

April 13, 1965

S. J. JAMISON

3,177,873

DIAPER

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2 Sheets-Sheet 1

Fig. 1.

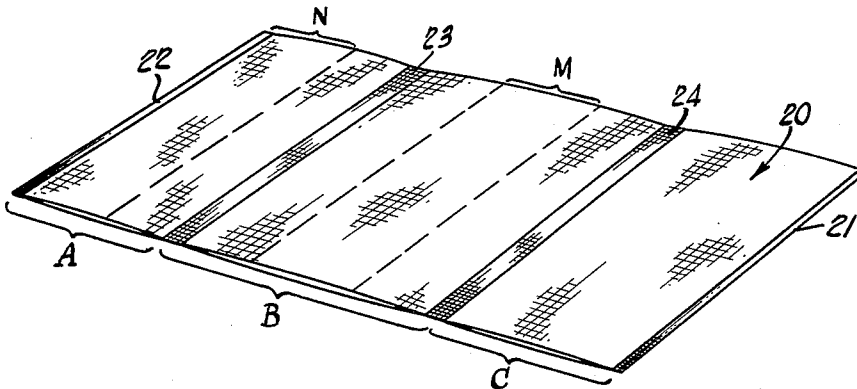


Fig. 2.

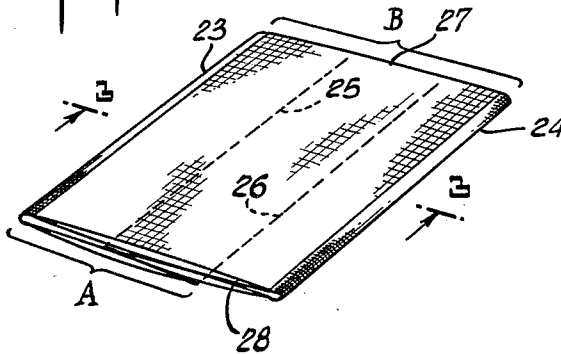
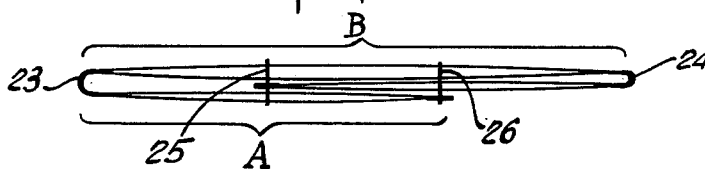


Fig. 3.



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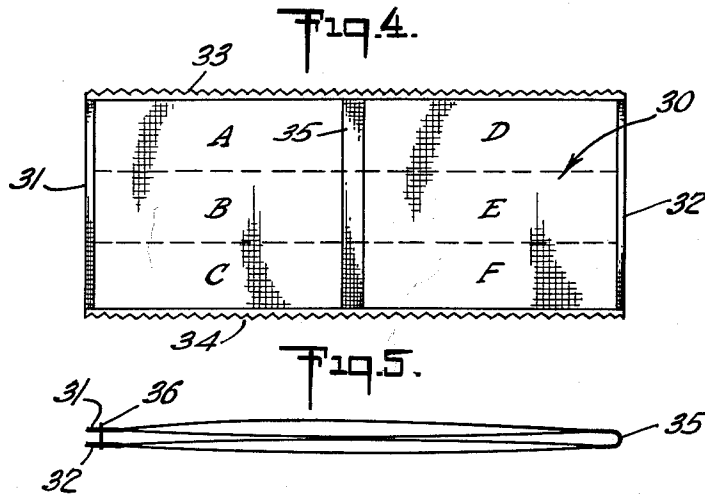
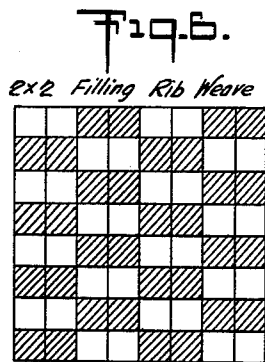
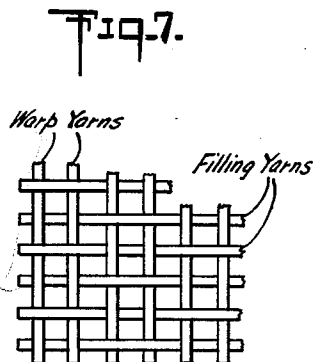
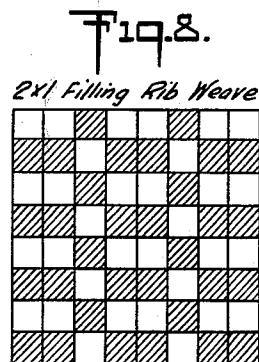
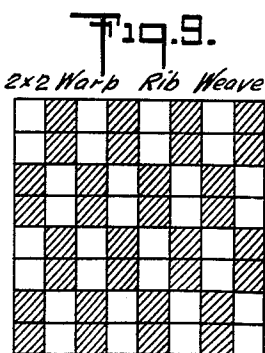
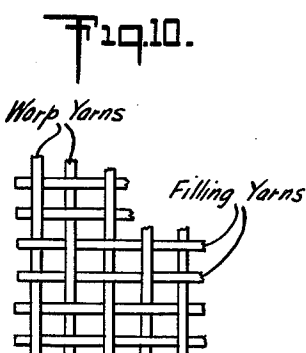
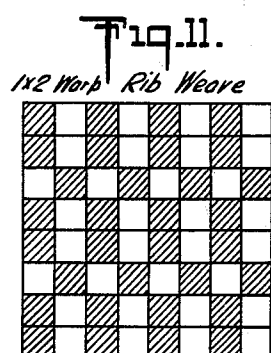
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2 Sheets-Sheet 2



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DIAPER

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The present invention relates to pre-folded woven
diapers, more particularly to such diapers which com-
prise several layers of gauze diaper cloth.

In accordance with the present invention a pre-folded
woven diaper comprising a plurality of layers of gauze
diaper cloth has a portion of the outer layers of the
final diaper woven in a weave selected from the group
consisting of 2 x 1 filling rib weave, 2 x 2 filling rib
weave, 1 x 2 warp rib weave, and 2 x 2 warp rib weave
with the floats (areas of a yarn which pass over or under
more than one yarn) of said weave running in the direc-
tion of the width of the pre-folded diaper. In the pre-
ferred form of the invention the rib weaves in the said
outer layers are centrally disposed in overlapping rela-
tionship on the opposite sides of the diaper. A diaper
woven as described is stabilized against shrinkage when
washed and does not bunch or ripple at its sewn seams
but lies flat after washing.

Pre-folded diapers are made by folding a large, rec-
tangular piece of lightweight, multi-layer, open-weave
fabric one or more times to obtain the final desired
rectangular diaper size. The folded fabric layers are
sewn together so that they will maintain their relative
positions during subsequent use of the diaper. The final
diaper comprises a plurality of layers of fabric and, de-
pending on how the original fabric is folded, the layers
may extend over the entire diaper area or there may be
a different number of layers over different portions of
the diaper.

The original fabric is woven with an open weave to
produce a soft and absorbent material. It may be woven
with different yarn counts over different areas of the
fabric so that when folded the center of the final diaper
will be relatively heavy and highly absorbent and the
side portions of the diaper relatively light, soft and re-
sistant to abrasion. Such variations in yarn count may
also provide a neater appearing diaper on the baby as
the portions around the legs are thin and close fitting,
whereas the bulk of the diaper is between the legs where
it is needed.

The original fabric is usually woven in a plain weave
over its entire area to insure absorbency and abrasion
resistance in the fabric. Another common weave used
for diaper cloth is a "birdseye" weave which is also
absorbent and soft and gives a pleasing diamond effect to
the appearance of the fabric.

The openness of the weave allows the fabric to shrink
to a great extent when washed. When the open weave
is sewn and the sewn seam washed the open weave allows
the yarns to bunch and push together around the sewn
seams which produces a puckered and rippled diaper.

It has now been discovered that if from about 30% to
70% of the area of each of the outer layers of a pre-
folded woven diaper is woven in a weave selected from
the group consisting of 2 x 1 filling rib weave, 2 x 2 filling
rib weave, 1 x 2 warp rib weave and 2 x 2 warp rib weave
with the floats of said weave running in the direction of
the diaper width, and these portions are centrally located
in superposed overlapping relationship on the opposite
sides of the final pre-folded diaper the diaper is soft and
unexpectedly stabilized against shrinking when washed
and the diaper maintains smooth sewn seams which lie
flat even after the diaper is washed.

The invention will be further described in conjunc-
tion with the accompanying drawings, wherein:

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FIGURE 1 is a view in perspective of a woven fabric
which may be used to form the pre-folded woven diaper
of the present invention.

FIG. 2 is a view in perspective of the fabric of FIG. 1
folded to form a pre-folded woven diaper of the present
invention.

FIG. 3 is a cross-sectional view taken along line 3—3
of FIG. 2.

FIG. 4 is a woven fabric which may be used to form
another embodiment of the pre-folded diaper of the
present invention.

FIG. 5 is a cross-sectional view of a pre-folded woven
diaper of the present invention made from the fabric
shown in FIG. 4.

FIG. 6 is a weave diagram for the center portion of
the outer layers of a pre-folded woven diaper according
to one embodiment of the invention, showing a 2 x 2
filling rib weave.

FIG. 7 is an enlarged, schematic plan view of a por-
tion of a diaper according to the invention showing the
outer layer weave according to the embodiment of FIG.
6.

FIG. 8 is a weave diagram for the center portion of
the outer layers of a pre-folded woven diaper according
to an embodiment of the invention showing a 2 x 1 filling
rib weave.

FIG. 9 is a weave diagram for the center portion of the
outer layer of a pre-folded woven diaper according to an
embodiment of the present invention showing a 2 x 2 warp
rib weave.

FIG. 10 is an enlarged, schematic plan view of a por-
tion of a diaper according to the present invention show-
ing the outer layer weave according to the embodiment
of FIG. 9.

And FIG. 11 is a weave diagram for the center por-
tion of the outer layers of a pre-folded woven diaper
according to another embodiment of the invention show-
ing a 1 x 2 warp rib weave.

Referring to the drawings, FIG. 1, the two-ply rectan-
gular piece of fabric 20 has selvage edges 21 and 22 run-
ning along its shorter dimension and has wearing strips
23 and 24 (areas where the two plies are woven as a
single ply) intermediate of these selvage strips so that
the fabric is separated into three panels A, B and C.
The center panel B has a portion M of its uppermost
layer, and the side panel A a portion N of its upper-
most layer, woven in a 2 x 2 filling rib weave. The re-
mainder of the fabric is woven in a plain weave.

In FIG. 2 the fabric of FIG. 1 is shown after it has
been folded about the two wearing strips 23 and 24
so that the center panel B forms the top layer of the
final diaper and the side panel A and a portion of side
panel C form the bottom layer. The rib weave areas
are disposed on the outermost layers of the final diaper.
Seams 25 and 26 are sewn intermediate of the wearing
strips along the selvage edges so that the diaper will
maintain its shape during use. The fabric edges 27 and
28 extending between wearing strips are overedged to
aid in the stabilization of the fabric layers and to produce
smooth edges in the final diaper.

In FIG. 4 there is shown a rectangular piece of fabric
30 of multi-layer material having selvage edges 31 and
32 along its shorter dimension and pinked edges 33 and
34 along its longer direction. Centrally located in the
fabric and extending between the pinked edges is a wear-
ing strip 35. The fabric is separated into six panels A
through F with the uppermost layer of the centrally
located panels B and E woven in a 2 x 2 warp rib weave
and the remainder of the fabric woven in a plain weave.

FIG. 5 is a cross-section of the fabric of FIG. 4

with panels D, E. and F, folded under panels A, B, and C, to superimpose the selvage edges. The selvages are sewn together at seam 36 to stabilize the fabric in its folded shape. The final diaper has the uppermost layer of panel B and the uppermost layer of panel E. 5 as the central portions of the outer layers of the final diaper.

The original piece of fabric from which the diapers of the present invention are produced may be of any size or shape such as rectangular, square, etc., depending upon the size and shape desired in the final diaper. The original fabric is commonly called gauze diaper cloth and is woven in a plurality of layers using an open weave. The layers are woven as a single layer at opposite edges to form the selvages of the fabric. The fabric may be woven as a single layer at different portions along the area of the fabric in order to produce areas of good abrasion-resistance (called wearing strips). Such abrasion-resistant areas are desirable at the folded edges of the final diaper because of the extreme wear at these areas.

Gauze diaper cloth is characterized by having a yarn count under 80 by 80. It is important, in accordance with the present invention, that the rib woven portions of the outer layers of the final diaper have a yarn count of from about 60 to 80 warp yarns per inch and a yarn count of from about 28 to 44 filling yarns per inch with the total number of warp yarns per inch and filling yarns per inch being at least about 100. Yarn counts within the ranges given above produce a soft, absorbent and stabilized area when woven in accordance with the present invention. If the warp yarns per inch, filling yarns per inch or the total of warp and filling yarns per inch are below the indicated ranges the resultant diaper will not be stabilized against shrinkage. Whereas, if the warp yarns per inch or the filling yarns per inch are greater than the ranges indicated above the resultant diaper will not be soft and absorbent. In the production of gauze diaper cloth yarn sizes range from about 22's to 28's in the warp and from about 25's to 44's in the fill.

The gauze diaper cloth is folded as shown in FIG. 2, 40 or in a similar manner, to produce a rectangular pre-folded diaper.

The final diaper will weigh from about 50 grams to 70 grams depending upon the final desired diaper size and the yarn count and size yarns used.

The diaper is sewn along some of its edges and at other areas of the diaper to form a pre-folded woven diaper which maintains its shape during subsequent use.

The exposed unfolded edges of the diaper may be overedged to prevent raveling at these edges or if the original fabric is woven with a pinking bar and the fabric cut in a pinked manner overedging is unnecessary.

Gauze diaper cloth is woven either in a plain weave or in a "birdseye" weave. It is important in the present invention that from about 30% to 70% of the area of each outer layer of the final diaper be woven in a weave selected from the group consisting of 2 x 1 filling rib weave, 2 x 2 filling rib weave, 1 x 2 warp rib weave, and 2 x 2 warp rib weave.

If less than 30% of each outer layer is woven in the aforementioned rib weaves the final diaper is not stabilized against shrinkage when washed. The final diaper will bunch and ripple at the sewn seams which are used to stabilize the diaper or to prevent raveling of the edges of the diaper. If more than 70% of the area of each outer layer of the diaper is woven in the aforementioned rib weaves the fabric is not soft and absorbent and does not make a suitable diaper.

The rib weave portions in the outer layers of the diaper are preferably disposed in centrally located areas on opposite sides of the diaper and thus the diaper is more or less uniformly stabilized and does not become askew or lose its shape when washed.

Referring again to the drawings, FIGURES 6, 8, 9 and 75

11 show on design paper the rib weaves which may be used in accordance with the present invention.

Design paper is graph paper in which the vertical lines represent warp threads and the horizontal lines represent filling threads. The darkened blocks indicate that the warp thread is above the filling thread and the undarkened blocks indicate that the warp thread is beneath the filling thread.

In FIG. 7 there is shown a filling rib weave in which two warp yarns weave alike, i.e., both warp yarns go over and under the same filling yarns and this pattern is repeated in every two warp yarns. The pattern is shown on the design paper of FIG. 6. In FIG. 10 there is shown a warp rib weave in which two filling yarns weave alike and go over and under successive warp yarns and every two filling yarns weave alike. The pattern is shown on the design paper of FIG. 9.

Whether a warp rib weave or a filling rib weave is used will depend on how the fabric is folded to form the pre-folded diaper. It is important in the final diaper that the floats run in the direction of the width of the diaper. For example, if the fabric is folded so that the filling yarns run the width of the diaper a filling rib weave is used, whereas if the warp yarns run the width of the final diaper a warp rib weave is used.

The areas of the outer layer of the diaper, adjacent the rib woven portion, may be woven with yarn counts, yarn sizes and weaves which are conventional in the manufacture of gauze diaper cloth.

The inner layers of the diaper may be woven fabric, nonwoven fabric, absorbent fill or other suitable material.

The invention will be further explained by reference to the example set forth below:

Example

Two-ply gauze diaper cloth is woven 38 inches wide with selvages running along both outer edges. Wearing strips approximately an inch wide (areas where the two plies are woven as a single ply) are woven in the fabric at strips running parallel to the selvages and placed approximately 11 inches therefrom to form three panels in the fabric. These panels are: two 11-inch side panels and a 16-inch center panel. The center 6 inches of the uppermost layer of the center panel and the outer 6 inches of the uppermost layer of one of the side panels are woven in a 2 x 2 filling rib weave using 67 warp yarns per inch and 35 filling yarns per inch, with the warp yarns being 25's and the filling yarns being 35's. The remainder of the uppermost layer is woven in a 1 x 1 plain weave with 40 warp yarns per inch and 35 filling yarns per inch. The warp yarns are 25's and the filling yarns 35's. The entire bottom layer is woven in a 1 x 1 plain weave using 33 warp yarns to the inch and 35 filling yarns to the inch with the warp yarn being 25's and the filling yarns being 35's.

A 21-inch length of this fabric is cut to form a diaper blank. The selvage edges are folded inwardly about the wearing strips to form 4 plies of fabric in the side areas and a 6-ply fabric in the center area of the diaper. The fabric is folded so that the rib weave portion of the uppermost layer of the center panel is in the center and on the top of the diaper and the rib weave portion of the uppermost layer of the side panel is in the center and on the bottom of the diaper. The folded fabric is sewn together along the selvages and the cut portions of the folded fabric overedges to form a pre-folded woven diaper.

The fabric is washed five times, and shrinks approximately 10% in the direction of its length. The washed diaper lies flat and the sewn seams are smooth. There is no bunching or rippling of the diaper either along the sewn seams or at the overedged edges.

For comparative purposes a similar fabric was woven in a plain weave over the entire area of the fabric.

The fabric was two-ply gauze diaper cloth 38 inches

wide with selvages running along both outer edges. One-inch wearing strips are woven in the fabric at strips running parallel to the selvages and placed approximately 11 inches therefrom to form three panels in the fabric. The panels are: two 11-inch side panels and a 16-inch center panel. The center 6 inches of the uppermost layer of the center panel and the outer 6 inches of the uppermost layer of one of the side panels are woven in a 1 x 1 plain weave using 67 warp yarns per inch and 35 filling yarns per inch, with the warp yarns being 25's and the filling yarns being 35's. The remainder of the uppermost layer is woven in a 1 x 1 plain weave with 40 warp yarns per inch and 35 filling yarns per inch. The warp yarns are 25's and the filling yarns 35's. The entire bottom layer is woven in a 1 x 1 plain weave using 33 warp yarns to the inch and 35 filling yarns to the inch with the warp yarns being 25's and the filling yarns being 35's. A 21-inch length of the fabric is cut, folded and sewn in the manner previously described to form a prefolded diaper. This diaper was washed five times and shrunk approximately 17%. The washed diaper was rippled and puckered at its sewn seams and the fabric layers awry and bunched at the overedged edges.

The invention is not to be construed as limited by the example previously given nor to the specific features mentioned therein except as the same may be included in the claims appended hereto. It is understood that changes, modifications, and variations may be made in the diaper without departing from the spirit and scope of the claimed invention.

What is claimed is:

1. A rectangular diaper blank folded along transverse lines to superimpose the two extremities of the diaper over the central portion thereof and sewn to provide seams along the edges of each of said extremities parallel to said lines of fold to insure said prefolded position, said diaper having an area of from about 30% to about 70%

of each exposed face, disposed adjacent to said seams, woven in a 2 x 1 filling rib weave, said weave having from about 60 to about 80 ends and from about 28 to about 44 picks per inch with the combined total of ends and picks per inch being at least about 100, and said diaper being characterized by stabilization against corrugation in the areas of said exposed seams.

2. The diaper of claim 1 wherein said weave is a 2 x 2 filling rib weave.

3. A rectangular diaper blank folded along transverse lines to superimpose the two extremities of the diaper over the central portion thereof and sewn to provide seams along the edges of each of said extremities parallel to said lines of fold to insure said prefolded position, said diaper having an area of from about 30% to about 70% of each exposed face, disposed adjacent to said seams, woven in a 1 x 2 warp rib weave, said weave having from about 60 to about 80 ends and from about 28 to about 44 picks per inch with the combined total of ends and picks per inch being at least about 100, and said diaper being characterized by stabilization against corrugation in the area of said exposed seams.

4. The diaper of claim 3 wherein said weave is a 2 x 2 warp rib weave.

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JORDAN FRANKLIN, *Examiner*.