United States Patent [19]

Robinson

[11] **3,900,632**

[45] **Aug. 19, 1975**

[54] **LAMINATE OF TISSUE AND RANDOM LAID CONTINUOUS FILAMENT WEB**

[75] Inventor: **James E. Robinson,** Crescent Drive, Wis.

[73] Assignee: **Kimberly-Clark Corporation,** Neenah, Wis.

[22] Filed: **Apr. 3, 1972**

[21] Appl. No.: **240,754**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 15,033, Feb. 27, 1970, abandoned.

[52] **U.S. Cl.** **428/196**; 428/198; 428/287; 428/219

[51] **Int. Cl.** **B32b 7/14;** B32b 7/10; B32b 3/30

[58] **Field of Search** 161/128, 129, 146, 148, 161/150

[56] **References Cited**

UNITED STATES PATENTS

2,410,884	11/1946	Lawrence	161/148
2,638,146	5/1953	Rounseville et al.	428/228
2,693,844	11/1954	Boy	28/72.121
2,902,395	9/1959	Hirschy et al.	161/129
3,025,199	3/1962	Harwood	161/129
3,063,454	11/1962	Coates et al.	161/150
3,276,944	10/1966	Levy	161/150
3,327,708	6/1967	Sokolowski	161/128
3,341,394	9/1967	Kinney	161/150
3,368,934	2/1968	Vosburgh	161/148
3,424,643	1/1969	Lewis et al.	161/150
3,509,009	4/1970	Hartmann	161/150
3,708,383	1/1973	Thomas et al.	161/146

FOREIGN PATENTS OR APPLICATIONS

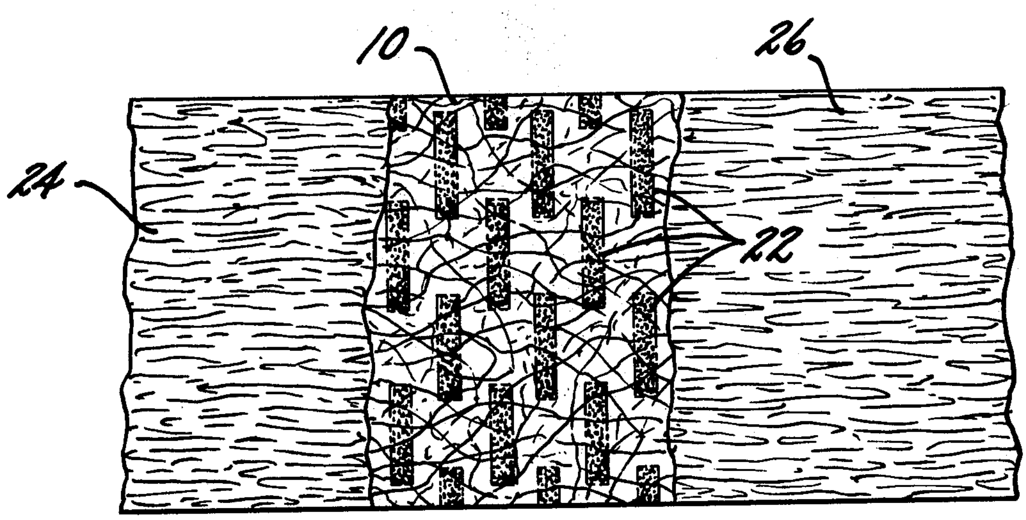
803,714	3/1963	Canada

Primary Examiner—George F. Lesmes
Assistant Examiner—J. Cannon
Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[57] **ABSTRACT**

Laminates comprising cellulose wadding and a web of continuous thermoplastic filaments are disclosed. The laminates have a good hand, are strong, attractive in appearance, and absorb and retain fluid.

11 Claims, 3 Drawing Figures



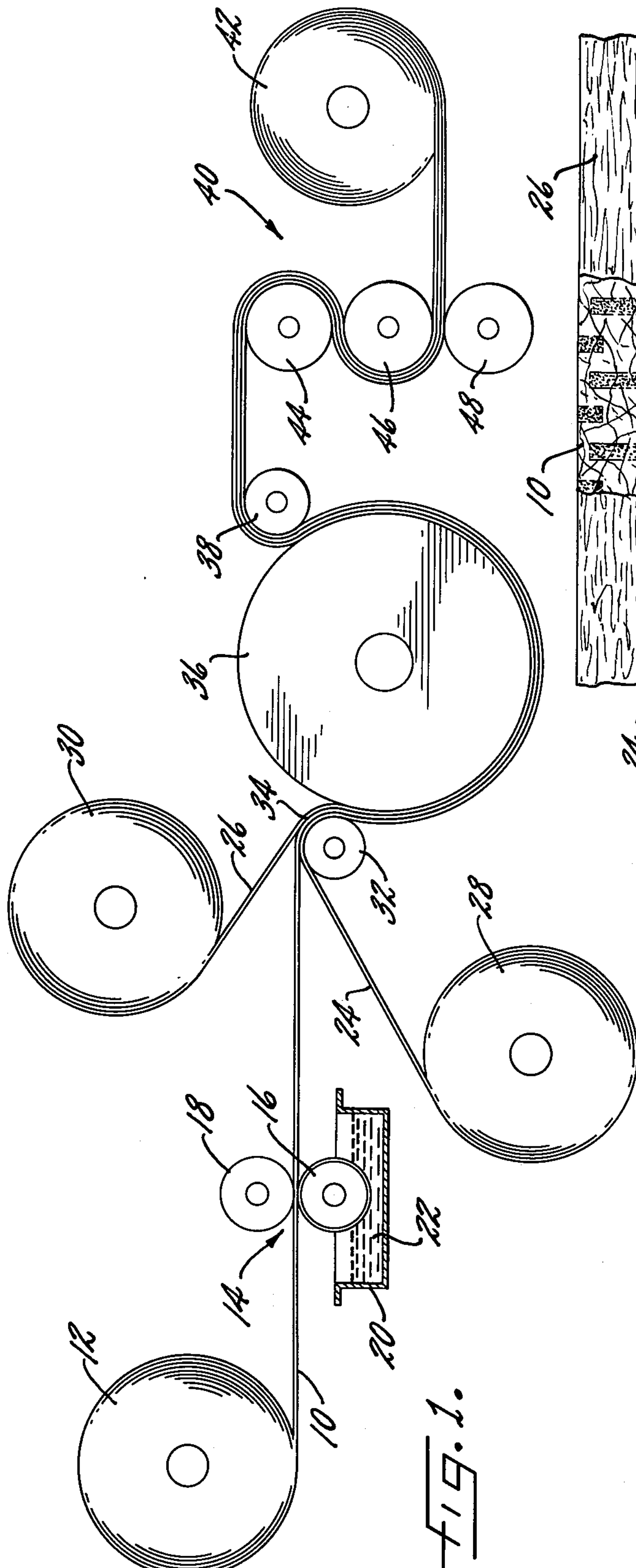


FIG. 1.

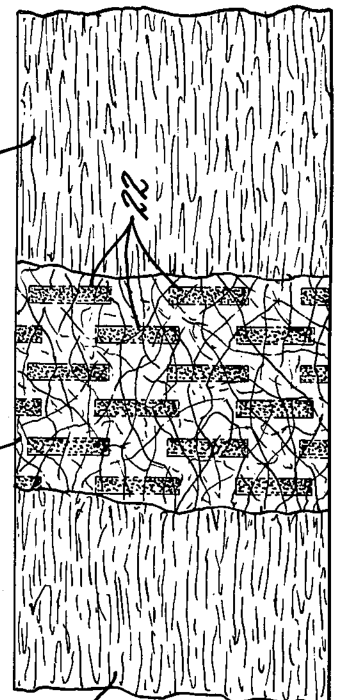


FIG. 3.

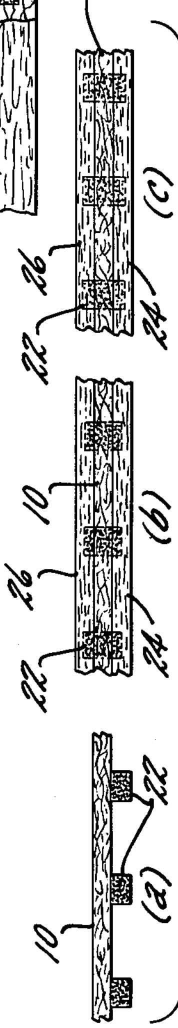


FIG. 2.

INVENTOR.
JAMES E. ROBINSON,
BY
Wolfe, Hubbard, Leydig, Voit & Osann
ATTORNEYS.

LAMINATE OF TISSUE AND RANDOM LAID CONTINUOUS FILAMENT WEB

RELATED APPLICATIONS

This is a Continuation-in-part of copending application Serial No. 15,033, filed February 27, 1970 entitled Laminate of Tissue and Random Laid Continuous Filament Web and which application is now abandoned.

DESCRIPTION OF THE INVENTION

This invention relates to nonwoven fabrics and, more particularly, to lightweight nonwoven laminates including webs of continuous thermoplastic filaments.

Nonwoven webs comprised of a plurality of continuous filaments of synthetic polymers are now widely known. As opposed to webs made by conventional spinning, weaving or knitting operations, webs of continuous filaments are generally prepared by continuous polymer extrusion and immediate deposition on a supporting surface in a generally random manner. Ordinarily, in order to achieve fiber tenacity, the filaments are molecularly oriented after extrusion and prior to deposition on the supporting surface. U.S. Pat. Nos. 3,338,992 and 3,341,394 to Kinney illustrate types of continuous filament nonwoven webs.

These webs have been used in a wide variety of product applications. For example, they have been employed as curtain drape material, bookbinding material, insulation, and backings for carpet. However, while the webs are generally suitable for uses such as have been described, there has been no substantial use of these materials in the filed of disposable fabric products, such as clothing, bed sheets, pillow cases, and the like. While products in these areas have employed nonwoven webs, the nonwovens have been prepared from staple length fibers that are either resin bonded or bonded to tissue. Also, scrim-reinforced materials, i.e., crossed sets of threads bonded at their points of intersection and employed as a reinforcing layer for one or more plies of tissue have been used as disposable nonwovens. The optimum suitability of these nonwovens for disposable fabric uses is generally restricted with respect to either their appearance, their strength characteristics, or their ability to absorb energy under strain.

The use of continuous filament nonwoven webs for disposable fabrics has been limited because of the need for a desirable "hand" in combination with a pleasing appearance and adequate strength characteristics. In this respect, it has been found that continuous filament webs possessing a desirable hand such that they would be suitable for uses such as bed sheets, hospital gowns and the like, do not possess the necessary uniform and functional opaque appearance required in such applications. On the other hand, while the opaqueness can be increased by using webs with higher basis weights, the webs do not have the required desirable hand, particularly if subsequent softening techniques such as embossing are not employed. In this respect, it should be noted that the webs of the aforementioned Kinney patents as well as others are principally high basis weight webs possessing an accompanying undesirable hand. Other methods for improving the opacity of low basis weight webs, such as by using lower denier filaments, have processing drawbacks since, for practical purposes, it is difficult to extrude such low denier filaments.

Moreover, even if a continuous filament web was prepared with an acceptable combination of hand, opacity, and strength, such a web would still be lacking in one very important characteristic. Because such webs are comprised predominantly of hydrophobic thermoplastic polymers having an inherently low capacity for absorbing and retaining fluids such as water, the webs themselves also have such low capacity and retentiveness. This behavior is particularly troublesome where it is desirable to treat the web with an agent such as a flame retardant, a necessity for any type of a disposable product where the user comes into direct contact with the material. Customarily, flame retardants are inexpensively applied with an aqueous carrier. Accordingly, the inability to easily absorb and retain water is a serious drawback necessitating complicated and expensive treating methods to achieve the desired flame retardancy, which methods can adversely affect the physical properties of the fiber. Also, because of this same characteristic, fabrics prepared from the continuous thermoplastic polymer webs do not acquire a high moisture content from the atmosphere, and this detracts from a natural fabric feel as well as presenting potential static problems.

Accordingly, it is an object of the present invention to provide a nonwoven material including a web of continuous thermoplastic filaments which possesses a desirable combination of hand and appearance. A related object is to provide such a material wherein the continuous filament web has a low basis weight.

It is a further object to provide a nonwoven material with the above-described characteristics which also has a good capaicty for absorbing and retaining fluids. A still further object is to provide such a material wherein the strength characteristics are quite isotropic.

It is a still further object to provide a nonwoven material as above described which can be prepared in an economical manner.

Other objects and advantages of the present invention will become apparent by reference to the following description and the accompanying drawings in which:

FIG. 1 is a schematic illustration of apparatus, and showing one means for forming the nonwoven materials of the present invention.

FIG. 2 is a schematic cross-sectional view of a laminate in various stages of preparation and showing levels of adhesive penetration therein; and

FIG. 3 is a fragmentary plan view of the laminate prepared as illustrated by FIG. 1, and with sections of individual layers broken away.

While the present invention is susceptible of various modifications and alternative constructions, there is shown in the drawings and will herein be described in detail the preferred embodiments. It is to be understood, however, that it is not intended to limit the invention to the specific forms disclosed. On the contrary, it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Briefly, the process hereinafter described involves preparing a laminate comprised of a web of continuous thermoplastic polymer filaments and a cellulose wadding web. Lamination is accomplished in a manner such that the desirable attributes of the laminated product are not detrimentally affected.

Turning now to the drawings, FIG. 1 schematically illustrates apparatus which can be used in preparing a three ply laminate of the present invention, wherein the outer plies are cellulosic webs. As shown, a web **10** comprised of a plurality of substantially continuous filaments of a synthetic polymer is unwound from a roll **12** and passed to an adhesive printing station **14.** The manner of initial formation of the web **10** is not particularly important, and a variety of well known techniques can be used. In general, such techniques involve continuously extruding a polymer through a spinneret, drawing the spun filaments, and thereafter depositing the drawn filaments on a continuously moving surface in a substantially random fashion. Drawing serves to give the polymer filaments tenacity, while substantially random deposition gives the web desirable isotropic strength characteristics. The aforementioned Kinney patents as well as other patents, such as Levy, U.S. Pat. No. 3,276,944, illustrate useful techniques of initial web formation.

A particularly useful technique is described in copending application Ser. No. 865,128, titled Continuous Filament Non Woven Web And Process For Producing The Same, and filed on Oct. 9, 1969 and now U.S. Pat. No. 3,692,618. Use of the method therein disclosed permits high rates of web formation. In general, the disclosed method involves conventional spinning of continuous filaments of synthetic polymer by, for example, extruding the polymer through a multiple number of downwardly directed spinning nozzles preferably extending in a row or multiple number of rows. The filaments as they are spun are gathered into a straight row of side-by-side, evenly spaced apart, untwisted bundles each containing at least 15 and preferably from 50 to 150 filaments. These filament bundles are simultaneously drawn downwardly at a velocity of at least 3,000 meters per minute, and preferably from 3,500 to 8,000 meters per minute, in individually surrounding gas columns flowing at a supersonic velocity and thus directed to impinge on a substantially horizontal carrier.

The gathering of the filaments into the bundles and their drawing and directing to impinge on the carrier is preferably effected by passing the bundles through air guns which surround the filaments with a column or jet of air which is directed downward at supersonic velocity. The air guns are arranged so as to extend in a straight row in a direction extending across the carrier at right angles to its direction of movement, so that the bundles contained in the gas columns as they strike the moving carrier extend in a line or row at right angles across the carrier. In order to enhance intermingling of the bundles, the air guns can be made to oscillate, the plane of oscillation being transverse to the direction of carrier movement. The carrier can be a conventional carrier used in the nonwoven art, such as an endless carrier or belt screen or the upper portion of a drum, as for example a screen drum.

When prepared as described above, the filament bundles containing a number of parallel filaments are laid down on the carrier in a loop-like arrangement with primary loops extending back and forth across the width of a section defined by the impingement of the air column from one air gun on the carrier. Before and as the parallel filament bundles impinge the carrier, they are broken up into sub-bundles containing a lesser number of parallel filaments and forming secondary smaller loops and swirls. The secondary loops and swirls overlap each other, and those of adjacent sections, to result in substantially complete intermingling with the overlapping portions of adjacent sections. Thus, the laid-down filament bundles form a continuous uniform nonwoven web.

Referring again to FIG. **1,** the thermoplastic polymer used in preparing the continuous filament web **10** must be crystallizable and spinnable and also capable of being bonded as hereinafter discussed. Due to its cost, predominantly isotactic polypropylene is preferred; however, other polymers such as other polyolefins, e.g., linear polyethylene, polyisobutylene, polybutadiene, etc., polyurethanes, polyvinyls, polyamides, and polyesters can also be used. In addition, mixtures of the above polymers and copolymers prepared from monomers used in preparing the above polymers are useful.

For use in the process illustrated in FIG. **1,** the web **10** generally can have a basis weight of about 0.3 – 1 oz./yd.^{2} with the filaments thereof having a denier of about 0.5 – 6. Especially preferred laminates can be prepared with webs having basis weights of 0.3 – 0.7 oz./yd.^{2} and filament deniers of about 0.8 – 2.5.

In order to facilitate web handling, particularly during the subsequently described adhesive application step, it is preferred that the web **10** be bonded. While web bonding can be accomplished by a variety of known techniques, a patterned method of bonding wherein the web is spot bonded at a number of intermittent points throughout the web is preferably employed. As described in copending Brock et al. application, Ser. No. 177,078, filed Sept. 1, 1971 entitled Nonwoven Laminate Containing Bonded Continuous Filament Web, now U.S. Pat. No. 3,788,936, which is a continuation-in-part of an earlier filed application, Ser. No. 14,943, filed Feb 27, 1970, entitled Nonwoven Laminate Containing Bonded Continuous Filament Web, now abandoned, laminates with a particularly desirable hand are obtained when a pattern bonded continuous filament web is employed. Furthermore, as described in the Brock et al. application, when pattern bonding is accomplished in a manner such that the web is a "release bonded" web, laminates with improved properties with respect to energy absorption can be obtained. The manner of preparing a release bonded web is disclosed in copending Hansen et al. application, Ser. No. 177,077, filed Sept. 1, 1971 entitled Pattern Bonded Continuous Filament Web, now U.S. Pat. No. 3,855,046, which is a continuation-in-part of an earlier filed and now abandoned application, Ser. No. 121,880, filed Mar. 8, 1971, which is a continuation-in-part application of now abandoned application Ser. No. 15,034, filed Feb. 27, 1970. When the web **10** is pattern bonded with a regular intermittent pattern of bonds, the total bonded area of the web should be about 5–50% of the web area, and the density of individual bonds should be about 50–3200 per square inch. Preferred webs have a total bond area of 8–20% and a bond density of about 100–500 per square inch.

Referring again to FIG. **1,** at the printing station **14** the continuous filament web **10** is printed on the bottom surface with a discontinuous adhesive pattern. Thus, as is shown, the web passes between an adhesive printing roll **16** and back-up roll **18,** the printing roll **16** being partially submerged in the tank **20** containing adhesive **22.** The surface of the printing roll **16** is provided with a series of grooves which serve to pick up the adhesive **22** from the tank **20** and transfer the adhesive to the bottom surface of the web **10.** A doctor blade can be used to control the amount of adhesive applied.

The grooves on the roll **16** can be in any patterned configuration; however, it is important that the pattern be substantially open and that, after printing, the area of the web which is occupied by adhesive be not more than about 25% of the total area, and preferably only about 15% or less of the area. The selection of the appropriate groove pattern on the roll **16** and the effect thereof on the characteristics of the resultant laminate is well known in the art.

While other types of adhesives such as hot melts, latexes, and the thermoplastic fibers themselves can be employed in the process described herein, it is preferred to employ a plastisol adhesive because of the ease of application and the ability to cure without adversely affecting the desirable laminate characteristics. For example, a plastisol comprised of a polyvinyl chloride resin plasticized with dioctyl phthalate or any other well known plasticizer can advantageously be used so long as curing can be accomplished at a temperature which does not adversely affect the components of the laminate. At application, the viscosity of the plastisol is generally about 800–6000 cps. and, preferably 1200–3200 cps., in order to obtain satisfactory transfer to the web.

Following the adhesive addition, the cellulose wadding webs **24** and **26**, generally having basis weights of about 0.3 – 0.7 oz./yd.^{2} and unwound from rolls **28** and **30**, are brought into contact with the adhesively printed web **10** at the roll **32** to form the laminate **84**. The prime requirements of the cellulose wadding are that it provide the desired opacity for the product laminate and that it have sufficient absorbency to retain any aqueous-borne additives such as flame retardants, printing inks, etc., that might be necessary for a particular application. After formation, the laminate is passed around the heated drum **36** in order to cure the plastisol. The roll **32** and the take off roll **38** serve to maintain contact between the laminate **34** and the heated drum **36**. If only a two ply laminate is desired, only the bottom cellulosic web **24** can be employed.

As is apparent from the above discussion, when the web **10** is bonded, adhesive can be directly printed thereon. On the other hand, direct printing is difficult when the web is unbonded. Accordingly, when an unbonded web is used, the adhesive is generally printed directly on the cellulosic webs **24** and **26**. Alternatively, if only a two ply laminate is being prepared, the cellulosic web and the unbonded continuous filament web can be reversed in the positions designated in FIG. **1**.

In order to obtain a laminate which is both aesthetically pleasing and possesses high delamination resistance, the manner in which the laminate is formed is important. Thus, laminate formation is accomplished such that the adhesive used in bonding sufficiently penetrates the cellulosic layers to assure good laminate strength, and yet adhesive strike-through to the outer surfaces of the cellulose and adhesive spreading within the laminate is minimized. Adhesive strike-through adversely affects laminate appearance, while adhesive spreading gives rise to an undesirable increase in laminate stiffness.

With reference again to FIG. **1**, suitable laminate bonding with a plastisol adhesive can be accomplished by appropriately coordinating the temperature of the heated drum, the time during which the laminate is in contact with the drum (dwell time), and the pressure exerted on the laminate in the nip formed between the drum and the roll **32**. In understanding the manner in which these parameters are coordinated, reference is directed to FIG. **2**. Embodiment (*a*) shows the plastisol adhesive **22** on the bottom surface of the web **10** prior to the time at which the web **10** is united with the cellulosic layers at the roll **32**. The viscosity of the adhesive at this time is about the same as its application viscosity and thus is low. Consequently, on bringing the web into contact with the cellulose wadding webs and subsequently bringing the laminate into contact with the drum, care must be exercised to avoid excessive adhesive penetration and spreading. Nip pressures between the roll **32** and the drum on the order of about 70–100 pli. are sufficient to achieve a desirable penetration as illustrated in embodiment (*b*) of FIG. **2**.

On the other hand, as the laminate travels on the drum surface, plastisol temperature and viscosity rise, and the problem of excessive adhesive penetration becomes less significant. Regarding travel on the drum surface, the laminate must remain in contact with the surface for a sufficient time to permit the plastisol to cure and develop maximum strength characteristics. For drum temperatures of about 250°F. – 300°F., dwell times of 0.5 – 3 seconds are usually sufficient. Embodiment (*c*) of FIG. **2** depicts a cross-section of the finished laminate with the plastisol substantially cured. As can be seen, little additional adhesive penetration occurs during curing on the drum surface.

Referring again to FIG. **1**, after leaving the drum **36**, the laminate can be passed through the calender stack **40** to provide a smooth surface finish and then wound up on the roll **42**. Typically, the calender stack **40** comprises three rolls, **44**, **46**, and **48**, with the top roll **44** generally being at about the same temperature as the drum **36** in order to assure complete plastisol curing. Pressures about equivalent to the nip pressure between the roll **37** and the drum are useful calender pressures.

FIG. **3** illustrates a laminate prepared by the method described above. As shown, the laminate has outer plies of cellulosic webs **24** and **26** and a single inner ply of a continuous filament web **10**. The individual filaments in the web **10** are bonded together by means of the intermittent pattern of bonds. The layers **24**, **10** and **26** are united together by means of the spaced pattern of plastisol adhesive **22**.

As should be apparent from the above discussion, the apparatus and process illustrated by FIG. **1** can readily be used to prepare a laminate wherein the outer plies are the continuous filament webs and the inner ply is a cellulosic web. Such laminates are disclosed in copending Brock and Hudson application, Ser. No. 14,930 entitled Laminates Containing Outer Plies of Continuous Filament Webs, filed on Feb. 27, 1970 which application has been abandoned in favor of continuation-in-part application, Ser. No. 247,962, filed Apr. 27, 1972, now U.S. Pat. No. 3,870,592. In addition to possessing the desirable attributes discussed above with respect to the laminates illustrated in FIG. **3**, the laminates disclosed in the Brock and Hudson application additionally possess exceptionally surprising textile-like features, are wrinkle resistant, and can be washed several times.

The following example illustrates the invention. All parts and percentages are by weight unless otherwise indicated. As reported in the example, Tensile Strength

(Ts) and Elongation (E) are measured on 1 × 3 inch samples using a cross-head speed of 12 in/min. according to ASTM D 1117-63. Wrinkle Recovery (WR) and Opacity (Op) are measured using the following standard procedures:

$(WR) = A^2TC^2\ 66 - 1959T$

$(Op) = TAPPIT\ 425M - 60$

EXAMPLE I

A laminate having outer plies of creped cellulose wadding (each being 12" wide and having a basis weight of 13 g/yd.²) and an inner ply of an intermittently bonded continuous filament polypropylene web (12" wide with basis weight of 15 g/yd.² bonded according to Example 5 of Hansen et al.) was prepared in a manner described above with reference to FIG. **1.** The conditions of preparation were as follows: Web Speed = 50 ft./min. Roll **32** = 6.5 inch dia., 200 pli. pressure against drum **36**; Drum **36** = 30 inch dia., 285°F.; Rolls **44, 46,** and **48** = 10 inch dia., roll **44** at 225°F., calender pressure at 200 pli. Laminate wrap on drum surface = 4.25 feet. The adhesive applied at the printing station **14** was a plastisol consisting of: 100 parts polyvinyl chloride copolymer (Geon 130 × 10), 100 parts dioctyl phthalate plasticizer (BFG 264) and 10 parts low odor mineral spirits (No. 17). The plastisol was applied to the web in an amount of 5 grams/yd.² and at a Brookfield viscosity of 1400 cps. (No. **4** spindle, 20 rpm.'s 30°C). After printing, the plastisol occupied 10% of the web area and was disposed thereon in a rectangular block (0.02" × 0.20") pattern with 43,200 blocks/yd.².

The laminate, prepared as above described, was tested with respect to the properties previously discussed. The results are presented in Table 1.

TABLE 1

Test	M.D.		C.D.
Tensile Strength (lbs.)	5.9		4.9
Elongation (%)	24		44
Wrinkle Recovery (°)		217	
Opacity (% light ab.)		70	

As can be seen the laminate prepared above possesses desirable isotropic strength characteristics and a desirable opaque appearance. In addition, it has a desirable hand and good capacity for absorbing and retaining fluids. Accordingly, the laminate fully satisfies the aims, objectives and advantages set forth above. Reference is also directed to copending Beaudoin, et al. application, Ser. No. 126,530, filed on Feb. 22, **1972** which application has been abandoned in favor of continuation-in-part application Ser. No. 228,349, filed Feb. 22, 1972, and now U.S. Pat. No. 3,793,133. Therein, it is disclosed that a laminate comprised of an intermittently bonded continuous filament web and a web of cellulose wadding can be fashioned with especially desirable energy absorbing and strength characteristics by appropriately controlling the intensity of the intermittent bonds and the ply attaching adhesive.

I claim as my invention:

1. A nonwoven fabric-like laminate comprising, in combination,

a. a low basis weight, single ply nonwoven web of substantially continuous and randomly deposited, molecularly oriented filaments of a hydrophobic ther-

moplastic polymer, said web prepared by continuous polymer extrusion through a spinneret and filament deposition on a supporting surface and having a basis weight of up to about 0.7 oz./yd.² with the filaments thereof having a denier of about 0.5–about 6,

b. a web of cellulose wadding having a basis weight of about 0.3–about 0.7 oz./yd.² disposed in laminar relationship with respect to the single ply web (a), and

c. patterned areas of adhesive disposed between said webs which penetrate into said cellulose wadding web at spaced open areas in a manner so as to provide delamination resistance in combination with fabric-like flexibility, said nonwoven web and cellulose wadding web combining to provide a material with desirable isotropic strength characteristics, fabric-like opaqueness, absorbency, and a natural fabric feel.

2. The nonwoven fabric-like laminate of claim **1** wherein the nonwoven web has a basis weight of about 0.3–about 0.7 oz./yd.², the thermoplastic polymer is polypropylene, and the filaments have a denier of about 0.8–about 2.5.

3. The nonwoven fabric-like laminate of claim **1** comprising outer plies of cellulose wadding and, as an inner ply, the single ply nonwoven web.

4. The nonwoven fabric-like laminate of claim **3** wherein the continuous filament web is bonded by the application of heat and pressure at intermittent areas occupying about 5–50% of the web area and in a density of about 50–3200 per square inch.

5. The nonwoven fabric-like laminate of claim **4** wherein the thermoplastic polymer is polypropylene.

6. The nonwoven fabric-like laminate of claim **3** wherein the nonwoven web has a basis weight of about 0.3–about 0.7 oz./yd.², the thermoplastic polymer is polypropylene, and the filaments have a denier of about 0.8–about 2.5.

7. A nonwoven fabric-like laminate comprising, in combination,

a. a low basis weight, single ply nonwoven web of substantially continuous and randomly deposited, molecularly oriented filaments of a hydrophobic thermoplastic polymer selected from polyolefins, polyurethanes, polyvinyls, polyamides and polyesters, said web prepared by continuous polymer extrusion through a spinneret and filament deposition on a supporting surface and having a basis weight of up to 0.7 oz./yd.² with the filaments thereof having a denier of about 0.5–about 6,

b. a web of cellulose wadding having a basis weight of about 0.3–about 0.7 oz./yd.² disposed in laminar relationship with respect to the single ply web (a), and

c. patterned areas of a plastisol adhesive disposed between said webs which penetrate into said cellulose wadding web at spaced open areas occupying less than about 25% surface area in a manner so as to provide delamination resistance in combination with fabric-like flexibility, said nonwoven web and cellulose wadding web combining to provide a material with desirable isotropic strength characteristics, fabric-like opaqueness, absorbency, and a natural fabric feel.

8. The nonwoven fabric-like laminate of claim **7** wherein the continuous filament web is bonded by the application of heat and pressure at intermittent areas occupying about 5–50% of the web area and in a density of about 50–3200 per square inch.

9. The nonwoven fabric-like laminate of claim **8** wherein the nonwoven web has a basis weight of about 0.3–about 0.7 oz./yd.^{2}, thermoplastic polymer is polypropylene, and the filaments have a denier of about 0.8–about 2.5.

10. The nonwoven fabric-like laminate of claim **8** comprising outer plies of cellulose wadding and, as an inner ply, the single ply nonwoven web.

11. The nonwoven fabric-like laminate of claim **10** wherein the spaced open areas of plastisol adhesive occupy less than about 15% surface area.

* * * * *