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LAMINAR REINFORCEMENT ELEMENT AND METHOD FOR REINFORCING TEXTILE GARMENTS

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ABSTRACT OF THE DISCLOSURE

The present invention is concerned with the provision of a laminar material or element comprising a thermoplastic film and a layer of a thin fibrous tissue. This element is employed for the reinforcement of garments in areas subject to severe wear such as the seat of the pants or the knee areas of slacks and the elbow areas of shirts and blouses. For such reinforcement the laminar article or element is placed on the area of the garment to be reinforced with the paper layer exposed and the element then pressed such as by a heated iron or the type of press that is used in laundries and drycleaning establishments while being subjected to heat to cause the thermoplastic film to adhere to the surface of the garment without excessive penetration of the interstices of the yarns of the garment by the mass of the film.

This application is a continuation-in-part of our copending application Ser. No. 805,359, filed Mar. 7, 1969 now U.S. Pat. 3,722,000, Mar. 27, 1973.

DESCRIPTION OF THE PRESENT INVENTION

This invention relates to an improved textile garment and to a method for reinforcing the fabric of the garment to increase its wear or abrasion resistance and/or its tear resistance.

In recent years, much effort has been expended to improve the wear characteristics of textile garments. Also, in recent years permanent-press and permanent-crease fabrics have entered the market place and taken an increasing share of the market. While the permanent-crease process and resins, for example, see U.S. Pats. 2,974,432 and 3,268,915 ("Koratron" Fabrics) are effective and provide a permanently pressed or permanently creased garment which will stand many washings, the resins themselves and the heat treatments required to thoroughly set them often deleteriously affect the fiber structure by weakening them and thereby decreasing the abrasion resistance of the finished garment. This is particularly noticeable in areas of the garment or garments which are subject to repeated stress such as the knees and elbows.

The present invention is concerned with an improved laminar reinforcement comprising a thermoplastic film having adhered to one of its surfaces a non-woven material formed of textile-length fibers or of paper-length fibers, such as paper tissue. The film may be of permanently thermoplastic character or it may be of temporary thermoplastic character, that is of the type which becomes tacky and adhesive on heating but undergoes thermosetting action on continued heating.

Examples of permanently thermoplastic materials that may be employed include polymers (including homopolymers and copolymers) of esters of acrylic acid or methacrylic acid such as the esters of the former obtained by reaction of acrylic acid with an alcohol having from 1 to 12 carbon atoms such as methyl acrylate, ethyl acrylate,

butyl acrylate, 2-ethylhexyl acrylate and dodecyl acrylate. Other examples include the esters of methacrylic acid with alcohols having from 5 to 12 carbon atoms such as amyl methacrylate, hexyl methacrylate, 2 - ethylhexyl methacrylate and dodecyl methacrylate. Copolymers of the acrylates or of these methacrylates or of both acrylates and methacrylates may be employed such as a copolymer of 60% ethyl acrylate and 40% butyl acrylate or a copolymer of 30% methyl methacrylate and 70% butyl acrylate. In addition, copolymers of any of the acrylates or methacrylates just mentioned with other lower methacrylates besides methyl methacrylate may be employed such as copolymers of ethyl methacrylate or butyl methacrylate with ethyl acrylate or butyl acrylate. The acrylate or methacrylate polymers may also be modified by a small amount of monomeric materials which lend adhesiveness such as acid monomers including acrylic acid, methacrylic acid and itaconic acid, hydroxyalkyl acrylates or methacrylates such as hydroxymethyl methacrylate; also acrylamide or methacrylamide and their derivatives including N-hydroxyalkyl-substituted acrylamide or methacrylamide; ureido-containing monomers such as ureido ethyl methacrylate and amine-containing monomers such as 2-aminoethyl vinyl ether or vinyl sulfide. The amount of such adhesion promoting materials may be from 0.2% to 5% and even in some cases 10% or higher with respect to the total monomer content of the polymer.

Besides the functional monomers just mentioned for imparting adhesion to the acrylate films, the polymers of acrylic or methacrylic acid esters may contain styrene, vinyl toluene, butadiene, vinyl acetate, vinyl chloride, vinylidene chloride and other non-functional monomers. The amount of this type of non-functional monomer that may be present in the copolymer may be quite large such as anywhere from 10% to 70% by weight of the copolymer.

The thermoplastic film may also be composed of polyethylene, polypropylene, polyisobutylene, or copolymers of styrene and ethylene, polypropylene or isobutylene. Other thermoplastic materials that may be employed include cellulose esters such as cellulose acetate, propionate, cellulose acetate butyrate, polyester resins such as polyethylene glycol terephthalate, polyamides such as nylon 66, and oil-modified alkyd resins.

The functional groups already mentioned for imparting adhesion may also provide a thermosetting quality if such is desired. For example, a copolymer containing N-methylol acrylamide, N-methylol methacrylamide, or N-methylol-4-pentenoguanamine in an amount of about 0.2 to 5% may be used because it is initially thermoplastic and capable of becoming adhesive and adhering to a garment against the surface of which it is placed with heat but upon sufficient duration of the pressing and heating action it is thermoset so that it is not subject to removal by later heat-softening that might occur during laundering and drying operations. Other thermosetting materials include copolymers containing glycidyl acrylates or glycidyl methacrylate in amounts up to about 2 to 7% or more. Also thermosettable films can be obtained by including both acid monomers such as acrylic acid or the like and hydroxyalkyl monomers since upon heating, cross-linking occurs by reaction of the hydroxyl and carboxyl groups. It is within the scope of the present invention to employ any permanently thermoplastic material, that is one which can be reheated indefinitely and which upon each reheating becomes tacky and adhesive as well as any material of thermoplastic nature which is thermosettable upon appropriate extent of heating. The worker in the art knows many such materials and the use of any permanently thermoplastic or thermosettable materials in a thermoplastic condition for making the film

component of the laminar component is within the scope of the present invention.

The fibrous layer of the reinforcing element may be composed of a non-woven material formed of fibers either of textile length or of short lengths commonly employed for the making of papers or it may even comprise a mixture of fibers of widely differing lengths. In general it is essential that the non-woven material that is employed be of such character as to present a soft feel to a wearer whose skin may come into contact with the non-woven material. For this reason, the preferred embodiment of the fibrous layer is a non-woven material in which the fibers are essentially unbonded or, at the most, lightly bonded either by fusion of the fibers themselves in the case that some of them are of potentially adhesive character or by the use of an adhesive material. By using an essentially unsized and unbonded or, at the most, lightly bonded fibrous material the wearer of any garment reinforced by the element of the present invention encounters quite a pleasant feel at the points of contact of the reinforcing patch with his skin. The nature of the fibrous material can thus be so selected as to make it impossible for the wearer to note any unpleasant differences in feeling of the reinforcing area of the garment as compared to the other areas thereof.

The permissible extent of bonding that can be tolerated in any given non-woven material depends on the particular fibrous material, its fiber-length and diameter, the disposition of the fibers in the non-woven structure, and the particular arrangement or distribution of the adhesive or binder. In general, however, the amount of binder in the non-woven sheet should not be over 5% by weight of the fiber weight and preferably it is less than 2% by weight thereof.

When a textile non-woven is employed, it may contain fibers of textile length such as from about ½ inch length even up to several inches in length and any of the common textile fibers may be employed depending upon the particular feel that may be desired. Thus cotton, rayon, wool, silk, linen, are typical textile fibers that may be employed. If desired, however, such fibers as nylon, polyethylene glycol terephthalate, casein, fibers of vinyl resins such as those formed from copolymers of vinyl chloride and vinyl acetate or of acrylonitrile with methyl acrylate, vinyl acetate and/or vinyl pyridine or even of an acrylic ester copolymer such as a copolymer of ethyl acrylate, methyl methacrylate and vinyl pyrrolidinone may be used. The use of textile length fibers in making the non-woven enables one to produce the non-woven material on such equipment as a card, a Rando-webber, or a garnett. If desired, a plurality of webs obtained from such devices may be superimposed to provide the thickness desired in the non-woven layer of the reinforcing element. In general, the thickness employed may vary from 1 to 15 mils or greater. The use of greater thickness up to about 50 mils is permissible but generally it is preferred that the thickness of the fibrous layer of the reinforcing element is not over 15 mils since a large proportion of the fibers of such a thick fibrous layer is ordinarily expected to be removed from the composite during normal wear and usage after it has been fixed in position for reinforcing the fabric that is made into a garment. The reason for this is simply that it is undesirable to have an appreciable amount of binding agent in the layer of fibers and hence the unbonded fibers are gradually removed during subsequent use of the fabric, as on wear and laundering. However, many fibers remain attached to the film of the reinforced element so that they are not removed but assure the maintenance of a pleasant textile feel over a long period of wearing of the fabric.

The fibrous layer is preferably unbonded but it may be lightly bonded as already stated. When it is of bonded type it is preferable that the bonding is effected by application of discrete small areas of the bonding agent such as at spaced small dots or spots. When such a lightly bonded non-woven layer is laminated to the film in making the reinforcing composite of the present invention, the adhesion of the non-woven web or fabric to the film may involve contact of these bonded dots or spots with the surface of the film. In so bonding the non-woven to the film the fibers between spots are adapted to shift rather freely under quite low forces. This assures that the non-woven facing of the reinforcement does not develop a puckered disposition or appearance even when it is employed for the reinforcement of a fabric of quite light weight. When there is employed a non-woven material which has a large portion of the length of the fibers adhered to the surface of the film there is sometimes a tendency for the development of a puckered disposition and appearance of the fibrous layer when the reinforcing element is employed on a lightweight fabric and subsequently subjected to washing. No difficulty is encountered when such a reinforcement is applied to a rather heavy fabric but it can be controlled in the reinforcement of even lightweight fabrics by predetermining the manner of adhesion of the fibers in the non-woven layer to the film. Thus preferred results are obtained by employing a fibrous layer in which the fibers are so disposed that they are adhered only along a minor portion of their length to the film of the reinforcing element. Such adhesion may be the result of the disposition of the fibers in the non-woven layer at the time it is laminated to the film or by controlling the area of adhesion of the fibers to the film. An example of the control of adhesion is the aforementioned presence of discrete dots of adhesion or adhesive in the fibrous layer at the time of lamination so that the adhesive in the dots makes contact with the surface of the film and joins the fibers to the film at relatively small points or areas extending only a short distance along the lengths of the fibers. The use of a blotting paper apparently falls into a combination of the categories of (1) disposition of fibers and (2) points of adhesion. In such a paper it is generally the ends of the fibers themselves that adhere to the film and there is no adhesion over a substantial proportion of the length of the fibers.

One expedient which may be employed to control the adhesive contact between the film and the fibers of the non-woven layer is to provide crimped fibers or a creped distribution of fibers, the former in a textile and the latter in a paper. By so distorting the fibers they can be adhered to the film at points of small area rather than quite extensive areas along the length of the fibers.

The basis weight of the non-woven web may be expressed in terms of the typical paper unit, namely the weight in pounds of a 480-sheet ream in which the sheets have dimensions of 20" x 30". In general, non-woven materials having a basis weight of about 3–25 lbs. may be employed and from 4–15 lbs. in preferred embodiments. However, heavier non-woven sheets may be employed even up to a basis weight of 120 pounds, particularly when an unsized, unbonded paper of high absorptive characteristics is used such as blotting paper, if some stiffening of the reinforced fabric can be tolerated. The fact that a non-woven sheet has a low basis weight is not the sole factor that determines whether it can be employed as a component of a reinforcing laminate for fabrics of light weight as well as heavy weight without encountering difficulties with the puckering problem on wear or washing. When low basis weight non-woven materials are employed, care should be taken in the laminating of the non-woven to the film of the reinforcing element that the area of bonding of the fibers to the film is kept small in relation to the length of the fibers. This may be controlled when the film under normal conditions is not excessively tacky at its surface by pressing the fibrous material against the film with a heated engraved roll having minute lands in the form of dots spaced apart by substantial distances. By so laminating the non-woven fibrous

layer of the film the tendency to pucker is largely inhibited or prevented entirely even when the reinforcement is employed with lightweight fabrics. Alternatively limited areas of fiber adhesion to the film can be obtained by providing crimped fibers in the non-woven web or by providing a creped structure therewithin. In these cases excessive areas of fiber adhesion to the film is avoided because of the distortions present in the individual fibers or the web thereof.

In all such cases the limited adhesive contact area between the fibers of the non-woven material is obtained so that a reinforcing laminate can be prepared that can be used even with lightweight fabrics without encountering the difficulties of puckering. It appears that this is accounted for by the ease of deformation of the fibrous structure of the non-woven material during the wear and customary handling of the reinforced fabric as in laundering, drycleaning, drying, etc. Thus any tendency to develop a puckered relationship in the fibrous layer during wear as a result of the absorption of moisture from the body of the person wearing the garment and subsequent drying as well as any such puckering caused by repeated wetting and drying as a result of washing or drycleaning is largely avoided or entirely prevented.

Thus, cellulosic fibers obtained from wood pulp as in the normal manufacture of paper are quite satisfactory for the tissue layer used in making the laminar element of the present invention. However, fibers of appropriate shortness in length formed of cotton, regenerated cellulose or of wool, linen, silk, or of synthetic resins, such as nylon, cellulose acetate, casein, vinyl or acrylic resins as acrylonitrile polymers may be employed alone or in admixture with each other and particularly in mixture with wood pulp fibers of alpha-cellulose fibers. When artificial fibers are employed they should not be of large diameter sizes. In the case of regenerated cellulose rayon the fibers should be of 30 denier size or less.

While the fibrous tissue should not be sized in the normal sense of the term nevertheless it may be of a type adapted to hold together when treated with aqueous media and for this purpose it may contain from 1% to 3%, on the weight of the fiber, of various materials imparting wet-strength, especially aminoplasts such as condensates of melamine or urea or mixtures thereof with formaldehyde, or polymers of ureiodoethyl vinyl ethers which are disclosed in U.S. Pat. 2,734,890.

Preferred papers are made from bleached or unbleached sulfite, kraft, alpa-cellulose fibers, rag fibers or mixtures thereof having the appropriate length as specified hereinabove.

As stated before, all of the fibers in the non-woven textile or paper may be of cellulosic type or of other types which are non-adhesive in character, that is they are not rendered adhesive on heating. However, if desired, a proportion of the fibers up to about 10% by weight thereof, may be of a type which is of potentially adhesive material, that is they are adapted to become tacky and adhesive upon heating, such as fibers made of thermoplastic or thermosetting resins including acrylic or vinyl polymers. The presence of such potentially adhesive fibers in the tissue favors the bonding of the fibers of the tissue to the thermoplastic or thermosettable film and such adhesion is enhanced during the pressing operation carried out to adhere the laminar element to an area of a garment to be reinforced. However, the proportion of such potentially adhesive fibers should not be so great as to make the paper so resistant to deformation that noticeable puckering occurs in use.

Preferably, the non-woven textile or paper is completely unbonded except to the extent that bonding of the fibers may occur when a wet-strength resin is employed in the amounts mentioned hereinabove. Such wet-strength resins may be employed to provide a wet-strength of 0.04 lb. to 0.1 lb. per inch per pound of basis weight.

The laminar reinforcing element may be provided in the form of sheets or rolls wound on itself or a core element either with or without a release layer on the face of the film that is not provided with the fibrous layer. Thus this face, which may be referred to as the back face of the laminar element, may be supported on a release paper or cloth, such as Holland cloth, that carries a silicone layer or a layer of polyethylene or polytetrafluoroethylene. The polyethylene, polytetrafluoroethylene or silicone layers have good release qualities so that the fibrous/thermoplastic film laminate can be stripped from the relase paper or sheet without tearing of the laminate. Also the presence of the release paper or cloth backing assures that if sheets of the composite are laid upon each other or wound in a roll the fibrous layer will not become attached to the back of the thermoplastic film which might make it difficult to separate the sheets or to unwind the roll without pulling the fibrous layer apart. The thermoplastic film is of a relatively soft, flexible and pliable structure and it may have a film thickness of about ½ to 10 mils, preferably being from 1½ to 3 mils in thickness. The film is preferably colorless and transparent and provides a surface which is durable to laundering. The use of the thermosetting type of film assures durability to laundering and even to dry cleaning. The presence of the fibrous layer provides a soft pleasant hand to the finished and reinforced fabric. Thus when the reinforced element is applied to the inner wall of the knee area of the trouser leg the wearer's knee finds the contact to be quite similar to that of the fabric itself because of the soft hand of the fibrous layer. Because of the thinness of the reinforcing element, the wearer normally cannot detect, from feel alone, the edge of the reinforcement.

In applying the reinforcement laminate to the garment it is merely necessary to cut a portion of the laminate to the size desired and to lay the reinforcement in contact with the area of the garment to be reinforced preferably against the surface of the garment that is not exposed to view. The exposed surface of the film, that is the surface that is not provided with the non-woven layer, is laid in contact with the surface of the garment and the assembly is pressed either with an iron or between the platens of a steam press or other mechanical press used in the industry. The heat of the press or iron causes the surface of the film to soften and adhere to the portions of the fibers in the garment which contact the film. The intensity of the heat and duration of pressing should be controlled to avoid excessive areas of adhesion of fiber lengths to the film. As mentioned hereinabove, the use of a pair of pressure rolls, one of which is heated and has spaced elevated lands, e.g. of round or square dots (1/16" in diameter or along the diagonal), which press fibers against the film, facilitates the control of the areas of fiber to film adhesion, and is particularly useful if the fibrous layer is that of a textile fiber non-woven the fibers of which are uncrimped or of a tissue paper which is uncreped. Such a roll is also useful for non-wovens containing crimped fibers or for creped papers, but generally suitable lamination with limited fiber to film adhesion areas can be obtained from such fibrous sheets and also from blotting papers by pressing between smooth-faced rolls or between the cloth-covered platens of a conventional laundry press.

The heat and/or pressure of the press is controlled to limit the fiber-to-film adhesion areas and also the extent of penetration of the film into the interstices of the yarns in the garment so that the area is not unduly stiffened but remains quite pliable and flexible. When the film is of a thermosetting type of material the duration of heating and intensity of heating are controlled to set up the film and to adhere it to the garment without excessive penetration. The temperature employed during pressing may be from about 200° F. to about 375° F. and the times of pressing may vary from 3–35 seconds at pressures from ½ to 100 lbs. per square inch but preferably not over 5–15 pounds per square inch. Generally a low pressure is adequate to

provide for bonding of the element to the garment without causing excessive penetration of the mass of the film into the garment interstices or excessive fiber-to-film adhesion area.

EXAMPLE 1

An aqueous dispersion containing 46% solids of an emulsion copolymer of about 85.9% ethyl acrylate, 10% acrylonitrile, 1.7% acrylamide and 2.4% methylol acrylamide is prepared by emulsion copolymerization. To 100 parts of this dispersion are added 7.1 parts of a 70% aqueous solution of tris-(methoxymethyl) melamine, 1.2 parts of ammonium hydroxide, 0.5 parts of a 25% aqueous solution of ammonium thiocyanate catalyst and 18.75 parts of a 4% aqueous solution of methyl cellulose having a viscosity of 4000 cps.

The mixture is cast onto a silicone-coated release paper using a knife-coater and dried for about 15 minutes at a temperature of 150° F. to 180° F. to give a preformed thermosetting reinforcing film of 2 mils thickness. A creped tissue paper (of the type used for making facial tissues) having a basis weight of 5.7 lbs. is laminated to the film by passing the film with the tissue superimposed thereon together through the nip of a pair of pressure rolls, the upper one in contact with the tissue having a temperature of 140° F. The rolls are driven at a peripheral speed of about 5 feet per second and the pressure exerted on the laminate being 1½ pounds per square inch. The laminate on release paper is rolled and ready to be cut to appropriate size for use in specific reinforcing applications.

A piece of the tissue/film laminate is stripped from the release paper and is laid with the exposed surface of the film on an area of a lightweight cotton broadcloth fabric (4 oz./sq. yd.) which is intended for manufacture into a shirt, the area being at the elbow which will be subject to more stress than other areas of the fabric. The thermosetting film is bonded to the cotton broadcloth using a pressure of 5 p.s.i., a temperature of 320° F. and a time of 7 seconds. These conditions provide an excellent bond of the reinforcing film and fabric fibers. The reinforced fabric is then cured at 300° F. for 10 minutes. The cure merely hardens the film and does not cause any additional flow thereof. The table below shows the increase in abrasion resistance resulting from the reinforcement.

TABLE A

Cycles to failure using a Wyzenbeck Abrader, broadcloth abraded agains duck cloth

	Cycles
Cotton Broadcloth Control ----	2,000 (hole developed).
Cotton Broadcloth reinforced with thermosetting film/tissue laminate ----------	10,000 (some wear apparent, but no hole).

It can be seen from the table above that the abrasion resistance of the cotton broadcloth increased by at least a factor of five. The film remains intact, and the fibrous tissue layer retains its fibrous body sufficiently to maintain a pleasing hand through multiple washings and drycleanings while the reinforced area of the garment does not show puckering.

Similar results are obtained without the ammonium thiocyanate catalyst.

EXAMPLE 2

A permanently thermoplastic polyurethane film is laminated with a facial tissue having a basis weight of 9 lbs. in the same way as described in Example 1. A piece of the laminate is then bonded to the knee area of a fabric (6 oz./sq. yd.) intended to be made into a pair of slacks by laying the laminate with the exposed face of the film in contact with that surface of the fabric that is to become the inside surface of the leg of the slacks. The bonding is effected at a pressure of 2 p.s.i., a temperature of 280° F. and a time of 5 seconds.

As in Example 1, the abrasion resistance is markedly increased and the reinforced area of the fabric provides a pleasant feel of textile character to the wearer. Furthermore, the fibrous lamina is free of any tendency to pucker. It remains smooth to both feel and appearance.

EXAMPLE 3

An aqueous dispersion containing 60% solids of an emulsion copolymer of about 85.9% ethyl acrylate, 10% acrylonitrile, 1.7% acrylamide and 2.4% methylolacrylamide is prepared by emulsion copolymerization. To 125 parts of this emulsion are added 9.2 parts of a 70% aqueous solution of penta(methoxymethyl)melamine, 1 part of ammonium hydroxide and 18.75 parts of a 4% aqueous solution of methyl cellulose having a viscosity of 4000 cps.

The above mixture is cast onto polyethylene and silicone coated kraft release paper and dried for about 15 minutes at 150° F. to 190° F. to give a preformed thermosetting reinforcing film of about 2 mils thickness on the release paper. The film/release paper combination is then laminated onto a 5-mil thick non-woven rayon fabric by passing the combination and non-woven rayon backing through pressurized rolls. The non-woven/thermosetting film laminate (about 6 mil thickness) is then stripped from the release paper and is applied to the garment or fabric area to be reinforced by laying the film surface of the laminate against the inner surface of the area to be patched or reinforced. This leaves the non-woven surface in a position to contact the leg or other area of the wearer.

The non-woven/film composite or laminate is used to reinforce the inside knee area of a pair of boy's play pants by bonding thereto at 320° F. for 7 seconds at 5 p.s.i. The pants show increased abrasion resistance and, in addition, there is a pleasant fabric-like feel against the knee of the wearer on very cold days or on hot, humid days. Also, the tear strength of the pants in the reinforced areas is improved with the non-woven/film composite or laminate when compared to reinforcement by the film alone.

EXAMPLE 4

The aqueous dispersion given in Example 3 above is cast on the polyethylene and silicone coated kraft release paper and dried for about 15 minutes at about 150° F. to 190° F. to give a preformed thermosetting or thermosettable reinforcing film of about 2 mils thickness on the release paper. The film release paper combination is then laminated onto a 3–4 mil thick tissue paper supplied by the Peerless Paper Mill of Oaks, Pa. The paper is 13 pound basis weight paper (500 sheets at 24" x 36") with a unit weight of 0.039 lbs. per sq. yard. Lamination is carried out by passing the film/release paper combination and tissue paper through pressurized rolls operated at about 15 tons pressure and at a temperature in the range of from about 75° F. to 270° F. The thermosettable film/paper laminate is then stripped from the release paper and is applied to the garment or fabric area to be reinforced by laying the film surface of the laminate against the inner surface of the area to be patched or reinforced. This leaves the tissue paper surface in the position to contact the leg or other area of the wearer. Garments which have been reinforced with this paper/film composite show increased abrasion resistance and, in addition to improved aesthetic qualities, the patch does not show any puckering after sixteen washes in a Maytag washer operated using Tide detergent at a temperature of about 140°–160° F. Tear strength, as indicated in Example 3, is also improved with the paper/film composite.

EXAMPLE 5

Similar results are obtained by repeating each of Examples 1, 2 and 3 with the following non-woven webs:

(a) An unbonded viscose rayon non-woven web having a basis weight of 7.4 pounds. The rayon fibers in the web are crimped staple fibers each of approximately 1.2 microns diameter and 1¼ inch in length.

(b) A thin uncreped tissue paper having a basis weight of 8.1 pounds.

(c) A blotting paper of 100 pounds basis weight.

(d) A print-bonded (1/32" diameter dots spaced apart by ⅛") viscose rayon web containing the same fibers as that in part (a) hereinabove.

In all cases (except (c)) the reinforced areas of the fabrics are not markedly stiffened by the application of the reinforcement laminate and improved abrasion resistance and wear is obtained by the reinforcement. When the reinforcement is placed on the lighter weight fabrics and laundered it is found that there is essentially no puckering when the materials of parts (c) and (d) hereinabove are employed. Only slight puckering occurs in the case of (a) and (b) hereinabove even when the reinforcement is employed on the lightweight fabrics.

EXAMPLE 6

A permanently thermoplastic cellulose acetatebutyrate film is warmed to a somewhat tacky condition on one of its surfaces by the passage of the film under a bank of infrared lights. Immediately after passage under the lamps the film is passed through a flocking zone wherein an electrostatic field is imposed in conventional fashion and 1/16 inch length staple rayon fibers are flocked onto the film. Immediately after passing through the flocking stage, the flocked film is passed through a cooling zone so that the ends of the fibers are adhered to the film in stable condition. The resulting laminate is pressed upon the elbow area of a lightweight fabric (4½ oz. per square yard) intended to be made in a blouse. The laminate is pressed against the surface of the blouse that is to become the inside wall of the arm with the fibrous layer of the laminate exposed. The pressing is accomplished by passing the assembled fabric between a pair of pressure rolls, that one of which contacts the fibrous layer of the laminate being heated to a temperature of 200° F., the pressure between the rolls being about 1 pound per square inch, and the time of passage between the rolls being about 2/10 of a second. The resulting reinforced fabric shows greatly increased abrasion resistance and resistance to wear. It retains a pleasant soft feel and does not show any puckering when the reinforced fabric is subjected to normal conditions of wear and handling during washing, drycleaning and drying.

We claim:

1. A textile garment including adhered on a portion of a surface thereof which is subject to more stress than other areas or portions of the garment, a preformed laminate comprising an at least initially thermoplastic film having a thickness of about 1 to 10 mils and, adhered to the exposed face of such film, a non-woven fibrous web layer, the overall thickness of the film/non-woven laminate being about 3 to about 20 mils, the portion of the garment to which the laminate is adhered remaining quite pliable and flexible after such adherence and the fiber-to-film adhesion between the non-woven layer and the film being present along a relatively short portion of the adhered fibers as compared to the fiber length so that the fibrous layer is easily deformed under low tension.

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