

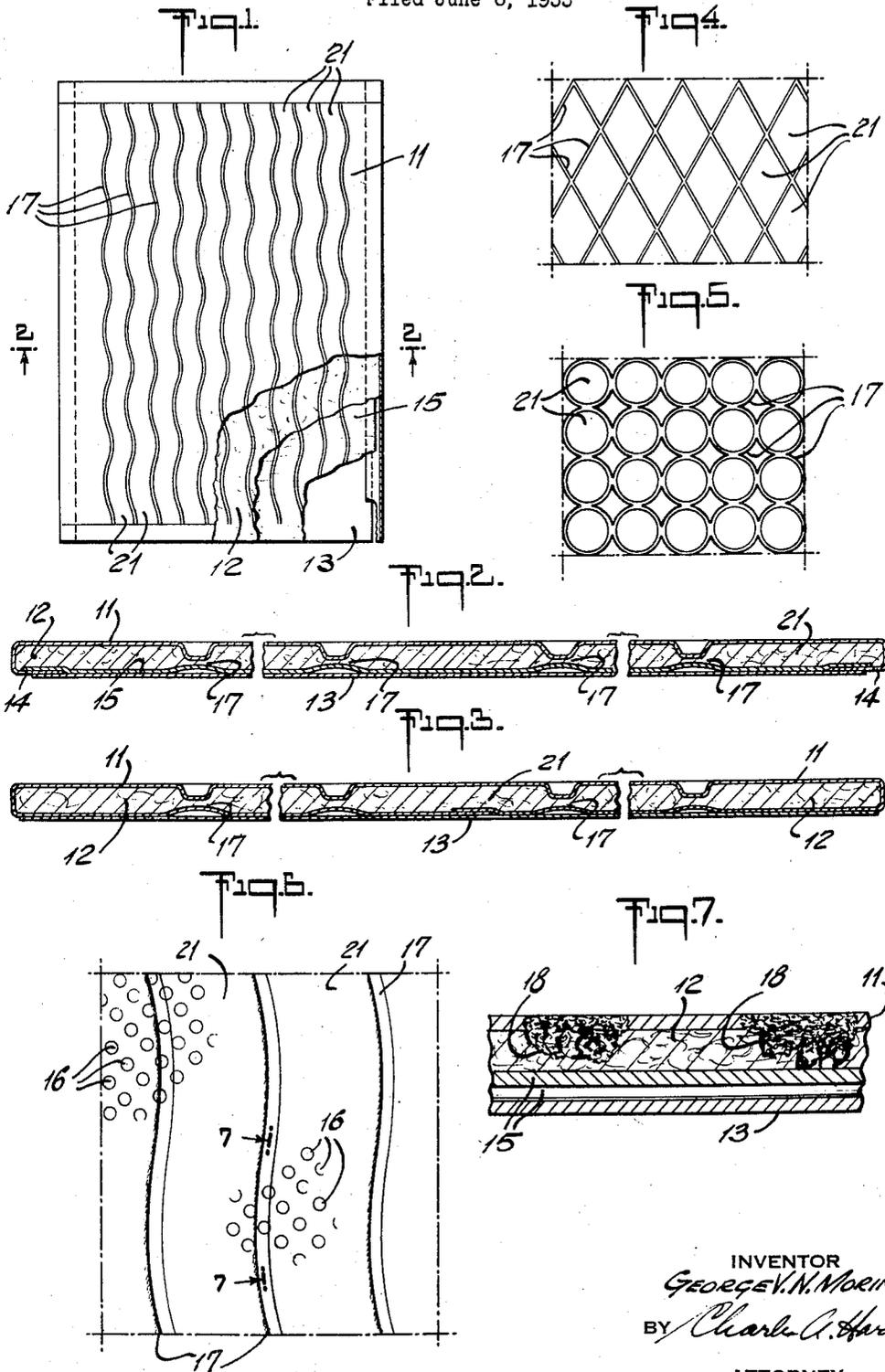
April 9, 1957

G. V. N. MORIN

2,788,003

DISPOSABLE ABSORBENT PAD

Filed June 6, 1955



INVENTOR
George V. N. Morin.

BY *Charles A. Harris*

ATTORNEY

1

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DISPOSABLE ABSORBENT PAD

George Van Norden Morin, Westfield, N. J., assignor to Chicopee Manufacturing Corporation, a corporation of Massachusetts

Application June 6, 1955, Serial No. 513,262

15 Claims. (Cl. 128—284)

The present invention relates to absorbent products, such as absorbent pads and dressings including bed pads and catamenial dressings and more particularly to disposable diapers, and is a continuation-in-part of my co-pending application, Serial No. 372,961, and now abandoned.

The present invention contemplates a disposable pad or dressing comprising a layer of inexpensive flocky absorbent material, such as fluffed woodpulp, covered with a relatively thin moisture permeable nonwoven web. The flocky absorbent material is stabilized and anchored to the nonwoven web through a pattern of spaced compressed strips of the material itself. Those portions of the web overlying the compressed strips are held in close contact with the absorbent material in said strips; preferably being positively held in this position by an adhesive intermittently distributed in the web. The web may be intermittently bonded with a thermoplastic adhesive, in which case this adhesive may be made to adhere to the absorbent material in the compressed strips by means such as a hot embossing device which also forms the compressed strips.

Disposable diapers have been known in the art for a number of years, and are now gaining widespread acceptance by consumers, both in private homes and in hospitals and institutions. Their use obviates the necessity of storing, washing and folding the conventional cotton woven diaper and, since they can be used once and then discarded, disposable diapers have been found to be especially desirable for use in hospital nurseries to prevent the spread of infection or contagion through the medium of reusable diapers.

To compete with the conventional product, however, the cost of the disposable diaper must be relatively low and it should be similar to a cloth diaper with regard to absorbency, softness, bulk and conformability. The important property of absorbency includes both the total amount of liquid that can be retained by the diaper before it feels wet, or its absorptive capacity, as well as the rapidity with which localized concentrations of liquid can be absorbed by the diaper without the formation of "puddles," or its moisture conducting power.

It is therefore an important object of the present invention to provide a cheaper disposable pad or dressing which possesses both a high absorptive capacity and effective moisture conducting powers and may be made similar to the conventional diaper in softness, bulk and conformability.

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

Fig. 1 is a partially cut-away plan view of a diaper of this invention.

Fig. 2 shows fragments of an enlarged sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a similar sectional view through a slightly different embodiment of the invention.

Fig. 4 is a plan view of a portion of a slightly dif-

2

ferent embodiment of the diaper of this invention showing a variation from the pattern of depressions in the face of the diaper of Fig. 1.

Fig. 5 is a similar plan view of a portion of still another embodiment of the invention showing another pattern of depressions.

Fig. 6 is an enlarged plan view of a portion of the diaper of Fig. 1.

Fig. 7 is still further enlarged portion of a sectional view taken along line 7—7 of Fig. 6.

Referring to the drawings, there is shown a disposable diaper comprising a moisture permeable facing sheet 11, a layer of flocky absorbent material 12, and a moisture repellent outer backing sheet 13. As shown in Figs. 1 and 2, the facing sheet may cover one side of the absorbent layer overlapping its edges and the outer backing sheet 13 may be secured peripherally to the overlapping portions 14 of the facing sheet. The backing sheet 13 is preferably impermeable to moisture to prevent any possibility of leakage through the diaper. For this reason, and also because they possess superior textile-like qualities of hand and drape, paper-backed or unsupported films of a plastic such as polyethylene are preferred for this use. However, other similar materials may be used for the backing sheet and water repellent papers have given reasonably satisfactory results. In the sense that it is impermeable to moisture, the diaper of this invention avoids the necessity for "rubber panties" and is superior to conventional cloth diapers. An inner backing sheet 15 of tissue paper or similar material may be included between the layer of absorbent material and the moisture repellent backing sheet 13. As will appear from the following description, it serves to support the absorbent material 12 during assembly of the diaper and to assist the facing sheet 11 in enclosing and anchoring the absorbent layer. In another form of the invention, shown in Fig. 3, the moisture permeable facing sheet 11 is extended completely around the absorbent material in the form of an envelope with a moisture repellent sheet 13 attached to one side thereof, such that one side of the diaper is moisture absorbent and the other is moisture repellent. The backing sheet may be removed entirely from the diaper of Fig. 4 and one side of the facing sheet coated with a moisture repellent material until sufficiently moisture proof to take the place of the outer backing sheet.

Preferably, the moisture-permeable facing sheet 11 comprises a nonwoven fabric bonded with a thermoplastic adhesive or binder applied to the nonwoven fibers in an intermittent manner, such as described in Goldman, Patent No. 2,039,312. However, somewhat lightly impregnated nonwoven webs or thin "wet strength" papers, such as described in Osborne, Patent No. 2,626,214, may be employed. It is preferred that the facing sheet contain a thermoplastic adhesive distributed in an intermittent pattern or intermittently at random as by light impregnation with a dispersion. In the Goldman patent, the bonding agent is applied to card webs in substantially parallel wavy lines normal to the machine direction of the web. However, a binder may be applied in any number of ways and in any number of patterns including the pattern of small circles 16 shown in Fig. 6. The intermittent arrangement of the thermoplastic adhesive may serve to bind the fibers into a fabric and at the same time provide fabric areas free of binder which are highly permeable to moisture. However, fiber arrangement and density should be such that the fabric will be impermeable to very short fibers and fiber particles which may occur in the layer of absorbent material 12. The facing sheet 11 may include fibers of cotton, viscose rayon, mixtures of cotton and rayon, wood, abaca, and/or other similar natural and synthetic fibers. Plasticized copolymers of polyvinyl

chloride have been found to be particularly suitable for bonding nonwoven fabrics for this use, since they impart to the facing sheet good resistance to wet rubbing, which obviously is an important quality in a disposable diaper or a similar product. Other suitable binders are polyvinyl acetate, polyvinyl acetate and acrylate copolymers, polyvinyl chloride-polyvinyl acetate copolymers, etc.

The absorbent layer comprises an inexpensive flocky material of high absorptive capacity, such as fluffed wood pulp. Fluffed wood pulp is preferred for its low cost and relatively high absorptive capacity, as well as the improved hand, conformability and bulk of disposable diapers made therefrom. In the past, paper tissue has generally been used as the absorbent filler material for disposable diapers. The economies inherent in the use of woodpulp for this purpose can be readily realized by recognizing that wood pulp is the raw material used in the process of making paper tissue. For a given weight, the pulp fill is much less dense, which means that the absorbent pad has a soft, high bulk, possesses a pleasing appearance, conforms readily to the body contours, and does not impart stiffness to material between the baby's legs. Thus, considerable economy may be attained by using less of a cheaper absorbent material to provide a softer, more comfortable diaper of the same absorptive capacity. However, a flocky material such as fluffed wood pulp, unless properly anchored, may present difficulties in an absorbent pad or diaper of this type, due to its tendency to break up and shift in position to form lumps and corresponding relatively empty areas of reduced absorptive capacity. Thus, some means must be found for anchoring the flocky fill to prevent it from breaking up and shifting in position during handling and use.

This is accomplished in the present invention by compressing spaced narrow strips 17 of the absorbent layer through or against the facing sheet 11 by means of a hot embossing tool, such as a roll with heated raised portions corresponding to the strips to be pressed. The heat of the tool in way of the strips is such as will cause the thermoplastic adhesive in the facing sheet to become sufficiently plastic to adhere to the layer of absorbent material and allow the pressure of the embossing operation to cause the adhesive to migrate from the facing sheet into the absorbent material in the compressed strips 17. The migrated adhesive acts to anchor the absorbent layer to the facing sheet. Migration will occur wherever the pattern of the thermoplastic adhesive in the facing sheet intersects the above-mentioned compressed strips. This is shown most clearly in Fig. 7 which is a portion of a sectional view taken along one of the compressed strips of Fig. 6. In these figures, the facing sheet is bonded in a pattern of intermittently occurring small circles 16 such that a relatively large number of adhesive containing circles occur in any given area of the diaper, thus assuring a relatively high frequency of intersection between the adhesive pattern and the compressed strips 17. The migrated adhesive areas 18 extend from the facing sheet into the absorbent material 12 toward the inner backing sheet 15 and, as shown at 19 in Fig. 7, may extend into contact with the inner backing sheet to the extent that they will adhere thereto, in which case the diaper structure will be more firm. The compressed strips are spaced and arranged in a pattern which provides adequate anchorage for the flocky absorbent material 12 and ensures a stable diaper structure. Such a pattern is shown in Fig. 1, as well as in Figs. 4 and 5. In all of these patterns the absorbent layer is compressed or embossed in spaced strips 17 which may or may not be interconnected. These relatively narrow strips define alternate areas 21 of uncompressed absorbent material. The flocky material in each of these areas is stabilized or retained in that area by the compressed strip or strips on its periphery and the compressed material in the strips is anchored to the nonwoven facing sheet

11 through the migrated binder areas extending from the facing sheet.

The narrow compressed strips of the diaper of this invention perform another very important function. While the flocky absorbent material 12 has a high absorptive capacity in it fluffed state, it seems to possess a relatively low moisture conducting ability, probably due to the separation between its fibers. If it is compressed to bring these fibers more closely together, it will exert a much stronger attraction for the capillary flow of liquid in the diaper. Thus, the compressed strips 17 of absorbent material will have a much greater moisture conducting power than the adjacent uncompressed portions 21 of the absorbent layer, and can be arranged in a pattern which will encourage the desired distribution of moisture throughout the diaper. In use, a diaper of this type is extended between a baby's legs and then folded up and around the front and rear of the baby such that corresponding corners may be overlapped for pinning to provide an absorbent covering having a crotch portion and a seat resembling a pair of panties. If the diaper does not possess sufficient moisture conducting power, moisture will tend to collect or puddle at or near the point of discharge to the diaper and at the lowest point thereof and then run toward the lowest edge, depending upon the position of the baby, to leak from the diaper. This is particularly true when the diaper comprises a moisture impermeable backing sheet such that moisture can only escape via its edges. This leakage tends to occur long before the total absorptive capacity of the diaper is utilized and results when its moisture conducting power is not great enough to convey the liquid to the unused absorbent portions of the diaper in time to prevent puddling. For this reason, the number and size of the compressed strips or moisture conducting channels 17 must be adequate to dissipate moisture concentrations under the worst conditions. Since the shortest distance between edges occurs in the transverse direction, and since the central portion of the diaper is bunched in that direction between the baby's legs, the greatest need is for means to encourage moisture to travel longitudinally through the diaper to the end portions which extend up and around the front and rear of the baby. Thus, the above-described pattern of moisture conducting channels 17 preferably extends in a predominately longitudinal direction. In fact, in the preferred pattern of Fig. 1, the channels are defined by longitudinally extending substantially parallel wavy lines. As shown, an appreciable space is provided along each longitudinal edge of the diaper between the respective edge and the pattern of moisture conducting channels 17. Since these spaces contain uncompressed flocky material of relatively low moisture conducting ability, they will act as buffer zones which further resist the tendency of moisture to travel to the longitudinal edges of the diaper. The patterns of Figs. 4 and 5 also serve to increase the moisture conducting power of the diaper, and since they extend transversely as well as longitudinally, they will also assist in conducting moisture in that direction. Whether compressed with the patterns of Figs. 1, 4, or 5, or similar patterns, the resulting diaper, in accordance with this invention, will comprise areas 21 of greater absorptive capacity separated by channels 17 of greater moisture conducting power. The areas of greater absorptive capacity will contain uncompressed flocky absorbent material and the channels of greater moisture conducting power will contain compressed absorbent material as shown in Figs. 2 and 3.

It will be seen that I have provided an absorbent product comprising an absorbent layer of relatively inexpensive flocky material of high absorptive capacity, such as fluffed wood pulp. The absorbent layer is covered with a moisture permeable facing sheet of nonwoven material and a backing sheet of flexible moisture repellent material such that the pad is soft and flexible, conforming

5

readily to the body contours. The absorbent material is stabilized and anchored to the facing sheet through a pattern of compressed strips 17 in the absorbent layer. These strips 17 provide channels of greater moisture conducting power for distributing moisture evenly throughout the pad to minimize the formation of puddles. The absorbent layer may be locked to the facing sheet in the way of the compressed strips by a thermoplastic adhesive contained in the nonwoven material.

The invention claimed is:

1. A disposable absorbent pad comprising a layer of flocky absorbent material covered with a facing sheet of moisture permeable nonwoven fabric intermittently bonded with a thermoplastic adhesive, said absorbent material being stabilized and anchored to said sheet through a pattern of spaced compressed strips of said material, said adhesive adhering to the layer of absorbent material wherever the pattern of compressed strips intersects the intermittently bonded areas of said fabric.

2. A disposable absorbent pad comprising a layer of fluffed woodpulp, a facing sheet of moisture permeable nonwoven fabric intermittently bonded with a thermoplastic adhesive covering one side of said layer, said absorbent material being stabilized and anchored to said facing sheet through a pattern of spaced compressed strips of said material, said adhesive adhering to the layer of absorbent material wherever the pattern of compressed strips intersects the intermittently bonded areas of said fabric, and a flexible moisture repellent backing sheet covering the other side of said pad.

3. A disposable diaper comprising a layer of flocky absorbent material covered with a facing sheet of moisture permeable nonwoven fabric intermittently bonded with a thermoplastic adhesive, said absorbent material being stabilized and anchored to said sheet through a pattern of spaced compressed strips of said material, said adhesive adhering to the layer of absorbent material wherever the pattern of compressed strips intersects the intermittently bonded areas of said fabric.

4. A disposable diaper according to claim 2, wherein the absorbent material is fluffed wood pulp.

5. A disposable diaper according to claim 2, wherein said facing sheet covers one side of said diaper, further comprising a moisture repellent backing sheet covering the other side of said diaper.

6. A disposable diaper according to claim 4, wherein said moisture repellent backing sheet comprises a thin film of a plastic material such as polyethylene.

7. A disposable diaper according to claim 4, wherein an inner backing sheet is included between the layer of absorbent material and said moisture repellent backing sheet, said inner backing sheet being secured to the edges of said facing sheet to act with said facing sheet to provide structural support for the layer of absorbent material.

6

8. A disposable diaper according to claim 6, wherein said inner backing sheet is compressed with said absorbent layer and is anchored thereto.

9. A disposable diaper according to claim 2, wherein said compressed strips define alternate areas of uncompressed absorbent material between them whereby said uncompressed areas and said strips provide a diaper having areas of greater absorptive power separated by channels of greater moisture conducting power.

10. A disposable diaper according to claim 8, wherein said pattern of compressed strips extends in a predominantly longitudinal direction.

11. A disposable diaper according to claim 9, wherein said pattern of compressed strips is in the form of substantially parallel wavy lines.

12. A disposable diaper according to claim 9, wherein said pattern of compressed strips is in the form of a grid of intersecting lines.

13. A disposable absorbent pad comprising a layer of flocky absorbent material covered with a moisture permeable nonwoven web containing an adhesive distributed intermittently therein, said absorbent material being stabilized and anchored to said web through a pattern of spaced compressed strips of said material, said adhesive adhering to the layer of absorbent material wherever the pattern of compressed strips intersects the adhesive in the web.

14. A disposable absorbent pad comprising a layer of flocky absorbent material covered with a relatively thin moisture permeable nonwoven web, said absorbent material being stabilized and anchored to said web through a pattern of spaced compressed strips of said material, the portions of the web overlying said strips being held in close contact with the material in said strips by an adhesive distributed intermittently along said strips.

15. A disposable absorbent pad comprising a layer of fluffed woodpulp covered with a relatively thin moisture permeable nonwoven web, said woodpulp layer being stabilized and anchored to said web through a pattern of spaced compressed strips of said woodpulp, the portions of the web overlying said strips being held in close contact with the woodpulp in said strips by an adhesive distributed intermittently along said strips.

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