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T. J. SWARTZ
CUT TEXTILE PIECE ADAPTED FOR USE AS
DIAPERS, WIPING CLOTHS, AND THE LIKE
Original Filed July 22, 1950

2,619,089

Fig. 1.

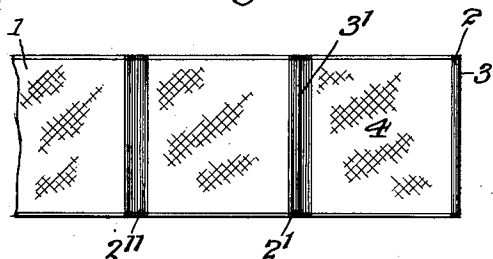


Fig. 2.

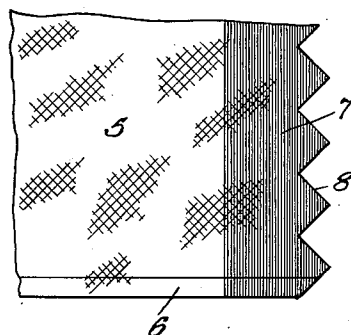


Fig. 5.

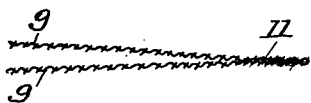


Fig. 4.



Fig. 3.

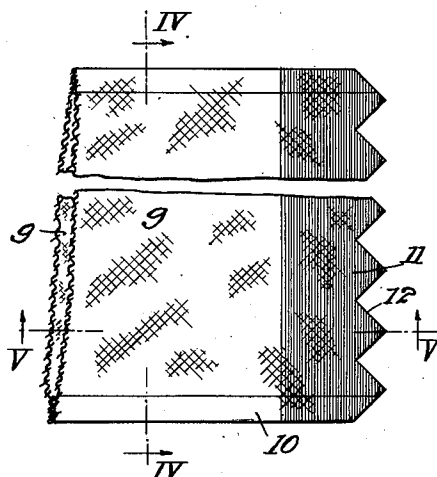


Fig. 6.

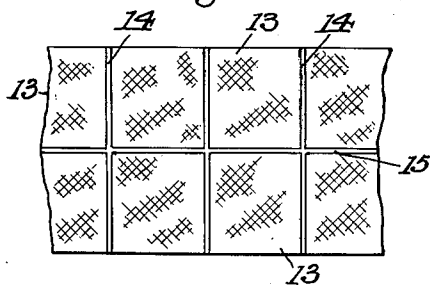


Fig. 7.

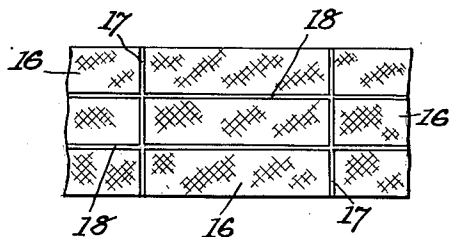
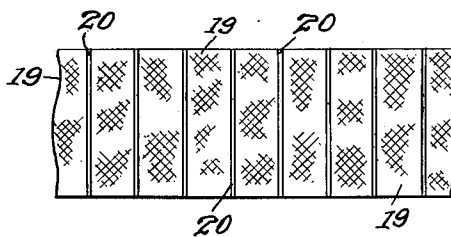


Fig. 8.



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UNITED STATES PATENT OFFICE

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CUT TEXTILE PIECE ADAPTED FOR USE AS
DIAPERS, WIPING CLOTHS, AND THE LIKE

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Original application July 22, 1950, Serial No.
175,313. Divided and this application May 23,
1951, Serial No. 227,795

9 Claims. (Cl. 128—284)

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This invention relates to cut textile pieces adapted for use as diapers, wiping cloths and the like, the present application being a division of application Serial No. 175,313, filed July 22, 1950.

An object of the invention is to provide a diaper, of bird's-eye or gauze material, which will be free of hems, and in which the cut edges are sealed to prevent raveling.

A further object is to provide diapers and the like which will dry rapidly and uniformly due to the elimination of extra thicknesses of fabric in the hem.

Another object is to provide certain improvements in the construction of the article by which the above named and other objects may effectively be attained.

A large proportion of the diapers now in use are made of a cotton fabric known as "bird's-eye," of which some hundred million yards per year are produced for this and other purposes. The fabric is woven to a width such that the selvages of the web form two edges of the final rectangular diaper (or one edge of a triangular diaper), but the edges corresponding to cuts across the web must be hemmed in order to prevent them from raveling; even when "pinked" such cut edges will start to ravel after being washed a few times. When hemmed, the edges contain at least three thicknesses of the fabric, and in normal use the superposition of such edges by folding results in there being a dozen or more thicknesses at certain points, with resulting discomfort to the user. The hems also take much longer to dry than does the single-thickness area, thus delaying materially the re-use of hemmed diapers after each washing.

According to the present invention, the hems are completely eliminated by applying to the fabric a narrow band of suitable sealing material and cutting (pinking) along the middle line of this band to leave pinked, ravel-proof edges no thicker than the rest of the fabric. The same arrangement is useful in connection with tubular gauze diapers, as will be discussed below.

The invention will be better understood by reference to the accompanying drawings, in which Fig. 1 represents, in plan view, a section of a web of fabric to be cut;

Fig. 2 represents a full size detail of a corner of a bird's-eye diaper;

Fig. 3 represents a full size detail, parts being broken away, of one end of a tubular gauze diaper;

Fig. 4 represents a transverse section taken on the line IV—IV of Fig. 3;

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Fig. 5 represents a longitudinal section taken on the line V—V of Fig. 3; and

Figs. 6, 7 and 8 represent, in plan view, webs of fabric designed to be printed and cut for uses other than as diapers.

As set forth in copending application Serial No. 175,313, the fabric is woven, finished and bleached in any customary manner. The web is then passed through a rotary textile printing machine having an intaglio cylinder formed to "print" strips transversely across the web at the desired intervals, corresponding to the lengths into which the web is to be cut, each strip being approximately from $\frac{1}{2}$ " to 1" in width. The material thus applied to the web is preferably a quick—or self-vulcanizing latex or rubber compound, more fully described below, or a suitable synthetic plastic material. The printed web is then led through a drier of usual construction, the heat and time factors of the drying operation being selected such that the latex or rubber compound is dried and vulcanized or the plastic material is polymerized or set. The web may pass directly to a pinking cutter, such as a rotary paper cutter with appropriately shaped blade or blades, or a "flying shear" cutter, the cutter being so synchronized with the printer as to cut the web accurately along the center line of each printed strip, or the web may be rolled up and cut later in any desired manner. In either case the cut pieces are delivered in a pile or stack and are ready for packaging, shipment and use.

In Fig. 1 is shown an end of the web 1 on which transverse strips 2, 2', 2'' have been printed, the width of said strips being exaggerated for convenience of illustration. The web has been cut at 3, 3' to form a complete diaper 4, and a cut will be made along the uncut strip 2'' and along each succeeding strip, as explained above.

In Fig. 2, showing a corner of a bird's-eye diaper, the plain untreated fabric appears at 5, the selvage is indicated at 6, the printed strip of sealing material (half of its original width) is shown at 7 and the pinked edge at 8.

Figs. 3, 4 and 5 show, instead of bird's-eye, a rather widely used type of tubular (or two-ply) woven gauze, having the separate plies 9, 9 united along their longitudinal edges in a common selvage 10, 10. As now made, the two plies are usually also united into a single closely woven fabric in transverse strips about $1\frac{1}{2}$ " wide, spaced along the web according to the desired size of the final product, and the separate diapers are formed by pinking across the web along the center line of each such closely woven strip. Such an arrangement is only moderately satis-

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factory, because repeated washings result in raveling of the edges even though they are closely woven and pinked. As shown herein, the transverse inter-woven strips are eliminated (obviously greatly simplifying the weaving operation) and the separate plies are united at the desired intervals by strips of sealing material 11 (half of one such strip being shown in Figs. 3 and 5) which also secures the threads along the pinked edge 12 against raveling. In order to prevent relative movement of the plies and to keep them even during the finishing, bleaching, printing and cutting operations, they may be joined along warpwise-extending lines, spaced an inch or more apart, by interweaving one or two warp threads (at the selected intervals) with the weft threads of both plies, in a well known manner.

In normal use diapers are subjected not only to varying amounts of physical wear but to certain chemical actions and extremely strenuous laundering treatment, including repeated boiling. For this reason many sealing or impregnating materials, commonly used with fabrics for various purposes, are not suitable for sealing the cut edges of diapers as described herein.

The material must be and remain flexible, somewhat elastic, unaffected by boiling or by normal detergents, not tacky nor brittle, and free from ingredients likely to cause allergic reactions in the user.

In general, materials having substantially the characteristics of rubber are most suitable. These include, natural rubber, synthetic rubbers such as co-polymers of butadiene and styrene, butadiene and acrylic nitrile, isobutylene and isoprene and polymers of 2 chloro, 1,3, butadiene.

While the natural rubber is very satisfactory for use in diapers on account of its elasticity and excellent resistance to aging and laundering, the co-polymers of 1,3, butadiene and styrene are also very durable and may be preferred for reasons of economy. Acrylic polymers and those of 2 chloro, 1,3, butadiene, while slightly more expensive than natural rubber or butadiene-styrene co-polymers, would be preferred for treatment of polishing or wiping cloths which might come in contact with oils or greases during use.

It will be obvious to those skilled in the art of treating textile fabrics with polymeric materials, that an emulsion of these in water would be most suitable because with the use of solvent solutions, the vapors might become ignited by static electricity generated by the passage of the fabric through the machines. This could be avoided by the use of non-flammable solvents but since the vapors of these are very often injurious to health, adequate ventilation must be provided to remove the toxic vapors.

The following formula has given excellent results in the process of my inventions:

Rubber (from 60% solids latex) -----	100.00
Zinc oxide -----	3.00
Sulfur -----	1.00
Zinc diethyl dithio carbamate -----	1.00
Heptylated di phenyl amine -----	2.00
Titanium dioxide -----	35.00
Casein -----	.50
Potassium oleate -----	1.00
Textile gum thickener Q. S.	

A butadiene-styrene base compound which has been found to be satisfactory is as follows:

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Butadiene-Styrene copolymer (from 50% solids latex) -----	100.00
Zinc oxide -----	5.00
Sulfur -----	2.00
Zinc di methyl dithio carbamate -----	2.00
Heptylated di phenyl amine -----	2.00
Titanium dioxide -----	35.00
Casein -----	.50
Potassium oleate -----	1.00
Textile gum thickener Q. S.	

As an example of a printing material for use on fabrics which must come in contact with oils or greases, the following is satisfactory:

Butadiene acrylic nitrile rubber -----	100.00
Zinc oxide -----	3.00
Sulfur -----	1.50
Zinc di methyl dithio carbamate -----	1.50
Heptylated di phenyl amine -----	2.00
Titanium dioxide -----	35.00
Casein -----	.50
Potassium oleate -----	1.00
Textile gum thickener Q. S.	

It will be recognized that the thickening of the formulas given must be regulated for the type and depth of the engraving on the print rolls and the thickness and absorbcency of the material to be printed. Ordinary textile gum thickeners such as algin, methyl cellulose and gum tragacanth may be used. If a slight drag to the paste is desired, a gum such as karaya is useful.

Other flexible and somewhat elastic polymers which are commercially available in latex form give excellent results and may be used for some purposes. It is not necessary to vulcanize many of these as a continuous durable film is deposited when the water is dried out. These include polymers of vinyl chloride, vinyl acetate, vinylidene chloride and copolymers of these with other materials such as acrylic nitrile.

Since most of the textile fibers carry a negative charge and emulsions of polymeric materials are also negatively charged, there is a tendency for certain fabrics to resist penetration. This can be overcome by the use of strong wetting agents, preferably of the non-ionic type or by reversing the charge of either the fabric or the emulsion. This may be accomplished in the case of the fabric by pre-impregnation with a cationic surface active agent. In the case of the emulsion, the particles may be given a positive charge by stabilizing with a non-ionic material and adding cationic soaps such as the amine acetates or quaternary ammonium compounds.

The quantity of sealing material (solids) applied to the fabric depends on the concentration of solids in the fluid when it is applied and on the depth to which the printing roller is engraved, both factors being readily determinable in any given situation. For a normal and practical depth of engraving the rubber compounds may be applied in a concentration of about 40% to 60% in order to obtain an adequate quantity of solids with good impregnation of the fabric threads and without danger of the solids being filtered out. Heavier fabrics naturally require somewhat heavier applications than lighter materials and the open porous gauze material, which is quite absorbent, may require more sealing material than a bird's-eye of the same weight, particularly when the two plies of gauze are being sealed together instead of woven together.

Although diapers constitute an important field of use for fabrics having their cut edges sealed

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as described, the same arrangement has more general applicability. In Fig. 6 is shown a web of woven fabric 13 on which transverse strips of sealing material 14, 14 have been printed, and which has also a longitudinal strip 15 of the same material running down the middle. Upon pink-
 5 ing such a web along the center line of each strip 14 and of strip 15, it will be divided into rectangular pieces suitable for use as cleaning cloths or for other purposes depending on the specific nature of the fabric. Particularly in the case of cleaning or wiping cloths used around moving machinery, it is of the greatest importance to eliminate all loose or hanging threads; this is accomplished very effectively by sealing
 10 the cut edges as described herein, preferably with an oil-resistant material, referred to above.

Fig. 7 shows in a similar manner a web of fabric 16 printed with transverse sealing strips 17, 17 and with a plurality of longitudinal strips 18, 18. Assuming the application of the strips to a fabric which is preferably napped, the elongated pieces formed by cutting along the center lines of the strips will be found useful, for instance, as shoe cleaning cloths of the type normally provided in hotel rooms. Fig. 8 shows another way in which pieces of the same shape (and for the same purpose) may be made, by printing on a fabric web 19 of suitable width a series of sealing strips 20, 20 relatively closely spaced in the warpwise direction, and cutting along the center line of each such strip. In the arrangements of Figs. 7 and 8, for the purpose mentioned, it is advisable to so form the webs that their greater strength is in the direction of the length
 35 of the pieces to be cut, i. e., warpwise in Fig. 7 and weftwise in Fig. 8.

As an alternative to printing, the sealing material may be applied by spraying through a suitably formed stencil; and in the case of Figs. 6 and 7 the longitudinal strips may be applied either by correspondingly shaped engraving of the printing cylinder or by separate narrow stripping rollers.

It will be understood that various changes may be made in the form, disposition and materials of the article without departing from the spirit and scope of the invention, and hence I do not intend to be limited to details herein shown or described, except as they may be included in the claims or be required by disclosures of the prior art.

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What I claim is:

1. A cut textile piece comprising, a piece of woven fabric having at least two cut edges, the threads in a narrow zone along each of said cut
 5 edges being impregnated with and sealed together by an application of a material having the physical characteristics of rubber.

2. A cut textile piece according to claim 1 in which the piece of fabric is rectangular and is bounded on two opposite edges by a woven
 10 selvedge.

3. A cut textile piece according to claim 1 in which the cut edges are pinked.

4. A cut textile piece according to claim 3 in which the piece of fabric is rectangular and is bounded on two opposite edges by a woven
 15 selvedge.

5. A cut textile piece according to claim 1 in which the piece of fabric is tubular woven and is bounded on two opposite sides by a woven selvedge, and in which the sealing material binds together the plies of the fabric.

6. A cut textile piece according to claim 1 in which the sealing material is a vulcanized compound of natural latex.

7. A cut textile piece according to claim 1 in which the sealing material is a vulcanized compound of synthetic rubber.

8. A cut textile piece according to claim 1 in which the sealing material is a synthetic plastic material.

9. A cut textile piece comprising, a piece of tubular woven fabric having two opposite cut edges and bounded on two other opposite sides by a woven selvedge, the threads in a narrow zone along each of said cut edges being impregnated with and sealed together by an application of a material having the physical characteristics of rubber, the plies of the fabric being bound to each other at their cut edges by the sealing material in said zones and said plies being bound together intermediate said zones by the interweaving at intervals across the fabric of one or more selected threads.

THOMAS J. SWARTZ.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
2,120,949	Hayden -----	June 14, 1938