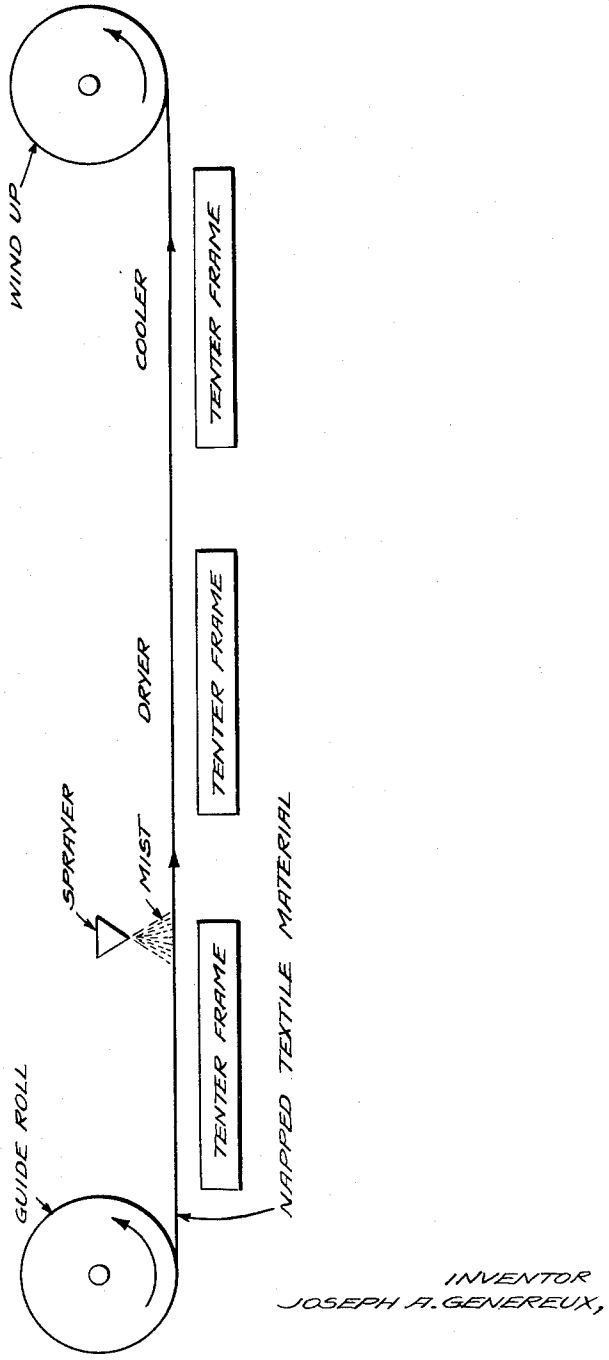
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PROCESS OF SOLVENT BONDING NAPPED TEXTILE FABRIC

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PROCESS OF SOLVENT BONDING NAPPED TEXTILE FABRIC

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8 Claims. (Cl. 8—130.1)

This application is a continuation-in-part of my earlier application Serial No. 845,339, filed October 9, 1959, now abandoned, and a continuation of my application Serial No.. 135,316, filed August 31, 1961, and now abandoned.

This invention relates to a method of bonding the fibers in textile materials and, more particularly, to a method of applying a mist to yarns and fabrics.

Many different methods of bonding fibers in fabrics have been proposed in the past. Among these are included the use of fiber solvents. A particular method of point bonding fabrics is described by Miller is copending U.S. application S.N.794,813, filed February 24, 1959, now Patent No. 3,053,609, dated September 11, 1962. The Miller technique involves the application of a liquid bonding solution comprising a liquid medium, a latent solvent for the fibers, and an inert extender. Normally, these liquid bonding solutions are applied to the fabric by padding the solution onto the surface of the fabric. When this method is used on the surface of certain fabrics with substantial thickness of surface fibers having one end held within the fabric structure and one end essentially free on the surface, the fibers become grossly bonded and the aesthetics and performance attributes of the fabric are greatly damaged. Also, the thickness of the raised surface is substantially reduced by padding on these bonding solutions, or spraying solutions under high pressure.

It is an object of this invention to provide a method for improving the properties of textile materials by bonding the surface fibers having one free end. Another object is to reduce the shedding and surface distortion of napped fabrics without increasing the stiffness. A further object is to bond the surface fibers on blankets and other fabrics having a pile surface, particularly where the surface fibers are derived from man-made filamentary material. Still a further object is to reduce the shedding of woven blankets without reducing the thickness, bult or aesthetics of the blanket. Other objects will appear hereinafter.

The above objects are accomplished by providing a process for bonding fibers of a textile material which comprises applying to the textile material a mist composed of discrete liquid particles, substantially all of which are less than .012 inch in size, dispersed in a gaseous medium, each liquid particle resulting from the atomization of a liquid comprising from about 1% to about 25% of a latent solvent for the fiber in a volatile diluent which is inert to the fibers to be bonded, the quantity of solvent being by weight of the total liquid, under conditions such that no fibers are substantially displaced within the textile material and the textile material maintains its original thickness, then activating the latent fiber solvent to cause bonding at a number of points in the material where two or more fibers contact each other, and removing the excess diluent, and optionally the solvent.

As a typical way of carrying out the invention, a woven blanket consisting of 100% polyacrylonitrile fibers distributed in the blanket such that approximately 25% of the total thickness of the blanket is in the center and 75% of the total thickness of the blanket is in the nap on both surfaces of the fabric is treated. A suitable mist for bonding this polyacrylonitrile blanket was prepared from an aqueous solution containing 5% sodium thiocyanate by weight of misting said solution in the web-wetter described in the examples given hereinafter. The blanket was fed continuously over the top of the web-wetter without coming in contact with the apparatus while tiny droplets of the liquid from the midst deposit on one side of the blanket. The fabric then was led directly through a 15-foot long drying oven maintained at 300° F. at a speed of two yards per minute in order to activate the fiber solvent by evaporation of the diluent to bond the fibers at a number of cross-over points. The oven also served to remove all of the diluent leaving a completely dry (i.e., non-tacky) fabric. The dried bonded fabric picked up 0.07 gram of sodium thiocyanate per square yard of fabric face. This bonded fabric exhibited less shedding and less surface distortion than the equivalent unbonded control fabric.

Surprisingly, it has been found that the stiffness of the bonded fabric is directly and primarily dependent upon the quantity of fiber solvent picked up on the face of the fabric, whereas the resistance to distortion and shedding resistance of the fabric are dependent upon both the quantity of fiber solvent picked up on the fabric face as well as the concentration of latent fiber solvent in the liquid solution from which the mist is formed. Therefore, in order to achieve bonded fabrics with a desirable combination of stiffness and shedding resistance at least two factors involving the fiber solvent are highly critical. The concentration of latent fiber solvent in the mist-forming solution must be between about 1% and 25% of latent fiber solvent based on the weight of the total solution, and preferably between 4% and 6% when using sodium thiocyanate as the latent fiber solvent for bonding polyacrylonitrile fibers. Also, in the case of using sodium thiocyanate, for example, as a latent fiber solvent for polyacrylonitrile fibers, the quantity of thiocyanate salt deposited on the fabric (dry weight) should be between 0.02 and 1.0 gram of 100% solvating material per square yard of each fabric face, and a more optimum range of fabric stiffness values for blankets is obtained when this quantity is between 0.06 and 0.15 gram.

The term solvating material as used herein means salt, liquid, or other material which when properly dissolved, diluted, or heated acts as either a solvent, gelatinizing agent, or other role capable of bonding touching; i.e., contiguous fibers at isolated points.

The term latent solvent is intended to refer to solvating material in a form or at a temperature in which it is not an active solvent, but which can be readily made active as by concentration, increase in temperature, or other means. For example, sodium thiocyanate is a solvating material for acrylonitrile polymer fibers. A 4% aqueous solution of this salt is called a latent solvent since it is not a solvent at this concentration. When water is evaporated from such a solution to the extent that it contains about 50% NaSCN it becomes an active solvent.

Under some conditions, it is possible to use active solvents in the form of a mist. Ethylene carbonate and propylene carbonates are examples for polyacrylontrile fibers. When using ethylene carbonate as a latent solvent for bonding acrylonitrile polymer fibers, it is preferred to use about 6% to 10% by weight in aqueous solution.

In any case the mist must be applied and actually deposited on the fibers in the form of discrete individual droplets. The yarns must not be completely wetted in the form of a continuous film since this would cause gross bonding and twinning with the result that the blanket so treated would be too stiff and boardy.

Furthermore, the droplets must be present on the fibers in sufficient quantity to insure point bonding at a preponderance of contiguous cross points of the fibers.

The deposition of from .02 to 1.0 gram of solvating material in appropriate form as discussed above insures sufficient droplets and resultant bonding points to yield a satisfactory finished fabric.

The mist may be applied to one or both sides of the fabric being treated, as shown in the accompanying flow sheet. The mist may be applied simultaneously to both sides from a bank of atomizers or it may be applied successively to one side and then the other with or without drying in between the application. In any case the fabric is held between tenter hooks during the whole process of application of the mist as well as drying to insure uniformity of mist application and to avoid shrinkage and compression of the fibers during the process. Compression or compacting in any form should be avoided. For this reason the velocity of the mist should not be so great as to compress the nap unduly.

By latent fiber solvent as used herein is meant any liquid or solid material or solution of same, soluble or miscible in the liquid medium, which is, in the initial single phase liquid solution, a non-solvent for the fiber, but is capable of bonding (i.e., at least rendering the fiber surface tacky) the fiber after activation of the latent solvent. The fiber solvent may be used herein by dissolving it in a separate liquid solvent for the same or by using it alone in the liquid medium specified.

Typical fiber solvents for acrylonitrile polymer fibers include aqueous solutions of sodium thiocyanate, lithium thiocyanate, lithium iodide, sodium iodide, calcium thiocyanate, potassium thiocyanate, calcium bromide, zinc chloride, lithium bromide, magnesium thiocyanate, cupric chloride, magnesium chloride, ferric chloride, ferrous bromide, cadmium iodide, barium chloride, and cobaltous iodide. Suitable fiber solvents also include propylene carbonate, ethylene carbonate, dimethyl sulfone, tetramethylene sulfone, dimethyl formamide, dimethyl acetamide, gamma-butyrolactone, trimethylene carbonate, and the like. These may be dissolved in water, or many of them may be dissolved in alcohol, ethylene glycol, benzene or the like. Typical fiber solvents for polyamide fibers include aqueous solutions of the inorganic salts listed above for acrylonitrile polymer fibers, as well as materials such as nitric acid, formic acid, phenol, meta-cresol, and the like. These may be dissolved in water, ethanol, methanol, benzene, and the like depending upon the fiber solvent used. Typical fiber solvents for polyester fibers include benzyl alcohol, benzoic acid, dichloro acetic acid, trichloro acetic acid, trifluoro acetic acid, dichloro phenol, and aqueous solutions of calcium and magnesium thiocyanate. Similarly, known solvents for other polymers listed below may be used when such polymers are present. In the case of natural fibers, etc., any known solvent may be used. Typical solvents suitable for wool include alkali metal salts of thioglycolic acid, and sodium sulfide. Dilute aqueous solutions of ferric chloride, etc., are suitable for rayon.

The liquid medium employed in the preparation of the one-phase liquid solution of this invention may be the same liquid as used for dissolving the fiber solvent when desired, as illustrated above in the lists of fiber solvents, or the liquid medium may be a different liquid which is miscible with the liquid employed to dissolve the fiber solvent. The liquid medium may be aqueous or organic or a mixture of two or more liquids which are miscible with one another. In each case the liquid medium should be capable initially of dissolving the fiber solvent to form the single phase liquid solution. The liquid medium should be relatively inert to the fibers of the fabric and should not be a good solvent for the polymer from which the fibers are made.

Although the composition of the liquid solution will normally be limited to consist essentially of two ingredients (i.e., latent fiber solvent and liquid medium), which may be advantageous in treating certain textile materials to employ in the solution small amounts of inert extenders (such as polyethylene oxide), softeners, antistats, slickening agents, sizes and finishes, pigments and dyestuffs, and other adjuvants which can be dissolved or dispersed in the solution to achieve particular results. However, these additional adjuvants must be carefully chosen in amount and composition so as not to disrupt the cooperating function of the two main ingredients of the solution in forming the mist and direct application and processing of the mist on the textile material.

The textile materials which may be treated in accordance with this invention may include sliver, tow, yarns, warps, batts, and woven, knitted, and non-woven fabrics. The woven fabrics may be woolen spun or worsted spun flannels, tweeds, shetlands, blankets, carpets, pile fabrics and the like. The knitted fabrics may be warp knitted or circular knitted jersey, sweaters, pile fabrics, socks and hosiery, suitings, gloves, scarfs, and the like. The non-woven fabrics may be carpets, upholstery, fleeces, furs, flannels, sweaters, felts, hats, and the like.

The composition of the staple fibers and/or continuous filaments making up the textile materials should be at least 25% by weight of organic, polymeric fibrous material capable of being bonded in order to achieve benefit from the misting treating in accordance with this invention. Blends of synthetic and/or natural fibers may be advantageously treated where all the fibers are to be bonded, or the solutions may be carefully chosen so that they are inert with respect to the fibers present that are not to be bonded.

Typical of the synthetic organic fibers and filaments which may be treated according to this invention include those prepared from polyamides such as poly(hexamethylene adipamide), poly(hexamethylene sebacamide), polycaproamide, and copolyamides, polyesters, and copolyesters such as condensation products of ethylene glycol with terephthalic acid, ethylene glycol with a 90/10 mixture of terephthalic/isophthalic acids, ethylene glycol with a 98/2 mixture of terephthalic/5-(sodium sulfo)-isophthalic acids, and trans-p-hexahydroxylylene glycol with terephthalic acid, polyacrylonitrile, copolymers of acrylonitrile with other monomers such as vinyl acetate, vinyl chloride, methyl acrylate, vinyl pyridine, sodium styrene sulfonate terpolymers of acrylonitrile/methyl acrylate/sodium styrene sulfonate made in accordance with U.S. Patent 2,837,501, vinyl and vinylidene polymer and copolymers, polycarbonates, polyurethanes polyesteramides, polyethylenes, polypropylenes, fluorinated ethylene polymers and copolymers, cellulose derivatives, such as cellulose acetate, cellulose triacetate, rayon, viscose, etc. composite filaments such as, for example, a sheath of polyamides around a core of polyester as described in the copending application of Breen, S.N. 771,676, filed November 3, 1958, now Patent No. 3,038,236 and two acrylonitrile polymers differing in ionizable group content spun as a sheath and core as described in the copending application of Taylor, S.N. 771,677, filed November 3, 1958, now Patent No. 3,038,237, and the like. The fibers and filaments may be crimped or uncrimped, drawn or undrawn, and/or bulked or unbulked.

Another highly critical factor in the present invention is the particle size of the discrete liquid particles which form the mist being applied to the textile materials. The maximum size of these liquid particles comprising liquid fiber solvent and diluent is about .012 inch. When the size of these liquid particles in the mist is much above the critical maximum given, the bonded resulting fabrics lose their good hand and aesthetics, the fabrics become undesirably stiff and blankets bonded with too large a particle have an undesirable loss in thickness of nap. Any suitable apparatus or method for forming a fine mist of discrete liquid particles less than .012 inch in size is suitable herein. There are commercially available humidifiers, fog nozzles, mist-forming apparatus, sprayers, and the like. One particularly suitable form of apparatus for practicing this invention is one that atomizes the liquid

solution into a mist, such as the humidifiers described in the Feldermann Patents 2,022,415 and 2,591,057. This type of humidifier produces a mist having a wide distribution of liquid particle sizes. The large heavy particles which are unsuitable for bonding the fibers in accordance with this invention, strike the walls of the humidifier, coalesce and fall back into the supply tank so that none of these large liquid particles ever contact the fibers or the fabric being bonded, only a portion of the smaller particles ever reach the fabric. The discrete liquid particles in the mist used in this invention are essentially round.

Another important limitation of the present invention lies in the conditions under which the mist is applied to the textile material. The mist of discrete liquid particles must contact the surface of the yarn, fabric, or other textile material without any accompanying mechanical compressive force such as the application of a roller or padder. In addition, the particles of the mist must not contact the textile material at such high speeds that they compress the fibers in any sense. In this connection, many of the commercial patented sprayers are unsuitable for applying a mist in accordance with this invention because the air and/or liquid pressure developed in the nozzle of the sprayer is so strong that it compacts the surface fibers of the textile material, which act reduces the thickness of the pile of napped fabrics and blankets and decreases the other desirbale properties of these textile materials. Also, the use of these high pressures for forcing the liquid particles against the textile material results in non-uniform application of the liquid fiber solvent across the width of the fabric being treated which leads to fabrics having non-uniform properties and makes it difficult or impossible to reproduce fabrics having the same properties.

Normally the mist is applied to the surface of the textile material at room temperature, although the temperature of the mist or the fabric may be elevated so long as it is well below the temperature necessary to convert the latent fiber solvent to an active fiber solvent for the fibers. A suitable temperature range for drying and bonding polyacrylonitrile fibers is from 215° F. to 350° F., and preferably from 250° F. to 300° F. for one to five minutes contact time. Obviously the temperature of application of the fog, drying and bonding should not be so high that it melts the surface fibers of the textile material or deforms the surface fibers to such an extent to destroy their fibrous character.

The chief advantage of this invention is the provision of a novel process for bonding the fibers of textile materials, and particularly loose surface fibers. Another advantage is the fact that the process provides a method for making blankets which have high resistance to surface distortion and high resistance to shedding without affecting the good hand of the blanket and without reducing the thickness of the nap of the blanket. Another advantage is a process for reducing the shedding and fuzzing of yarns and fabrics without substantially affecting the stiffness of the yarn or fabric. Still another advantage lies in the fact that the method of the present invention reduces the fuzzing and pickiness of non-woven fabrics. Another advantage is that this process produces blankets having improved resistance to surface distortion upon repeated washings and launderings. The process of this invention also produces bonded fabrics which have greater cover and smoothness than the unbonded fabrics.

The following test methods were used to measure the properties listed in the tables below. The quantity of sodium thiocyanate deposited per square yard of fabric face was determined by the colorimetric test using excess ferric ion following the procedure given on page 485 of Scott's "Standard Methods of Chemical Analysis," fifth edition.

The appearance retention was measured using an appearance retention tester which is an instrument that rubs a sample of fabric against itself in a circular rotary movement using a standard load. This appearance retention tester was obtained from Fabric Development Tests, P. O. Box 45, Brooklyn 32, New York, and is described by Jack J. Press in an article entitled "The Development of a Pilling Test for Apparel Fabrics," published in "Papers of the American Association for Textile Technology," pages 19–33, December, 1953. The numbers reported in the tables below for appearance retention signify that the fabric samples which have been treated in the appearance retention tester vary from a rating of 1 (greatly distorted surface fibers), to 5 (perfect with no visible distortion of fibers).

The subjective stiffness rankings given in Table I are numbers which were obtained by a panel of five persons who ranked the various fiber samples each against the other for relative stiffness, the lower the number, the lower the stiffness. These rankings vary from 1 for the control fabric up to 5 which is the stiffest of the fabrics reported in Table I.

The stiffness reported in Table II is a quantitative measure of the stiffness of the fabric samples, determined by first conditioning the fabric samples for at least 12 hours in air at room temperature. The test employs a modified Monsanto Wrinkle Recovery Test. A 9/16 inch wide strip of fabric is suspended one inch beyond the clamp in a horizontal position and vertical sagging deflection at the free end of the fabric is noted. This deflection is measured and reported in millimeters, the lower the deflection value, the higher the stiffness or body of the fabric. A value of less than 5 is generally regarded as too stiff for most purposes. A satisfactory blanket for example should have a deflection of more than 5 mm. and preferably from 7 to 9 mm.

In the drawing the single figure is a flow sheet showing a continuous length of napped textile material such as that commonly used for household blankets held under tension across its width by means of a conventional tenter frame. A mist is applied to the moving textile material. The mist is supplied by a bank of sprayers or atomizers to the textile. The material then passes to a dryer while under constant tenter tension and is then cooled under tenter tension and passed on to a wind up.

EXAMPLE I

A woven napped blanket made from 100% polyacrylonitrile staple fibers was passed horizontally through a fine mist which was propelled vertically from the top of a liquid atomizer. This atomizer was purchased as Model No. OTVT "Web-Wetter," available from Walton Laboratories, Inc., Irvington, New Jersey. The atomizer was continuously charged through a feedline from a reservoir with aqueous solutions of sodium thiocyanate of the specified concentration given in Table I. The speed of the fabric as it passed through the vertical column of mist was varied to change the amount of sodium thiocyanate picked up by the fabric. After passing through the mist, the fabric was fed directly through an air drying oven at a temperature of 250° F. for a contact time of 5 minutes. Special precautions were taken during the fabric treatment with mist so as to avoid compacting either surface of the fabric. The bonded fabrics were tested and the properties reported in Table I. It will be seen that the smaller concentrations of sodium thiocyanate do improve the appearance retention of the fabrics over the control, although 4% yields the best appearance retention of all samples measured in this series. Also, in Table I the amount of sodium thiocyanate pickup on the fabric does not appreciably affect the appearance retention, but does increase the stiffness of the fabric. Sample 5 which contains 0.110 gram of thiocyanate per square yard of fabric is still in the acceptable range of stiffness for a blanket fabric.

Table I

Sample	Contact Time (Secs.)	Percent NaSCN in Solution	Grams NaSCN Deposited/yd.² of Fabric Face	Appearance Retention	Subjective Stiffness Rankings
1	8	1	.035	3.2	2
2	5	1	.021	3.2	1
3	8	2	.048	3.0	3
4	8	4	.120	4.9	5
5	5	4	.110	4.0	4
Control	0	0	.001	1.0	1

EXAMPLE II

A sample of the same woven napped blanket made from 100% polyacrylonitrile fibers that was used in Example I was treated by the same method as described in Example I using different concentrations of sodium thiocyanate solution for forming the mist. The bonded fabrics were tested and the properties reported in Table II in comparison with the control fabric which was not treated with bonding solution. The results reported in Table II indicate the concentration of sodium thiocyanate in the bonding solution is critical in obtaining bonded fabrics with satisfactory properties. The results indicate that a bonding solution containing as much as 10% of sodium thiocyanate solution yields a fabric which has a tacky surface and, therefore, cannot be used as a blanket, even though the appearance retention is satisfactory. Also indicated is the fact that samples 1 and 2 which deposit about 0.1 gram of sodium thiocyanate per square yard of fabric face result in fabrics which have acceptable stiffness and a dry surface, whereas fabric sample 3 which deposits 0.375 gram of sodium thiocyanate per square yard of fabric face yields a fabric which is too stiff to use as a blanket even though the appearance retention is very satisfactory.

Table II

Sample	Percent NaSCN in Solution	Grams NaSCN Deposited/yd.² of Fabric Face	Appearance Retention	Surface Tackiness	Stiffness (mm.)
1	2	.102	3.4	Dry	7.3 (acceptable).
2	5	.122	3.9	Dry	5.5 (acceptable).
3	10	.375	4.3	Tacky	3.0 (unacceptable).
Control	0	0	1.1	Dry	7.0 (acceptable).

EXAMPLE III

A sample of the same woven acrylic blanket was used as that described in Example I. A fiber bonding solution was prepared by dissolving the indicated quantities shown in Table III of polyethylene oxide and sodium thiocyanate in water to produce two different single-phase solutions. Three samples of the blanket were selected for this example. The first two were treated with a mist and the third one was untreated. A fine mist of the fiber bonding solution was produced from a commercially available De Vilbiss paint gun attached to a compressed air line at 95 p.s.i. gauge pressure. The mist was ejected from the paint gun to follow an arched path through the air to finally contact a stationary sample of blanket a few feet away from the gun while the blanket was supported in a horizontal plane. Direct straight-line application of the mist under excessive force was avoided to prevent compressing the blanket nap. The surface of the blanket fabric was uniformly wetted with liquid globules of the solution. Then the wetted fabric was placed in a circulating air oven at a temperature of 212–248° F. for ten minutes. After drying, the bonded fabric was hand washed for five minutes in water at 100° F. to remove any excess bonding solution, then allowed to air dry. The two bonded fabrics were tested for appearance retention and the resulting improvement in this property compared with an unbonded control fabric is shown in Table III. The stiffness of samples one and two were acceptable for a blanket fabric as evidenced by feeling the samples by hand and noting they were not objectionably stiff.

Table III

Sample	Grams NaSCN	Grams Poly-Ethylene Oxide	Grams Water	Appearance Retention
1	6.0	2.0	500	4.2
2	12.0	4.0	500	4.6
Control				1.8

EXAMPLE IV

Following the procedure of Example I, the same woven acrylic blanket was treated with a mist formed from an aqueous solution of 8.7% ethylene carbonate by weight while tentered. The speed of the fabric as it is passed through the mist is approximately 15 yds./min. After passing through the mist, the still tentered fabric is fed directly through a drying oven containing circulating air at 285° F. for a contact time of 2 minutes, after which the fabric is cooled. The resulting fabric is found to have an acceptable hand, and good resistance to surface distortion and shedding.

While the invention has been illustrated by treatment of a napped polyacrylonitrile blanket, it is to be understood that the identical steps may be used to apply a mist containing known solvent to textile materials made from any other polymer which is amenable to bonding by the application of a liquid which has substantially no solvent effect on the polymer at room temperature but which may be activated by heating to render the polymeric fibers cementitious at contact points where a droplet of the mist has been deposited, and the solvent may subsequently be removed leaving the fibers point bonded.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations are to be understood therefrom. The invention is not limited to the exact details shown and described for obvious modifications will occur to those skilled in the art.

What is claimed is:

1. The process for bonding contiguous fibers of a fibrous textile fabric having substantial thickness and in which surface fibers have one end held within the fibrous structure and one free end protruding therefrom forming a raised surface, which comprises forming a solution comprising 1 to 25 weight percent of a latent solvent for the fibers of the fibrous textile fabric, converting the solution to a mist of liquid particles having an average particle size of less than about 0.012 inch in diameter, depositing a controlled amount of the thus formed mist containing the liquid particles on contiguous fibers of the textile fabric while said fabric is horizontally disposed by passing the mist of liquid particles to the raised surface of the textile fabric in the absence of substantial propelling force to settle the particles thereon without displacement of the fibers, and thereafter bonding contiguous fibers on which the discrete liquid particles have been deposited by heating the textile fabric containing the latent solvent particles at a temperature of about 215° F. to about 350° F. to activate said latent solvent.

2. The process of claim **1** in which the fibers to be bonded are made of an acrylonitrile polymer.

3. The process of claim **2** in which the latent solvent is ethylene carbonate.

4. The process of claim 2 in which the latent solvent is sodium thiocyanate and is present as a 4% to 6% aqueous solution in the mist and is deposited in an amount of from 0.02 to 1.00 gram of latent solvent per square yard of each fabric face.

5. The process of imparting dimensional stability to a napped textile fabric by bonding contiguous fibers in the nap comprising forming a solution comprising 1 to 25 weight percent of a latent solvent for the fibers of the nap, converting the solution to a mist of liquid particles having an average particle size of less than about 0.012 inch in diameter, depositing a controlled amount of the thus formed mist containing the liquid particles on contiguous fibers of the nap by passing the mist of liquid particles to the raised surface of the napped fabric while it is horizontally disposed in the absence of substantial propelling force to settle the particles thereon without displacement of the fibers, and thereafter bonding contiguous fibers on which the discrete liquid particles have been deposited,

without compression, by heating the napped fabric containing the latent solvent particles at a temperature of about 215° F. to about 350° F. to activate said latent solvent.

6. The process of claim 5 in which the average particle size of the mist is substantially equal to the diameter of the cross section of the fibers making up the textile fabric.

7. The process of claim 6 in which the napped fabric is a blanket material woven from polyacrylonitrile fibers of which about 75% are in the nap.

8. The process of claim 7 in which the solution is aqueous ethylene carbonate.

No references cited.

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