(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 331 215 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89200041.5**

(51) Int. Cl.[4]: **D06M 17/00**

(22) Date of filing: **09.01.89**

(30) Priority: **01.03.88 DK 1084/88**

(43) Date of publication of application:
06.09.89 Bulletin 89/36

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **STORK BRABANT B.V.**
Wim de Körverstraat 43a
NL-5831 AN Boxmeer(NL)

(72) Inventor: **Rasmussen, Knud V.**
Skyggevej 62
DK-7442 Engesvang(DK)

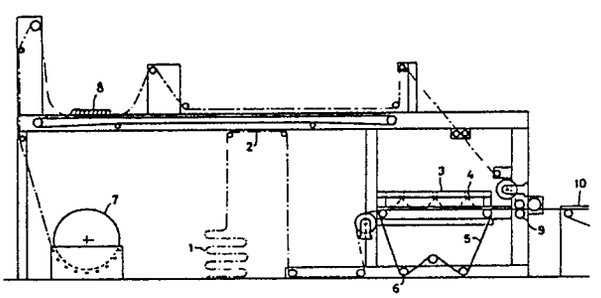
(74) Representative: **Barendregt, Drs. F. et al**
EXTERPATENT B.V. P.O. Box 90649
NL-2509 LP 's-Gravenhage(NL)

(54) A process for laminating textiles.

(57) In a process for laminating textiles, wherein a textile web (1) is coated with adhesive in a spraying station (3) and joined with a layer of wadding (8) or with another textile web when passing through a pair of rollers (9), the adhesive used is a moist curing solvent-free polyurethane prepolymer of the mono-component type which is sprayed on the textile web under essentially anhydrous conditions, and then the laminate is allowed to cure in usual atmosphere having normal moisture.

Preferably, the adhesive maximum contains 1.5% free isocyanate, and it preferably has a viscosity of about 9000 mPa.s at 130 °C, a density of 1.1 and a softening point (ring/ball) of 45 °C. Such an adhesive is sprayed at about 190 °C, measured at the nozzle tips.

The result is a product having excellent properties with respect to washing fastness and softness, just as the drawbacks usually involved in spray lamination are avoided in the production.



EP 0 331 215 A2

A process for laminating textiles

The present invention concerns a process of the type defined in the introductory portion of claim 1 for laminating textiles, and the process of the invention is characterized by the features defined in the characterizing portion of claim 1.

For use in the production of various types of clothing, including in particular T-shirts, sweatshirts and jogging clothing, but also for use in the production of materials for upholstery, car seat covers, quilts and sleeping bags, the weaving factories produce various laminated textiles as piecegoods for further processing at sewing workshops. Laminated textiles for the above-mentioned purposes frequently consist of a textile web to which there is adhered a layer of natural or synthetic wadding, or of two textile webs between which a layer of wadding may be placed.

Such laminates are produced by machine bonding the individual layers with a suitable adhesive. Generally, the process takes place in that the textile web is sprayed with the adhesive, and then the sprayed textile web is joined with the wadding in a roller system. The adhesive used is often a solvent-based polyurethane, where the mixture of polyurethane and solvent contains up to 90% solvent to ensure a consistency which makes the adhesive suitable for spraying with spray guns. Even with the most effective suction systems it is impossible in practice to avoid occurrence of unhealthy concentrations of the solvent (most frequently ethyl acetate) in the air during the process, and these high concentrations involve various physical troubles, such as air passage irritation, dizziness, headache and at worst concentration and memory problems. To this should be added pregnant women's potential risk of embryonic or fetal deformities.

In addition to these serious problems, the produced product bears the stamp of the intensive solvent treatment because the smell of the solvent sticks to the fabric for a long time and is often difficult to wash out.

It has been attempted to solve the problem by using water-based adhesives, which, although they do not give rise to the above-mentioned working environment and health troubles, nevertheless do not provide the desired results as regards product quality.

To avoid having to work with liquid solvents it has been attempted to laminate textiles with cotton or synthetic wadding by means of an intermediate tissue of high density polyethylene or polypropylene. The tissue may also be produced from other polymers or polymer mixtures. The polymer serves as a hot melt adhesive when - interposed between the webs to be laminated - it is moved through a roller system under controlled pressure. The process is desirable from an environmental point of view because no vapours are released during the passage through the roller system, and the process can moreover be performed easily and rapidly, but it is vitiated by the drawback that an adequately strong tissue is necessary to ensure sufficient washing fastness of the finished laminate. If a tissue is used which is strong enought to ensure good washing fastness, the result will be a too stiff product which is inconvenient to wear.

Finally, it has been attempted to perform the lamination by means of powdered adhesives, most frequently in the form of polyamides, polyesters, low or high pressure polyethylenes, ethylene vinyl acetate copolymers or various mixed polymerisates. The powdered adhesive is sprinkled over the textile web, which is then moved through a heating tunnel to melt the powder. When emanating from the heating tunnel, the web provided with adhesive is joined with the second web in a calender roller system.

In addition to dust problems this process has the drawback that it is very difficult to dose the powdered adhesive properly. Thus, underdosing means a risk of too poor adhesion, which influences the durability of the laminate, including washing fastness, while overdosing causes the powder to sink into the textile web. This results in an undesirably stiff product. Further, owing to the actual dosing form, satisfactory lamination necessitates using an amount of adhesive which is up to 20 times the theoretically necessary amount.

It has now surprisingly been found that it is possible to avoid all the above-mentioned drawbacks and to obtain a product having excellent uniformity and durability, if the adhesive is a moist curing mono-component polyurethane prepolymer which is sprayed on the textile web under essentially anhydrous conditions. After the textile web coated with adhesive has been joined with a web of wadding and after rolling-up of the resulting laminate, the laminate is allowed to cure in an atmosphere of normal moisture to provide a product having extremely good properties.

The advantage of using an adhesive of this type is primarily that polyurethane melt adhesives can be used without any form of solvent. Secondly, such adhesives may be used in considerably smaller amounts than other melt adhesives. The process of the invention uses just 1 to 3 g of adhesive per m^2 , where other melt adhesives are to be used in amounts of up to 10 to 20 g per m^2 to provide sufficient washing fastness. So large

amounts of adhesive make the laminate stiff and unelastic, whereas the process of the invention results in a pliable and elastic laminate which also has excellent washing features.

Adhesives of the type used in the process of the invention have been known for some time. Thus, they have been used for one-sided gluing of plane objects of various foam materials and in other forms of gluing where only minor tensions occur. Moreover, they may be applied to wood, metal and many plastic material, just as they can replace contact glue in many cases.

Their usefulness for the present purpose is due to the fact that - with careful observance of temperature and pressure conditions - they may be sprayed in fine threads (typically of the order of 1/10 mm) on the passing textile web. By suitable location of the necessary number of nozzles, each of which provides a "fan-shaped" pattern on the web, it is possible to obtain completely uniform and optimum spraying of glue in practice.

A very suitable adhesive for the purpose is TivoMelt 9600/41 from Tivoli Werke AG, Hamburg. This adhesive is a moist curling polyurethane prepolymer of the hot melt type. It contains maximum 1.5% free isocyanate (NCO) and no solvent, i.e. the content of dry matter is 100%. The viscosity is around 9000 mPa.s at 130 °C, the density is about 1.1 and the softening point (ring/ball) is 45 °C. The flash point of the product is above 200 °C.

It has been found that the best results are obtained with a glue of this type when it is sprayed at a temperature (measured at the nozzle tip) of about 190 °C. A temperature of about 150 °C is maintained in glue tank and feed conduits.

Of course, other glue makes of the polyurethane prepolymer type may be used. The working temperatures then depend upon the viscosity and the other properties of the glue in question.

The process of the invention makes no special requirements as to the type of the wadding and textile material used, except that silicone treated (water repelling) textiles are not suitable since the glue exhibits poor adhesion to such materials. When pure, i.e. non-impregnated textiles, are involved, these may be both natural and synthetic. The same applies to the wadding, which may e.g. be of cotton or polyester.

The invention is illustrated more fully by the following example.

EXAMPLE

The figure shows a machine for the use in the performance of the process of the invention. The textile web is unwound from a supply 1 and passed via a roller system 2 to the spraying station 3 where the adhesive is sprayed on the textile web by means of a plurality of nozzles 4 under pressure and at a temperature carefully determined by means of a thermostat, said textile web being supported by an endless carrier band 5 which rotates about a roller system 6.

The wadding is unwound continuously from the supply roll 7, the accumulation region 8 ensuring that the web can be directed evenly to the pair of rollers 9 in which it is joined with the textile web coated with glue.

During the entire passage of the glue from tank to heating furnace (not shown), the nozzles ensure moist-free conditions, e.g. by maintaining a carbonic acid pressure in the tank, to prevent premature curing.

The laminated web is passed to a take-up device 10 and is allowed to cure after winding-up in normal moist atmosphere for about 24 hours. The result is an excellent, pliable laminate having great strength and fastness.

If the TivoMelt 9600/41 glue, mentioned above, is used, the temperature at spraying must be 190 to 195 °C. This high temperature is obtained by means of special nozzles provided with heating elements embedded in aluminium. The temperature is raised only shortly before the nozzle tip, while it is maintained at a lower value, typically about 150 °C, during the passage through the conduits. The pressure in the nozzles is typically more than twice the normal pressure in such nozzles.

The laminated textile web may be passed through the system once more with the purpose of producing a double textile web with wadding therebetween.

Claims

1. A process for laminating textiles, wherein a textile web is coated with an adhesive and joined with a layer of wadding or with another textile web when passing through a pair of rollers, **characterized** by using as adhesive a moist curing solvent-free polyurethane prepolymer of the mono-component type which is sprayed on the textile web under essentially anhydrous conditions, and allowing the resulting laminate to cure in usual atmosphere with normal moisture.

2. A process according to claim 1, **characterized** in that the adhesive maximum contains 1.5% free isocyanate, and that it has a viscosity of about 9000 mPa.s at 130 °C, a density of about 1.1 and a softening point (ring/ball) of 45 °C.

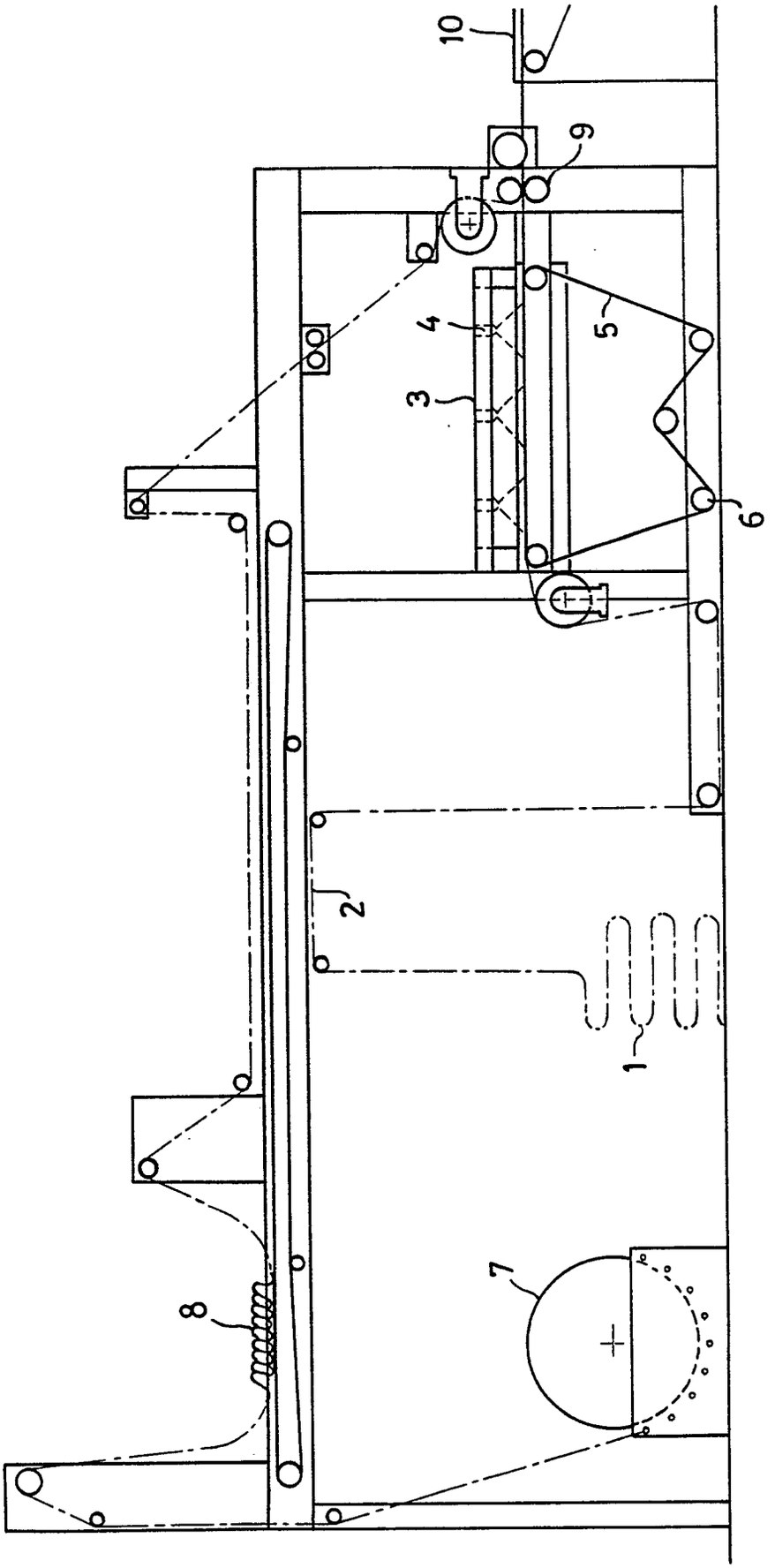
3. A process according to claim 2, **characterized** by applying the adhesive at a temperature of about 190 °C, measured at the nozzle tips.

4. A laminated textile product, **characterized** in that it is produced by a process according to any of claims 1-3.

5. Use of a moist curing solvent-free polyurethane prepolymer of the mono-component type as adhesive in the lamination of textiles.

6. Use according to claim 5, **characterized** in that the adhesive maximum contains 1.5% free isocyanate, and that is has a viscosity of about 9000 mPa.s at 130 °C, a density of 1.1 and a softening point (ring/ball) of about 45 °C.

7. Use according to claim 5, **characterised** in that the application takes place at a temperature of about 190 °C, measured at the nozzle tips.


10
9
4
5
3
6
2
1
8
7