

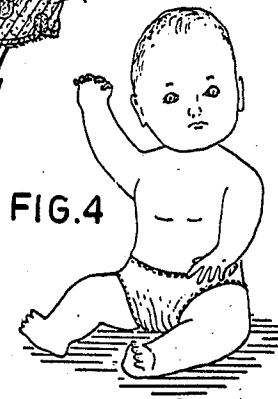
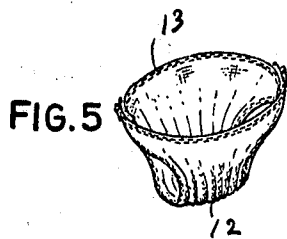
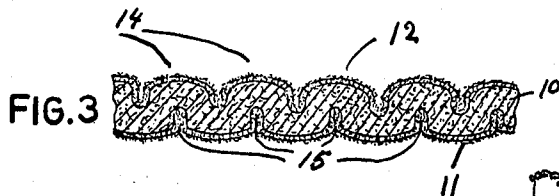
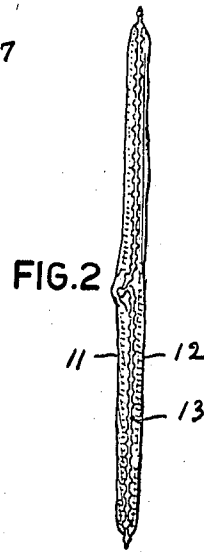
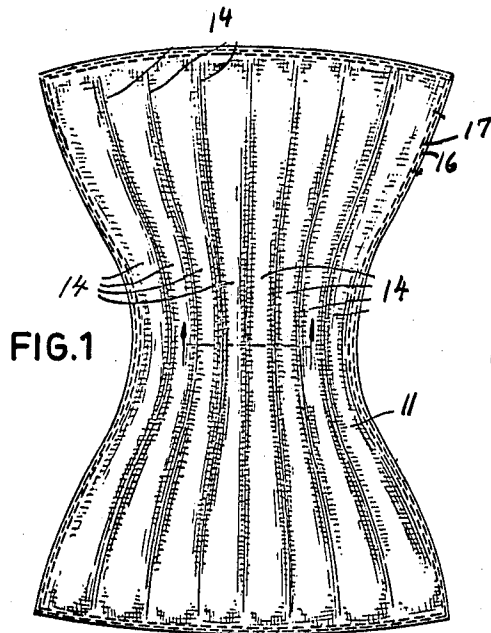
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CORRUGATED DIAPER

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CORRUGATED DIAPER

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4 Claims

ABSTRACT OF THE DISCLOSURE

A diaper according to this invention comprises a body of absorbent material, normally of a substantially rectangular shape—i.e. having a length greater than its width, provided with a plurality of regularly spaced longitudinally extending corrugations grouped at the center of the diaper, whereby the diaper is of a restricted range of width at its center. In a preferred embodiment of this invention, applicant has found it desirable that the corrugations extend substantially from side to side (i.e. width to width). Further, it is desirable that the corrugations extend from end to end of the diaper.

SUMMARY OF INVENTION

This invention relates to absorbent products.

More particularly, this invention relates to diaper products in the type normally worn by infants. These diapers are generally of two basic types—those made of various types of absorbent cloth and those of an absorbent core of pulp fibers or paper provided with liquid permeable coverings. This latter type is normally referred to as “disposable” type, since it is designed to be used once and then discarded. Both types of diapers normally come in varying sizes, generally of a rectangular shape with dimensions of from 10” to 14” in width and 13” or more in length.

Prior art problems

One of the problems with diapers has been their adaptation to the varying anatomical contours of the infants. Specifically, a diaper having a width of 8” to 12” must be compressed to 2” or 4” in its central area when the diaper is put in place on the infant. The resulting “bunching-up” of the diaper not only is uncomfortable to the infant, but of more importance, is the fact that this usually reduces the efficiency of its absorbency characteristics at the point where it is most needed.

This type of problem is further complicated by the fact that in the prior art, particularly with reference to disposable diapers, it has been common to add one or more center strips to increase the absorbency of the diaper where it is most needed.

Prior art attempts to overcome this problem have taught folding the longitudinal edges of the diaper. The resulting article with longitudinal bands of 2 or 3-ply material—i.e. 2 or 3 layers of material in juxtaposition with one another, reduces the width of the diaper to some extent while at the same time permitting the ends of the diaper to expand by releasing the plies of material. However, the problem has not been adequately overcome in that at the center point of the diaper, the amount of surface area is still too great to be comfortably worn by any infant and provide adequate absorbency characteristics.

Further, the bulk created by the addition of extra strips in the center of the diaper, as mentioned above, greatly increases this problem.

Applicant's development

Applicant has now developed a diaper which overcomes the above disadvantages and at the same time provides an article having vastly improved absorbency characteristics.

A diaper according to this invention comprises a body of absorbent material, normally of a substantially rectangular shape—i.e. having a length greater than its width, provided with a plurality of regularly spaced longitudinally extending corrugations grouped at the center of the diaper, whereby the diaper is of a restricted range of width at its center. In a preferred embodiment of this invention, applicant has found it desirable that the corrugations extend substantially from side to side (i.e. width to width). Further, it is desirable that the corrugations extend from end to end of the diaper.

According to a further embodiment, the corrugations are desirably spaced-apart equidistant. In this respect, the diaper is preferably corrugated to an extent such that its width, upon corrugation, is less than 50% of its original width, and preferably in the range of 25% to about 15%. The corrugations may vary in height considerably, with a preferred range being from about $\frac{3}{8}$ ” to about $1\frac{1}{4}$ ”. A particularly preferred range is from about $\frac{1}{2}$ ” to about $\frac{5}{8}$ ”, as measured in the compressed state.

GENERAL DESCRIPTION OF APPLICANT'S DEVELOPMENT

Applicant's products possess many advantageous characteristics resulting from the corrugations contained in a diaper according to this invention. Not only is there a very comfortable fit, but of great importance is the fact that a corrugated diaper brings out the most desirable absorbent characteristics of the material. Further, a diaper according to this invention also eliminates the necessity of providing extra absorbent strips in the center of diapers.

It will be understood that although the center portion of the diaper is of a restricted width, the ends of the diaper may be of similar restricted width, in which case, the diaper will assume a uniform shape suitable for packaging.

However, since in the preferred embodiment, in which the center portion of the diaper is maintained in its restricted state by means of, for example, adhesive, the ends of the diaper are free to spread out about the waist of an infant, as will subsequently be disclosed in detail.

In order to retain the restricted range of width at the center of the diaper, the adjacent corrugations can be secured together on one or both sides of the diaper, preferably on one side only. This may be accomplished by the use of suitable adhesives or other methods such as stitching etc. In using adhesives, it is preferred that the adhesive possess the properties of being somewhat “flexible,” wet or moisture resistant, non-irritating to the skin, etc. Although the adhesives should be moisture resistant, they need not be waterproof, depending on the type of diaper. If a diaper is made completely of cloth, then the adhesive should be wash waterproof.

Suitable adhesives for use in the present invention include the acrylic resins, such as the polymers and copolymers of the lower alkyl esters of acrylic acid, for example, ethyl acrylate, and the like; the formaldehyde condensation products such as ureaformaldehyde, melamine-formaldehyde, phenolformaldehyde, and the like; the vinyl resins such as vinyl acetate, vinyl chloride, and the like; the polyolefins such as polyethylene, polypropylene, polyisobutylene and the like; the styrene resins, the polyurethane resins; the synthetic and natural rubbers; the cellulosic materials such as viscose, and the like, etc. The preferred bonding materials are the acrylic

resins, such as that marketed under the trademark "Rhoplex HA 8."

The amount of adhesive used will vary according to different factors—e.g. the material of the diaper, etc.

Similarly, the manner in which the adhesive is applied to the diaper may vary according to different factors in this art.

If it is desired to provide a diaper having a restricted range of width, more than just at the center, this may readily be obtained by providing an adhesive along the desired length of the corrugation.

DETAILED DESCRIPTION

Having thus generally described the invention, reference will now be made to the accompanying drawing, illustrating a preferred embodiment of the invention, and in which:

FIGURE 1 is a top plan view of a diaper according to this invention shown in a "relaxed" state;

FIGURE 2 is a side elevation of the product of FIGURE 1;

FIGURE 3 is a vertical cross-section taken along the line 3—3 of FIGURE 1;

FIGURE 4 is a diagram of an infant wearing a corrugated diaper of this invention; and

FIGURE 5 is a prospective view of a diaper as it would appear on an infant.

Referring now to the drawings, there is illustrated a diaper according to this invention of the type normally referred to as "disposable." The diaper consists of an absorbent core 10 provided with liquid pervious covering layers 11 and 12 respectively. The core preferably consists of wood pulp fluff fibers with the covering layers of liquid pervious material being gauze or non-woven fabric. The diaper is embossed about its periphery, as indicated generally by reference numeral 13, so as to prevent the absorbent core 10 from "dusting."

According to this invention, such a diaper as is shown in FIGURES 1 through 3 is provided with a plurality of longitudinally extending corrugations 14. In embodiment shown, these corrugations extend substantially from end-to-end and side-to-side of the diaper. Further, the corrugations 14 have been secured together or "tied-in" in the central area of the diaper, as shown in FIGURE 1 by means of an adhesive spot applied between corrugations on one side of the diaper, as indicated by reference numeral 15 (FIGURE 3) resulting in the adjacent surface of the corrugations 14 being bonded together. This gives the diaper an "hour-glass" shape where the corrugations do not extend to the ends of the diaper, or where when extending to the ends, the ends are opened for placing the diaper on an infant. The resulting product has a restricted range of width in its center being approximately 50% of its original width. By the term "restricted width" it will be understood that a diaper so corrugated in its central area may still be flexed outwardly by placing the corrugations under tension. Normally, the diaper may expand from about 20% to 40% of the restricted width.

The diaper shown in the drawings, on a reduced scale, has corrugations of approximately $\frac{1}{2}$ " in height.

According to a preferred embodiment of this invention, and where a diaper corrugated in the above described manner is composed of an absorbent core with a liquid pervious surface covering, the periphery of the diaper is preferably embossed or sealed in the following manner. The diaper, prior to being corrugated, is passed through spaced-apart embossing rolls carrying a "staggered" pattern resulting in the embossing shown on the periphery of the diaper in FIGURE 1. More particularly, this pattern includes an outer layer of spaced-apart indentations 16 and an inner layer of spaced-apart indentations 17 wherein the material of the diaper is bonded together by compaction, with the patterns complementing one another so that there are actually

no "free" points where the fibers of the absorbent core may escape.

The material from which the diaper is made can be any material suitable for this purpose, and which is normally employed in this art. For example, diapers which are reusable can be made of cloth or cloth-like products, while the disposable-type diapers can be made from pulp fibers or similar products. If the diaper is cloth or a cloth-like product, it should have a sufficient body to retain its corrugation characteristics. The covering layer of liquid pervious material may be any suitable product normally used for this purpose in the prior art. Such products are, for example, non-woven fabrics, gauze, etc.

Preferably, the absorbent core is composed of the material taught in our copending application Ser. No. 614,131, filed of even date. Specifically, it is preferred that a disposable diaper include an absorbent core consisting of a heterogeneous fibrous composition composed of from about 1% to about 20% by weight, preferably from 5% to 15% and most preferred from 8% to 12%, by weight, of cellulosic hydrophilic fibers having a length of about $\frac{3}{4}$ " to about 3" (normally 1" to 1 $\frac{1}{4}$ ") interengaged and intermingled with from about 99% to about 80% by weight, preferably 85% to 95%, and desirably 88% to 92% by weight of non-cardable, hydrophilic short fibers which normally have a length of $\frac{3}{8}$ " or less.

The term heterogeneous as used throughout the disclosure and claims is in the sense that one can distinguish, under a microscope, between the hydrophilic long fibers and the non-cardable short fibers.

The hydrophilic fibers, which are relatively long in length, are either regenerated cellulose fibers or natural cellulose fibers. Particularly preferred regenerated cellulose fibers are rayon or modified rayon. Thus, it is possible to use surgical or "mill-run" fibers in this invention. These fibers are normally marketed in many different grades, depending on the quality desired fiber will vary accordingly. It is thought that the long fibers form a structural skeleton for the short fibers so that when the long and short fibers are mixed, the long fibers serve to "hold" the short fibers thereby forming a stable cohesive structure. The short fibers are preferably wood pulp fluff.

The method of manufacturing applicant's diaper can be carried out in several ways. Thus, for example, the reusable cloth types of diapers can be made by permanent creasing procedures in which components used to impart the crease to the diaper are applied to the diaper, with the diaper subsequently being corrugated. The resulting corrugated diaper may then be cured to set the crease-retaining components.

For the disposable-type of diaper, the article, after being manufactured, can be passed through a corrugating apparatus to impart the longitudinally extending corrugations to the article. These articles can then be passed through a machine which "spot" applies a suitable adhesive to the center corrugations of the diaper and presses the corrugations together to form the article shown in FIGURE 1.

The diapers of this invention have many advantages over the diapers of the prior art. Among these are, for example, the diaper possesses greatly improved absorption characteristics at the point where they are most required, because the material has a restricted range of width whereby it is "bunched up" in a controlled fashion in the area where wetting takes place. Furthermore, it is thought that the corrugations act as "channels" to mechanically entrap fecal matter and thus insure against soiling of outer clothing. Additionally, the diaper of this invention is economical to manufacture and its manufacture can be carried out on existing equipment.

Although reference has been made in detailed description to the use of adhesive for securing adjacent corrugations it will be understood that stitching may also be used.

Stitching will find most applications in the reusable type diaper.

Having thus described my invention, I claim:

1. A diaper having an absorbent fiber core and a liquid permeable covering for said core, said diaper having a plurality of longitudinally extending corrugations running from one end of said diaper to the other, said corrugations being spaced apart equidistant across the width of said diaper and extending from one side edge of the diaper to the other side edge, said diaper having an uncorrugated length greater than its width, said corrugations being in juxtaposition at the center of the diaper to form a portion of the diaper having a restricted width of from 50% to 15% of the width of the uncorrugated diaper, said restricted width being maintained in the central portion of the diaper by securing adjacent corrugations together with an adhesive.

2. A diaper of claim 1 wherein said adhesive is applied only on one surface of the diaper.

3. A diaper of claim 1 in which said absorbent core comprises from about 1 to about 20% by weight of cardable cellulosic fibers intermingled and interengaged with from about 99 to 80% by weight of non-cardable short

absorbent fibers, a liquid pervious covering enveloping a portion of said core, and a liquid impervious backing enveloping the balance of said core, the adjacent surfaces of corrugations of said diaper being adhesively secured together on at least one surface thereof in the center area of said diaper.

4. A diaper of claim 1 in which the central portion of said diaper has a width of about 50% to about 25% of the total width of the diaper in a non-corrugated state.

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