 50 to 100 percent.

One elastic member which has been found to work well is an elastic tape having a cross section of 0.007 inches by 0.25 inches and made from natural rubber which is available from Easthampton Rubber Thread Company and identified by them as L-1900 rubber compound. This elastic tape produces a tensile force of about 100 grams when stretched 100 percent from its relaxed condition. That rubber tape was used as elastic member 26 in the preferred embodiment of FIG. 1 and was stretched 100 percent from its relaxed condition to place it in its stretched condition, i.e., its maximum stretched length as allowed by other materials in the side flap when attached to the side flap, and has a ten-

sion therewithin in its stretched condition of about 100 grams.

The elastic member 26, as shown in FIG. 1, is operatively associated with the side flap 25 by securing it to the backsheet 22, the topsheet 23, or both with an elastic attachment means 45. This elastic attachment means 45 should be flexible and of sufficient adhesiveness to hold the elastic member 26 in its stretched condition substantially indefinitely. The elastic member 26 is shown in FIGS. 2 and 3 attached to the topsheet 23 by elastic attachment means 45. One material which has worked as a flexible elastic attachment means is a double sided transfer tape available from The Minnesota Mining and Manufacturing Company, St. Paul, Minnesota, which is compatible with the material of the elastic member and is known by their designation as No. 465 pressure-sensitive tape (high tack). Other flexible adhesives compatible with the elastic member could also be used as the attachment means 45. The elastic member 26 need not necessarily be secured to the side flap along its entire length, but may instead, for example, be attached only at its two ends and be operatively associated with the side flap for the remainder of its length by extending through a sleeve within the side flap or loops integral with the side flap.

The laterally outer edge of elastic member 26 in the embodiment of FIG. 1 is the elasticized contractable line through the side flap 25. The elasticized contractable line in the side flap is the "path of response" set up in a flexible side flap by an elastic member. Although the word "line" is used to describe the "path of response" in the side flap, this is not intended to preclude a "path of response" having width. In this embodiment the elastic member is shown extending along the entire elasticized contractable line in the side flap, but that structure is not absolutely required. An elasticized contractable line can be established in a flexible side flap by attaching an elastic member to the side flap which, in its stretched condition, is shorter than the elasticized contractable line. For example, an elastic member extending only from the lateral centerline 29 to either intersect 60, or an elastic member shorter than elastic member 26 placed anywhere along the path of elastic member 26. If an elastic member shorter than the elasticized contractable line is used, it is preferably located in the back portion of the diaper.

The elastic member 26 to be effective is spaced outwardly from the lateral edge 41 of the absorbent body 24 to establish the elasticized contractable line a distance from the lateral edge 41 of the absorbent body and provide a flexible side flap width, i.e., the distance from the elasticized contractable line to the edge of the semi-rigid absorbent body which in this embodiment is from the lateral outer edge of elastic member 26 to lateral edge 41 of the absorbent body 24. The most effective portion of the elastic member 26 in this embodiment is that portion in the crotch area of the diaper, i.e., adjacent the lateral centerline 29. The outward spacing of the elastic member is necessary to provide a contractable side flap for a disposable diaper. The flexible side flap width should be a minimum of $\frac{3}{4}$ inch in the crotch area, but preferably from about $1\frac{3}{4}$ to about $4\frac{1}{2}$ inches and most preferably about 3 inches.

An elastic member when operatively associated in an elastically contractable condition with a flexible side flap provides an elasticized contractable line or path of response through the side flap to form a longitudinally

contractable side flap. There is a flexible side flap having an elasticized contractable line on each side of the diaper thereby providing oppositely disposed elasticized contractable lines. Each flexible side flap has a width which extends inwardly toward the longitudinal centerline from the elasticized contractable line. The minimum separation between these oppositely disposed elasticized contractable lines is: 4 inches and preferably 5½ inches for babies weighing less than 14 pounds; 5 inches, preferably 6½, and more preferably 7½ inches for babies weighing from 14 to 35 pounds.

The elastic member 26 in its stretched condition may be longer than the elasticized contractable line so that each end of the elastic member 26 extends to and beyond the lateral edge 41 of the absorbent body 24 at the elastic member-absorbent body intersect 60, and thereby overlaps the absorbent body 24. This structure is shown in FIGS. 1 and 3. The portion of elastic member 26 beyond intersect 60 may be operatively associated with the absorbent body in any of many ways, e.g., glueing it to the topsheet 23, or glueing it directly to the absorbent body.

To perform most effectively, the elastic member in its stretched condition should have a minimum effective length of about 4 inches and preferably about 7 inches, to provide an effective elastically contractable side flap.

The effective length of the elastic member in its stretched condition is that length available to contract. In the embodiment of FIG. 1, the effective length of the elastic member 26 in its stretched condition is the uncontracted length through the side flap 25 from the elastic member-absorbent body intersect 60 on the back portion 30 of the diaper to the corresponding intersect 60 on the front portion 31 of the diaper.

An elastic member which does not extend outside the flexible side flap has an effective length equal to the stretched length of the elastic member. In the "day-time" diaper, i.e., one intended for ordinary daytime use on infants weighing about 14 to 28 pounds, an effective length of about 9 inches is preferred for a diaper as is shown in FIG. 1.

A fastening tape 27 is applied typically to the back waist portion 32 of a disposable diaper to provide a fastening means to hold the diaper on an infant. Fastening tapes 27 can be any of those well known to those of ordinary skill in the art, such as the fastening tape disclosed in U.S. Pat. No. 3,646,937 issued to Gellert on Mar. 7, 1972. These fastening tapes, or other diaper fastening means — such as pins — are typically applied near the top edge of a diaper in its "in-use" configuration. Thus such a diaper is fastened or fixed only near the top of the diaper and is not fastened or fixed near the leg opening, as contrasted to the typical plastic panty which is fastened or fixed both at the top and at or near the leg opening.

An alternate embodiment is shown in FIG. 6 wherein the absorbent body 46 is of a modified hour-glass shape which has ears 49 and where the elastic members 47 extend between the ears 49 of the back and front portions, 50 and 51 respectively, of the diaper. This places the elasticized contractable line laterally outward about as far as it can go and still be laterally inward from, or in line with, the edges of the ears. In this embodiment, the elastic member 47 is located outwardly about as far as it can be and still have the ends of the elastic member 47 coextensive with the ears 49 of the

absorbent body 46. A diaper of the configuration of FIG. 6 then can be folded in a "Z" fold as is taught in U.S. Pat. No. Re. 26,151 issued to Duncan et al. on Jan. 31, 1967, said patent is hereby incorporated by reference, or in a "C" fold.

Other embodiments of the absorbent body which provide ears which can be inherently stiff or stiffened through the use of stiffening members, such as stays, are "I" or "T" shapes such as are shown in FIGS. 8 and 9 respectively.

Another embodiment incorporating the improvement of this invention is shown in FIG. 5. The topsheet 54, backsheet 55, and absorbent body 65 have different configurations than those described with the diaper of FIG. 1 but the diaper is put together in essentially the same manner as that described for the diaper of FIG. 1. In the diaper of FIG. 5, the absorbent body 56 is essentially rectangular. The backsheet is wider than the absorbent body 56 so that a portion of the backsheet 55 extends beyond each edge of the absorbent body 56 an amount sufficient to form the flexible side flap 58 which can be 2 to 3½ inches wide, and a minimum of ¼ inch wide. The backsheet is also longer than the length of the absorbent body to provide a small margin of backsheet at each end of the absorbent body 56. An elastic member 57 is operatively associated with each side flap 58. The side flap 58 is formed by the portion of the backsheet 56 extending beyond the edges of the absorbent body 56. The elastic member 57 is attached to the side flap 58 and is located a distance from the lateral edge 59 of the absorbent body 56. The distance between the elastic member 57 and the lateral edge 59 is as taught above to form a contractable or elasticized side flap for a disposable diaper.

The diaper of FIG. 5 can also be formed in a "C" fold or "Z" fold as mentioned above in conjunction with the diaper of FIG. 6. A transverse cross section of the diaper of FIG. 5 in a "Z" fold configuration is shown in FIG. 7.

An additional alternative embodiment is one wherein the diaper is essentially the same as that shown in FIG. 1 with the exceptions that the absorbent body is "T" shaped and the front ends of the elastic member 26 are not attached to the absorbent body but are attached to the backsheet or topsheet in the same manner as disclosed in detail for the major length of the elastic member 26 of FIG. 1. A "T" shaped absorbent body is one which does not have the ears 39 and 40 on the front portion of the diaper.

Although the above descriptions have not specifically disclosed any absorbent material within the side flaps of the diaper, some absorbent material could be present therein. The amount of absorbent material within the side flap, for example, located between the topsheet and the backsheet in the side flap area, would have to be limited so that the flexural rigidity of the side flap does not exceed the above stated maximum for flexible side flaps, i.e., a maximum of 6, preferably less than 3, and most preferably less than 0.5 gram-centimeters.

If some absorbent material were provided in the flexible side flap the width of the side flap would be the distance between the elasticized contractable line and the lateral edge of the absorbent body. In most instances the edge of the absorbent body occurs at the point where the flexibility of the diaper is less than the minimum abovementioned.

Thus, it is apparent that there has been provided, in accordance with the invention, an improvement for an integral disposable diaper that fully satisfies the objects, aims, and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications, and variations that fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. In an integral disposable diaper having a backsheet and a semi-rigid absorbent body superposed on and associated with the backsheet, an improvement, comprising:

- a. a flexible side flap extending outwardly from and along each lateral edge of the absorbent body, the side flap being in the crotch area of the diaper,
- b. an elastic member secured to the side flap in an elastically contractable condition, the elastic member being effective to gather the side flap thereby providing an elasticized contractable line through the side flap;
- c. the portion of the elasticized contractable line in the crotch area being spaced outwardly from the lateral edge of the semi-rigid absorbent body at least $\frac{3}{4}$ inch;

whereby effective elastic side flaps are formed on the integral diaper and the side flaps being compliant and forming effective seals about an infant's leg.

2. The improvement claimed in claim 1 including attachment means between the side flap and its corresponding lateral edge of the absorbent body so that tension forces in the side flap are transmitted to the lateral edge of the absorbent body, whereby the absorbent body if compacted by the legs of the infant during wearing is uncompacted or stretched out by outward movement of the infant's legs due to tension imposed on the edge of the absorbent body developed in the side flaps by outward movement of the infant's legs.

3. The improvement claimed in claim 2 including an ear portion at a longitudinal end of the absorbent body, the ear portion extending outwardly beyond the lateral edge of the absorbent body in the crotch area and having flexural rigidity so that it is resistant to inward forces imposed on the ear portion, the elastic member being laterally inward toward the longitudinal center line of the diaper from the lateral edge of the ear portion, whereby the ear portion tends to remain extended outwardly when subjected to forces imposed by the elastic member.

4. The improvement claimed in claim 3 wherein one end of the elastic member intersects the front portion of the absorbent body and the other end of the elastic member intersects the back portion of the absorbent body.

5. The improvement claimed in claim 2 wherein one end of the elastic member intersects the front portion of the absorbent body and the other end of the elastic member intersects the back portion of the absorbent body.

6. The improvement claimed in claim 1 including an ear portion at a longitudinal end of the absorbent body, the ear portion extending outwardly beyond the lateral edge of the absorbent body in the crotch area and hav-

ing flexural rigidity so that it is resistant to inward forces imposed on the ear portion, the elastic member being laterally inward toward the longitudinal center line of the diaper from the lateral edge of the ear portion, whereby the ear tends to remain extended outwardly when subjected to forces imposed by the elastic member.

7. The improvement claimed in claim 6 wherein the minimum effective length of the elastic member in its stretched condition is 4 inches.

8. The improvement claimed in claim 6 wherein the side flap is essentially triangular.

9. The improvement claimed in claim 8 wherein the angle α is between 20° and 65° , the angle β is between 20° and 70° , and α plus β is between 90° and 135° .

10. The improvement claimed in claim 8 wherein the angle α is about 52° and angle β is about 58° .

11. The improvement claimed in claim 6 wherein one end of the elastic member intersects the front portion of the absorbent body and the other end of the elastic member intersects the back portion of the absorbent body.

12. The improvement claimed in claim 1 wherein one end of the elastic member intersects the front portion of the absorbent body and the other end of the elastic member intersects the back portion of the absorbent body.

13. The improvement claimed in claim 1 wherein the elasticized contractable line is spaced outwardly from the lateral edge of the absorbent body at least $1\frac{1}{4}$ inches.

14. An integral disposable diaper, comprising:

- a. a flexible moisture impermeable backsheet;
- b. a semi-rigid absorbent body having a crotch area width narrower than the width in the waist area on the back portion thereof, whereby the absorbent body has ears at the corners of the back portion thereof, the ears having flexural rigidity so that they are resistant to inward forces imposed thereon, the absorptive body superposed on the backsheet;
- c. the backsheet extending laterally beyond the edges of the absorbent body, whereby a flexible side flap along each edge of the diaper is formed;
- d. an elastic member longitudinally operatively associated with the side flap in an elastically contractible condition, to provide a longitudinally elastically contractable side flap, the elastic member being effective to longitudinally gather the side flap thereby providing an elasticized contractable line through the side flap; and
- e. the portion of the elasticized contractable line in the crotch area being spaced outwardly from the edge of the semi-rigid absorbent body at least $\frac{3}{4}$ inch;

whereby effective elastic side flaps are formed on the integral diaper and the side flaps are compliant and contractable and form effective seals about an infant's leg.

15. The diaper claimed in claim 14 wherein the absorbent body is hour-glass shaped, the angle α is between 20° and 65° , the angle β is between 20° and 70° , α plus β is between 90° and 135° ;

16. the diaper claimed in claim 15 wherein the lateral edges of the absorbent body are secured to the flexible side flaps in the crotch area of the diaper.

17. In an integral disposable diaper having a semi-rigid absorbent body, an improvement comprising the combination of:

- a. a moisture impermeable, flexible side flap extending along each lateral edge of the diaper and being at least in the crotch area;
- b. an elastic member operatively associated with each side flap in an elastically contractable condition to provide a longitudinally contractable side flap, the elastic member being effective to longitudinally gather the side flap thereby providing an elasticized contractable line through each flexible side flap and oppositely disposed elasticized contractable lines, one on each side of the diaper;

- c. the flexible side flap being located laterally inward toward the longitudinal center line of the diaper from the elasticized contractable line, the flexible side flap having a width of at least 3/4 inch in the crotch area;

- d. the oppositely disposed elasticized contractable lines being at least 4 inches apart; whereby during wearing each elasticized contractable line maintains contact with an infant's thigh and the flexible side flap permits free movement of the infant's legs while spanning the gap between the semi-rigid absorbent body and the thigh.

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REEXAMINATION CERTIFICATE (1033rd)

United States Patent [19] [11] B1 3,860,003

Buell

[45] Certificate Issued **Apr. 18, 1989**

[54] **CONTRACTABLE SIDE PORTIONS FOR DISPOSABLE DIAPER**

[75] **Inventor: Kenneth B. Buell, Cincinnati, Ohio**

[73] **Assignee: The Proctor & Gamble Co., Cincinnati, Ohio**

Reexamination Request:
No. 90/001,349, Oct. 13, 1987

Reexamination Certificate for:
Patent No.: **3,860,003**
Issued: **Jan. 14, 1975**
Appl. No.: **418,147**
Filed: **Nov. 21, 1973**

Certificate of Correction issued Jan. 14, 1975.

- [51] **Int. Cl.⁴** **A61F 13/16**
- [52] **U.S. Cl.** **604/385.2**
- [58] **Field of Search** **604/385.1, 385.2, 358, 604/389, 390**

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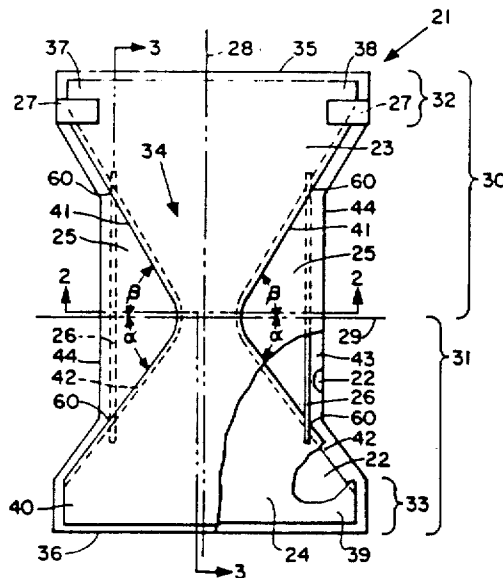
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Primary Examiner—John D. Yasko
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[57] **ABSTRACT**

An elastically contractable, flexible side position for an integral disposable diaper. The side portion extends along the lateral edge of the diaper and an elastic contracting member is attached to the side portion adjacent the outer lateral edge of the side portion to elastically contract the outer edge of the side portion.



**REEXAMINATION CERTIFICATE
ISSUED UNDER 35 U.S.C. 307**

NO AMENDMENTS HAVE BEEN MADE TO
THE PATENT

AS A RESULT OF REEXAMINATION, IT HAS
BEEN DETERMINED THAT:

5 The patentability of claims 1-17 is confirmed.

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REEXAMINATION CERTIFICATE (1308th)
United States Patent [19] [11] **B2 3,860,003**
Buell [45] Certificate Issued **Jun. 19, 1990**

[54] **CONTRACTABLE SIDE PORTIONS FOR DISPOSABLE DIAPER**

[58] **Field of Search** 604/378, 385.1, 385.2, 604/381, 382, 389

[75] **Inventor:** Kenneth B. Buell, Cincinnati, Ohio

[56] **References Cited**
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[73] **Assignee:** The Proctor & Gamble Co., Cincinnati, Ohio

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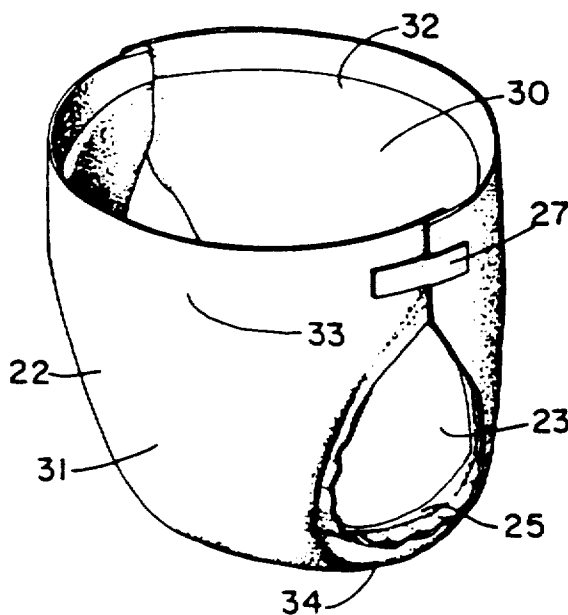
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Primary Examiner—Stephen C. Pellegrino

[57] **ABSTRACT**

An elastically contractable, flexible side position for an integral disposable diaper. The side portion extends along the lateral edge of the diaper and an elastic contracting member is attached to the side portion adjacent the outer lateral edge of the side portion to elastically contract the outer edge of the side portion.

[51] **Int. Cl.⁵** A61F 13/16
 [52] **U.S. Cl.** 604/385.2



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5 The patentability of claims 1-17 is confirmed.

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