Nov. 5, 1963 S. J. JAMISON 3,109,428

DIAPER

Filed April 14, 1961

Fig. 1.

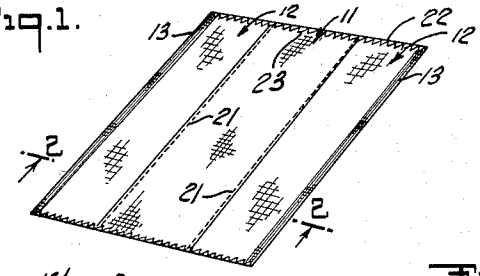


Fig. 2.

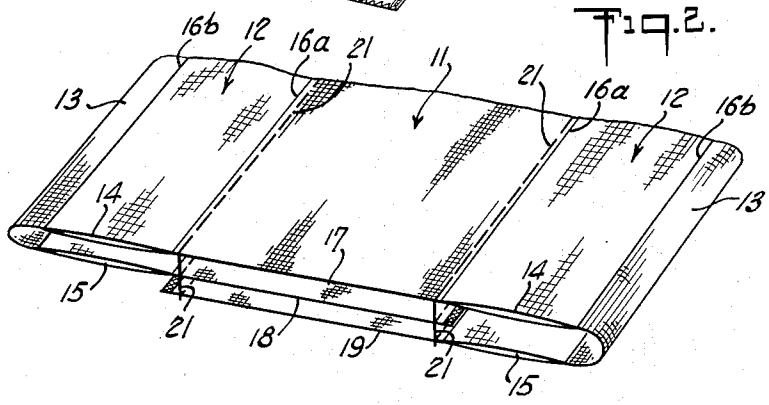


Fig. 3.

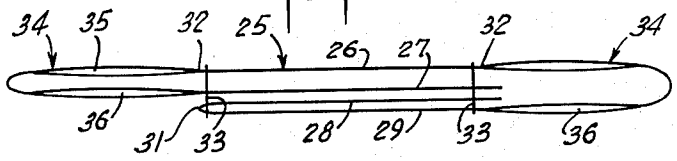


Fig. 4.

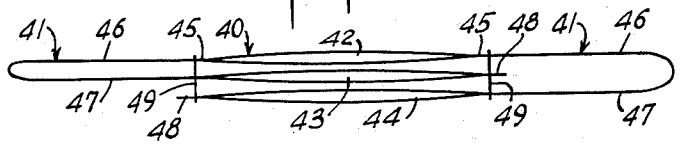
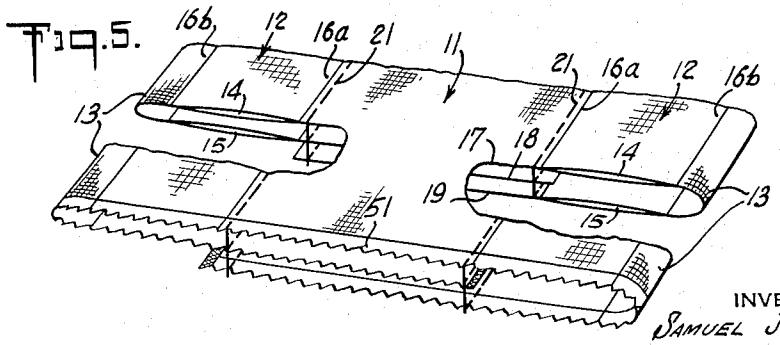


Fig. 5.



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3,109,428

DIAPER

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The present invention relates to prefolded, woven diapers, more particularly to prefolded diapers comprising multiple layers of relatively open diaper cloth woven from an absorbent material such as cotton wherein the diapering material is concentrated centrally of the diaper.

Prefolded diapers of this type have been manufactured in different forms, many of which are illustrated in Jamison et al., Patent No. 2,845,069. Typically, gauze diaper cloth is woven in the form of a tube, or tubes, in a multi-ply blank which then is folded in such a way as to superimpose parts of the blank and form a smaller rectangular pad suitable for application. These diapers normally have been folded to form three panels extending lengthwise of the diaper, i.e., a central panel and two side panels with the diapering material concentrated in the central panel. Each of the panels comprises at least two sections of the blank superimposed. Normally, the side panels each comprise two sections and the central panel, three or more.

In prefolded diapers of this type, the longitudinal edges of the pad are formed by the folds and the transverse edges at the ends of the diaper may be either closed, by stitching, or left open if pinking bars are employed for severing the diaper blanks from the strips in which they are woven. Typically, whether or not the diapers have been stitched at the ends, they have been sewn together in the form of a prefolded pad by two lines of stitching, one along each of the edges of the central panel. The stitching extends lengthwise of the diaper pad adjacent the edge of the central panel and may pass partially, or all the way, through the pad.

Various modifications of this type of diaper have been proposed. For instance, all of the sections making up the various panels of the diaper may be multi-ply, i.e., consisting of more than one layer; or some of the sections may be multi-ply and some of them single ply. Also, all of the fabric and all of the sections of all of the panels may be relatively open having a fabric density within the range of conventional gauze diaper cloth; or, in certain of the sections, the fabric may be relatively tightly woven, i.e., it may have a higher end count and/or it may be woven from heavier yarns. Typically, at least the outer layers at the top and bottom of the central panel and the outer layer of fabric passing around the fold at the longitudinal edges of the diaper may be in the form of a heavier material of this type.

When automatically folded prior art diapers of this type have been washed repeatedly by conventional techniques, the diapering material has puckered seriously along the lines of stitching located at the edges of the central panel. Additionally, in the diapers which are stitched or sewn across the ends, bunching of the diapering material inside the diaper occurs adjacent each end of the diaper. Both the puckering and the end bunching described, result in the formation of raised portions on the surface of the diaper which, because they are raised, are subject to more wear than other parts of the diaper. As a result, the fabric in these portions wears out more quickly than the rest of the diaper and forms weak spots and unsightly surface areas in the diaper.

I have discovered that by forming the side panels of single ply sections when the central panel comprises multi-ply sections, or forming the side panels of multi-ply sections when the central panel comprises single ply sections, and passing the longitudinal lines of stitching through the panel, or panels, comprising single ply sections; puckering on washing virtually is eliminated. Surprisingly also, when the diaper is one which is sewn or stitched at the ends and normally would exhibit end bunching, the end bunching also virtually is eliminated in the panels comprising single ply sections by sewing the diaper together in this manner when the plies are arranged as described above. When the diaper is woven of multi-ply and single ply sections as just described, there may be some loss in total absorptive capacity. However, the combination of multi-ply sections having a fabric density approximately within the range of conventional gauze diaper cloth and single ply sections of considerably greater density, i.e., at least about one and a half times that of the fabric in the multi-ply sections and normally about twice that of the fabric in the multi-ply sections, provides a diaper which possesses not only the necessary absorptive capacity, but also sufficient bulk and softness that it is suitable for use wherever prefolded prior art diapers formed completely from gauze diaper cloth would have been useful.

The present invention, then, contemplates a prefolded rectangular, multi-ply layer woven diaper comprising a longitudinally extending central panel and two side panels, one on each side of the central panel and lying between the central panel and the adjacent longitudinal edge portion of the diaper. Each of the side panels comprises a top and bottom section and the central panel comprises top, middle and bottom sections. Each of the longitudinal edge portions of the diaper comprises diaper fabric folded in the shape of a U having one of its legs connected to the top section of the adjacent side panel and the other of its legs connected to the bottom section of the adjacent side panel. The sections in the side panels and the central panel are woven single ply and multi-ply and arranged in three sets alternating, a set of single ply sections—a set of multi-ply sections, across the diaper. In other words, either each of the side panels comprises two single ply sections when the central panel comprises three multi-ply sections, or each of the side panels comprises two multi-ply sections when the central panel comprises three single ply sections.

The various sections are secured together by two longitudinally extending lines of stitching, one adjacent each of the longitudinal edges of the central panel and substantially parallel thereto. It is most important that these longitudinally extending lines of stitching pass through a set of single ply sections, not a set of multi-ply sections. Thus, the longitudinal stitching passes through the side panels when the side panels comprise single ply sections and through the central panel when the central panel comprises single ply sections. In either case, the lines of stitching are located close to the longitudinal edges of the central panel, but in the panel, or panels, comprising single ply sections. The multi-ply sections are formed from relatively open fabric which normally possesses a fabric density approximately within the range of conventional gauze diaper cloth. This means that the openness of the fabric, which is a function of yarn count and yarn size, is within this range. Gauze diaper fabric according to this invention may be woven with an end count of between about 32–48 in the warp and 32–52 in the filling and from yarn numbers of about 20s–30s in the warp and 25s–45s in the filling. Normally, in such gauze diaper fabrics, the twist multiplier of both the warp and the filling yarns is less than about 4.75. It is yarns of this twist and size which are referred to in this application as gauze diaper cloth yarns.

The fabric in the single ply sections possesses a fabric density at least about one and a half times that of the fabric in the multi-ply sections. For instance, assuming that the warp and filling yarns are the same size, if the

filling pick count is doubled and the warp count is unchanged, the fabric density will be increased approximately one and a half times.

Fabric density, when warp and filling end and pick count are assumed to be constant, will vary more or less inversely with the square root of the yarn numbers of both the warp and filling yarns since these figures approximately represent changes in yarn diameter.

Normally and preferably, the fabric density in the single ply sections is in the order of twice that of the fabric density in the multi-ply sections. However, as stated above, diapers according to this invention may be formed utilizing single ply sections having a fabric density only at least about one and a half times that of the fabric in the multi-ply sections.

Other and further advantages of this invention will be apparent from the following description and claims taken together with the drawings wherein:

FIG. 1 is a view in perspective of one embodiment of a diaper according to this invention.

FIG. 2 is an enlarged schematic view partly in perspective and partly in section taken along the line 2—2 of FIG. 1.

FIG. 3 is an enlarged schematic sectional view of a diaper according to a somewhat different embodiment of this invention.

FIG. 4 is a similar enlarged schematic sectional view of a diaper according to still another embodiment of the invention.

FIG. 5 is a view in perspective of one end portion of a diaper according to another embodiment of this invention.

Referring to the FIGS. 1 and 2 of the drawings, there is shown a prefolded, rectangular, multi-ply woven diaper comprising a longitudinally extending central panel **11**, two side panels **12** and two longitudinal edge portions **13**. The side panels **12** are located, one on each side of the central panel **11** and lying between the central panel and the adjacent longitudinal edge portion **13** of the diaper.

Each of the side panels **12** comprises a top and a bottom section **14** and **15** and each of the sections of the side panels comprises two layers of relatively open gauze diaper cloth woven together along the longitudinal edges **16***a* and **16***b* of the panels. The central panel **11** comprises top, middle and bottom sections **17**, **18** and **19**, respectively, each of which is single ply and formed from a heavier fabric having a fabric density at least about one and a half times that of the fabric in the multi-ply sections of the side panels. Each of the edge portions **13** is folded in the shape of a U having one of its legs connected to the top section **14** of the adjacent side panel and the other of its legs connected to the bottom section **15** of the adjacent panel. The multi-ply sections **14** and **15** of the side panels are woven integral with the single ply sections **17**, **18** and **19** of the central panel so that the diaper is formed by folding the diaper blank about lines extending through the longitudinal edge portions **13** to superimpose the sections as described above and the sections then are secured to one another by lines of stitching **21** passing through the single ply sections **17**, **18** and **19** located in the central panel **11** of the diaper. These lines of stitching **21** are substantially parallel to the common longitudinal edges **16***a* but in the central panel.

The ends, or transverse edges **22**, of the diaper are closed by overedge stitching **23** extending transversely of the diaper.

In FIG. 3 a diaper according to this invention is shown which is very similar to that of FIGS. 1 and 2. In fact, it differs from the diaper of FIGS. 1 and 2 only in that it comprises a central panel **25** which includes four sections **26**, **27**, **28** and **29** of the heavier single ply material. This results from weaving a somewhat different diaper blank and folding it differently so that an additional fold **31** is created in the diaper. This additional fold **31** is located adjacent one of the longitudinal edge **32** of the central panel **25** and lines of stitching **33**, similar to the stitching

21 in the diaper of FIG. 2, are provided along the edges **32** passing through the single ply sections **26**, **27**, **28** and **29** of the central panel **25**.

The diaper of FIG. 3 comprises side panels **34** having multi-ply top and bottom sections **35** and **36** and the multi-ply top and bottom sections of the side panels **34** are integral with the single ply sections of the central panel **25**.

FIG. 4 illustrates a diaper according to another embodiment of the invention which also comprises a central panel **40** and two side panels **41** located, one on each side of the central panel and lying between the central panel and the adjacent longitudinal edge portion of the diaper. The central panel **40** comprising top, middle and bottom sections, **42**, **43** and **44**, respectively, each of which, in turn, comprises two layers of gauze diaper cloth woven together at the edges **45** of the central panel. The side panels **41**, in turn, comprise single layer top and bottom sections **46** and **47**, respectively, woven from a relatively closed material having a fabric density at least about one and a half times that of the fabric in the multi-ply sections of the central panel. The single ply material of the top and bottom sections of the side panels **41** is folded in the shape of a U at each of the longitudinal edges of the diaper to provide U shaped longitudinal edge portions with one leg of the U connected to the top section **46** and the other leg connected to the bottom section **47** of the adjacent side panel. Extra wide single ply selvages **48** are located along one edge of the middle section **43** of the central panel and along one edge of the bottom section **44** of the central panel. Each of these single ply selvages **48** extends beyond the edge of the central panel **40** into the side panels **41**. Lines of stitching **49** pass through the single ply sections of the side panels **41** and the extra wide single ply selvages **48** just outside the longitudinal edges **45** of the central panel and extend all along these edges and approximately parallel thereto. The ends of the diaper of FIG. 4 are closed by overedge stitching, not shown, extending across the diaper at its ends, as shown for the diaper of FIGS. 1 and 2.

Diapers according to FIGS. 1, 2, 3 and 4 may be washed repeatedly by the most severe techniques in conventional use without appreciable puckering along the edges of the central panel and without end bunching in the panels woven with single ply sections. As a result, these diapers wear better and are longer lasting and more efficient and atractive during the latter portions of their useful lives.

FIG. 5 depicts a diaper according to a somewhat different embodiment of this invention which is the same as the diaper of FIG. 2 with the exception that the diaper blank from which it was folded was woven with single layer pinking bars **51** and is not closed at the ends since the folded pinking bars provide sufficient stability for the fabric. Since this diaper is not closed at the ends, end bunching would not be a problem even if it were made in a conventional manner and did not incorporate the features of this invention. However, this is not true of puckering along the edges of the central panel. In the diaper of FIG.5, puckering along the edges of the central panel is virtually eliminated as explained in connection with FIGS. 1, 2, 3 and 4.

Having now described the invention in specific detail and exemplified the manner in which it may be carried into practice, it will be readily apparent to those skilled in the art that innumerable variations, applications, modification, and extensions of the basic principles involved may be made without departing from its spirit or scope.

The invention claimed is:

1. A prefolded, rectangular multiple layer woven diaper comprising a longitudinally extending central panel; and two side panels, one on each side of the central panel and lying between the central panel and the adjacent longitudinal edge portion of the diaper, each of said side panels comprising a top and a bottom section and each of said longitudinal edge portions comprising diaper fabric

folded in the shape of a U having one of its legs connected to the top section of the adjacent side panel and the other of its legs connected to the bottom section of the adjacent panel, said central panel comprising superimposed top, middle and bottom sections, the sections in said side panels and said central panel being woven single ply and multi-ply and arranged in three sets alternating, a set of single ply sections—a set of multi-ply sections, across the diaper, said sections being secured together by two lines of stitching, one adjacent each of the longitudinal edges of the central panel and substantially parallel thereto, said lines of stitching each passing through a set of single ply sections, the fabric in the multi-ply sections being relatively open and the fabric in the single ply sections having a fabric density at least about 1½ times that of the fabric in the multi-ply sections.

2. A prefolded, rectangular multiple layer woven diaper comprising a longitudinally extending central panel; and two side panels, one on each side of the central panel and lying between the central panel and the adjacent longitudinal edge portion of the diaper, each of said side panels comprising a top and a bottom section and each of said longitudinal edge portions comprising diaper fabric folded in the shape of a U having one of its legs connected to the top section of the adjacent side panel and the other of its legs connected to the bottom section of the adjacent panel, said central panel comprising superimposed top, middle and bottom sections, the sections in said side panels and said central panel being woven single ply and multi-ply and arranged in three sets alternating, a set of single ply sections—a set of multi-ply sections, across the diaper, said sections being secured together by

two lines of stitching, one adjacent each of the longitudinal edges of the central panel and substantially parallel thereto, said lines of stitching each passing through a set of single ply sections, the fabric in the multi-ply sections having a fabric density approximately within the range of conventional gauze diaper cloth and the fabric in the single ply sections having a fabric density at least about one and a half times that of the fabric in the multi-ply sections, said fabrics being woven from gauze diaper cloth yarns.

3. A prefolded, woven diaper according to claim 2, wherein the fabric density in the single ply sections is in the order of about twice that of the fabric in the multi-ply sections.

4. A prefolded, woven diaper according to claim 2, wherein the central panel comprises a set of multi-ply sections and the side panels comprise sets of single ply sections, and the lines of stitching pass through the side panels adjacent their inside longitudinal edges.

5. A prefolded, woven diaper according to claim 2. wherein the central panel comprises a set of single ply sections and the side panels comprise sets of multi-ply sections, and the lines of stitching pass through the central panel adjacent each of the longitudinal edges thereof.

6. A prefolded, woven diaper according to claim 2, wherein the ends of the central and side panels are closed by stitching extending across the ends of the prefolded diaper.

References Cited in the file of this patent

UNITED STATES PATENTS

2,845,069 Jamison et al. _____ July 29, 1958