United States Patent

[11] 3,542,027

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[21] Appl. No. **702,247**
[22] Filed **Feb. 1, 1968**
[45] Patented **Nov. 24, 1970**

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[54] **DIAPER WITH MULTILAYERED TIE-INS**
9 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **128/284,**
139/383
[51] **Int. Cl.** **A61f 13/16**
[50] **Field of Search** 128/284;
139/383, 384, 413

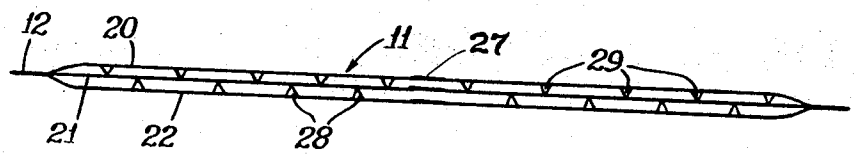
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2,995,154	8/1961	Seltzer	128/284
3,104,684	9/1963	Seltzer	128/284
3,247,872	4/1966	Jamison	128/284
3,291,162	12/1966	Jamison	128/284
3,339,548	9/1967	Seltzer	128/284

Primary Examiner—Charles F. Rosenbaum
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ABSTRACT: A woven diaper of the type including a low density multilayered central section, the layers of which are bound together by closely spaced parallel rows of yarns interwoven in each of two adjacent layers.



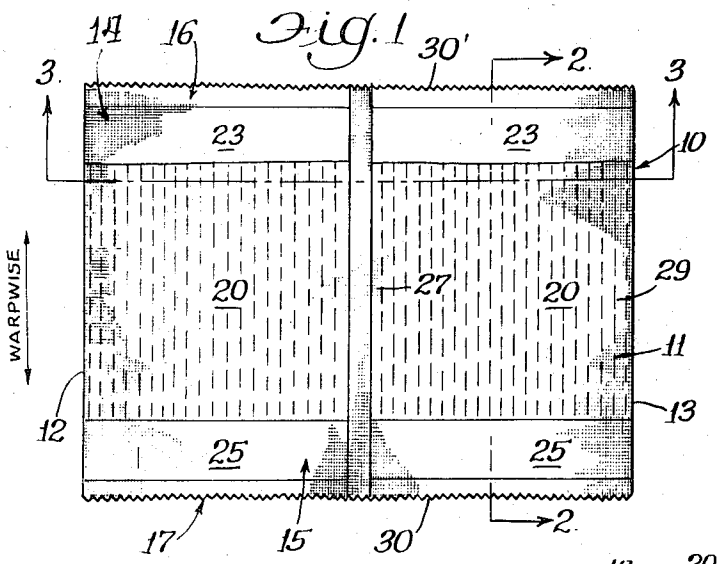


Fig. 1

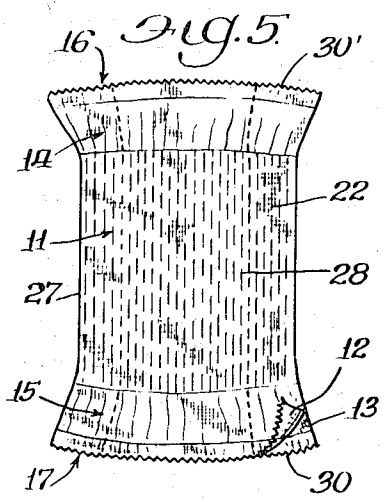


Fig. 5

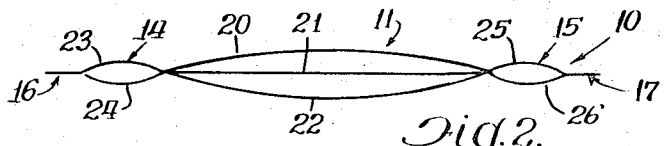


Fig. 2

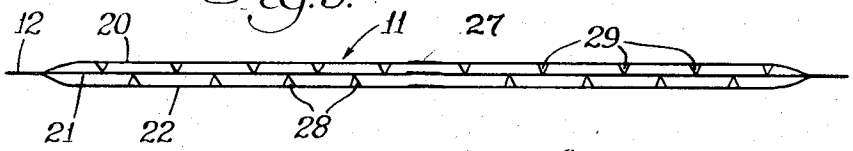


Fig. 3

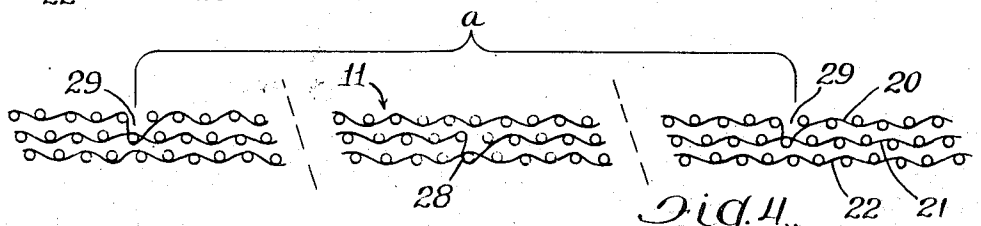


Fig. 4

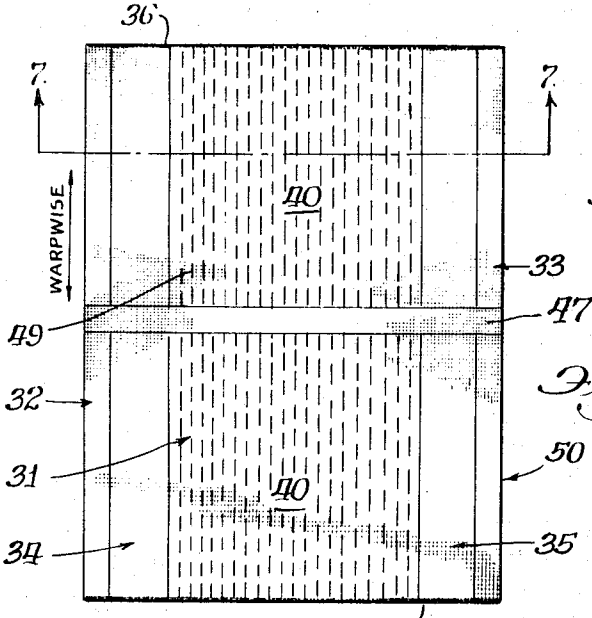


Fig. 6

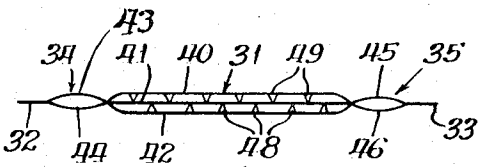


Fig. 7

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DIAPER WITH MULTILAYERED TIE-INS

BACKGROUND OF THE INVENTION

Diapers of the shrink-contoured type which have been on the market for some time have definite advantages over conventional straight-sided diapers. Furthermore, shrink-contoured diapers have recognized superiority to other contoured diapers formed by cutting or folding with subsequent fastening in the contoured shape. Shrink-contoured diapers are woven with a plurality of layers in the area which later is to be contoured by shrinking. Such diapers are formed of normal straight-sided fabrics and are usually prefolded along straight lines one or more times and fastened into a rectangular shape with the central section positioned so that it shrinks transversely of the diaper. The construction is such that shrinkage in the central section is greater than at the diaper ends, thus providing a contoured diaper after the first washing.

This effect is brought about usually by incorporating high twist yarns in the set of yarns which extends transversely of the diaper and normal twist yarns in the other set of yarns, the degree of shrinkage being controlled by the relative density of the layers involved. Thus if the same number of the same warp yarns and filler yarns are used to make a three-layer center section as are used to make a two-layer end section, the center section would shrink more because each layer would be less dense and have larger interstices than layers of the two-layer section.

DESCRIPTION OF THE PRIOR ART

A shrink-contoured diaper utilizing the above described construction is illustrated and described in U.S. Pat. No. 3,339,548 to Norman L. Seltzer, issued Sept. 5, 1967. Another method of making shrink-contoured diapers, using high twist yarns only in the central section rather than for one entire set of yarns, is also illustrated in U.S. Pat. No. 3,339,548, as well as in U.S. Pat. No. 3,247,872 issued to Samuel James Jamison on April 26, 1966. A high degree of contouring may be procured by using both selective high twist yarns and selective density of the layers. Other less pertinent art is listed in the Seltzer patent above.

But there is one difficulty with shrink-contoured diapers when the density of the fabric is used to control the shrinkage. In the multilayered central areas of fabric density becomes quite low and usually the sley or the picks are reduced to a relatively low number per inch. At any rate, when one of the two falls below 38 per inch, whether the diaper be shrink-contoured or otherwise, it becomes necessary to slow the usual finishing speed of 250 yards per minute at which modern high speed range equipment normally operates, to about 150 yards per minute in order to prevent excessive displacement of yarns in the layers which have the low counts indicated.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a diaper with a multilayered center section in which substantial displacement of yarns in the low density layers does not occur at finishing speeds approaching normal and in the preferred embodiments does not occur at normal finishing speeds.

It is a further object of this invention to provide shrink-contoured diapers of various constructions wherein one portion of such diapers shrinks to a lesser degree, the weave design including means for substantially reducing yarn displacement of the more open weaves during finishing processing at normal speeds.

It has been discovered that diapers, including without limitation shrink-contoured and other diapers with low density multilayered center sections in which substantial displacement of yarns in the low density central section layers does not occur at normal finishing speeds may be provided by so constructing the central section layers that they are bound together by closely spaced parallel rows of tie-ins of at least one set of yarns which are interwoven in each of two adjacent layers. For example, selected warp yarns may be interwoven or selected filler yarns may be interwoven or selected yarns in both sets may be interwoven. A single warp yarn may be interwoven, for instance, by tying in with every other filler yarn in one layer and with every other filler yarn in the adjacent layer. Alternatively the tie-in warp yarn might be substantially interwoven with filler yarns in one layer while being interwoven with only an occasional filler yarn in the adjacent layer. The distance between lines of tie-ins should be in the range of about ¼ inch to about 2 inches depending upon the density of the layer and upon other factors such as the degree of softness desired and the like. Obviously the distance between the lines of the tie-ins need not be uniform. Likewise, the lines of tie-ins may be broadened to include additional adjacent yarn tie-ins but the surface tends to become less soft to the touch.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 illustrates a woven diaper 10 cut from a length of diaper cloth and consisting of a section 11 of three layers terminating at the respective side edges in single layer selvages 12 and 13. The section 11 is bordered on one end by a two-layer section 14, and on its other end by a two-layer section 15. Section 14 is in turn bordered by a pinking bar 16 of relatively high density single layer material which terminates in pinked edge 30'. Likewise at the other end, section 15 is bordered by pinking bar 17 which terminates in pinked edge 30. Running warpwise in the center of the diaper is a high density band 27 which occurs in each layer of each section. This band is a folding bar including extra warp yarns which give added wear resistance to the folded edge of the finished diaper.

FIG. 2 is a schematic cross-sectional view taken along the line 2–2 of FIG. 1 when viewed in the direction of the arrows. This view illustrates that section 11 consists of layers 20, 21 and 22, that section 14 consists of layers 23 and 24, and that section 15 consists of layers 25 and 26.

FIG. 3 is a schematic cross-sectional view taken along the line 3–3 when viewed in the direction of the arrows. The fold bar 27 is clearly illustrated, as are the schematic representations of warp tie-ins 28 and 29 between the layers in section 11.

FIG. 4 is a schematic enlarged partial cross-sectional view of one repeat *a* of lines of warp tie-ins between layers of section 11 of FIGS. 1—3.

FIG. 5 is an illustration of a washed prefold diaper made from the diaper of FIG. 1 by folding it along the folding bar 27 and fastening the folded portion together.

FIG. 6 is an illustration of an alternative structure in which the diaper 50 is woven with selvage edges 32 and 33 with two-layer sections 34 and 35 and with a three-layer center section 31, all extending warpwise. A folding bar 47 extends transversely in all layers. The diaper cut from a running length is over edged at each end or folded at the folding bar and the ends 36 and 37 are over edged together. The warp tie-ins 49 extend warpwise in the top layer 40 of section 31 except where the folding bar occurs.

FIG. 7 is a schematic cross section of FIG. 6 along the line 7–7 looking in the direction of the arrows. Section 31 is shown to consist of layers 40, 41 and 42; section 34 consists of layers 43 and 44; and section 35 consists of layers 45 and 46. The warp tie-ins 49 are shown between layers 40 and 41 as are the warp tie-ins 48 between layers 42 and 41.

Where the expression "low density" is used in the specification or claims to refer to woven layers, it refers to layers having a layer sley or a layer pick count per inch less than 38. The expression "relatively high density" when used in the specification or claims refers to woven layers having a density higher than the low density layers and wherein both sley and pick count are greater than 38. Satisfactory diapers have been made in accordance with this invention in which the relatively high density layers have had a sley of from 45 to 100 and a pick count of 50 to 90.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred construction of the diapers of this invention is that shown in FIGS. 1 to 5. The preferred embodiment utilizing that construction is one in which the pinking bars 16 and 17 have a sley of about 96 of 30's yarns of normal twist cotton with picks of about 96 of 30's cotton yarns with a twist multiple between 4.5 and 7.5 preferably between about 5.0 and 6.5. In the layers 23 and 24 both the sley and the picks are about half that of the pinking bars while in the center panel 11 of the layers 20, 21 and 22 have about one-third the sley and picks of the pinking bar. The diaper has a fold reinforcement 27 which extends in every layer of each section from one end of the diaper to the other. This reinforcement has the same pick count as the layers in which it occurs but the sley is increased to about 192 throughout. The layers 20 and 21 have tie-in lines in which a single warp yarn interweaves with alternate picks in layer 20 and intermediate picks in layer 21. The lines of tie-ins are about three-quarters of an inch apart. The tie-ins between layers 21 and 22 are similar but spaced about midway between the tie-in lines joining layers 20 and 21. The preferred diaper has relatively high density ends which are shown as pinked ends 30 and 30' but other ravel proof constructions, such as over edging, hemming and impregnation with flexible plastic materials are acceptable alternatives.

The diaper may be made entirely of normal twist yarns if desired but because of the very reduced degree of contouring such diapers are not preferred.

I claim:

1. An absorbent diaper including ravel-resistant opposite end sections and a medial section, the latter section including at least two layers of fabric each formed of interwoven sets of warp and filling yarns, at least one of said sets of one of said layers having less than 38 yarns per inch, a series of parallel junctures between the outermost and the next adjacent of said layers, extending warpwise, each of said junctures consisting of at least one of immediately adjacent warp yarns of one of said outermost and next adjacent layers interwoven with closely adjacent picks of the other of said outermost and next adjacent layers to form tie-ins, said junctures being spaced weftwise of said medial section at intervals of not less than one quarter inch nor more than 2 inches forming said outermost and next adjacent layers into a series of joined parallel flat tubes extending warpwise.

2. The diaper of claim 1, a fold therein whereby portions of the various sections are in superimposed relationship and means fastening said diaper in folded relationship.

3. The diaper of claim 2 wherein fabric of greater wear resistance woven integrally with the outer fabric of said diaper is disposed in a relatively narrow band extending along and on either side of said fold.

4. The absorbent diaper of claim 1 wherein the medial section at least contains one set of high twist yarns in each layer extending transversely of the diaper.

5. The absorbent diaper of claim 1 wherein the medial section contains three layers.

6. The diaper of claim 1 wherein all of one set of yarns thereof are high twist yarns having a twist multiple between 4.5 and 7.50, said high twist yarns extending transversely of said diaper.

7. The diaper of claim 1 wherein the medial section contains three layers and is connected to the ravel-resistant sections at each end by a double-layer section, said ravel-resistant section having the same sley as the sum of the sleys in the layers of each of the other sections.

8. The diaper of claim 7 wherein the pick counts in each of the layers of the medial sections are less than the pick counts in each of the layers of the double-layer section or in the ravel-resistant section.

9. In an absorbent diaper including ravel-resistant opposite end sections and a medial section, the latter section including at least two layers of fabric each formed of interwoven sets of warp and filling yarns, the fabric of said medial section having greater lateral shrinkability than the fabric outside said medial section whereby the side edges of said medial section assume a position inwardly of the other side edges after shrinking to provide a shaped zone, that improvement wherein said layers of said medial section are joined by a series of parallel junctures between the outermost and the next adjacent of said layers extending warpwise, each of said junctures consisting of at least one of immediately adjacent warp yarns of one of said outermost and next adjacent layers interwoven with closely adjacent picks of the other of said outermost and next adjacent layers to form tie-ins, said junctures being spaced weftwise of said medial section at intervals of not less than one quarter inch nor more than 2 inches forming said outermost and next adjacent layers into a series of joined parallel flat tubes extending warpwise.