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(54) Method and apparatus for preparing artificial hide or hide backing and the hide or hide backing thus obtained.

(57) The present invention relates to a method and an apparatus for preparing an artificial hide or backing for artificial hides, and the hide and backing thus obtained.

The method comprises the steps of applying a liquid-state pre-polymer onto a textile base or weave, hot foaming and cross-linking the pre-polymer in an acqueous medium, and drying the product thus obtained.

The apparatus comprises an applicator unit for applying a liquid-state pre-polymer onto a textile support or base, a processing chamber or tank wherein the pre-polymer is exposed to hot water or steam, and a drier unit.

The backing for artificial hides thus produced comprises a textile weave which is impregnated with a foam obtained from a liquid polyurethane polymer containing an active isocyanic group-based agent.

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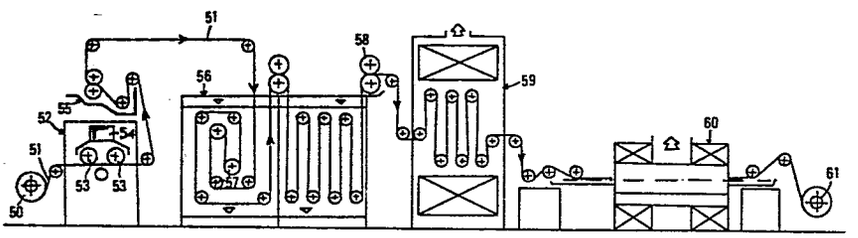
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METHOD AND APPARATUS FOR PREPARING ARTIFICIAL HIDE OR HIDE BACKING AND THE HIDE OR HIDE BACKING THUS OBTAINED

The present invention relates to a method and an apparatus for preparing an artificial hide or hide backing and the hide or hide backing thus obtained.

As it is known, many artificial hides or imitation hides generally comprise a synthetic resin (plastics) skin or film having a surface (front side) imitating the grain of a real skin, and a textile base (a warp-and-weft woven fabric, a knitted fabric, or a non-woven fabric) which is stably applied to the skin reverse side.

A method used for applying the base to the skin is the so-called transfer process carried out by means of a continuous web of release paper.

According to that method, a release paper web is coated with a synthetic resin designed to form the skin later on.

The whole is then allowed to dry and the exposed side of the resin is coated once again with a suitable adhesive and a selected textile base laminated onto it.

Next, the resin undergoes polymerization. The paper web is then removed for being re-used a few times.

Thus, a product (imitation or artificial hide) is obtained which resembles quite closely a real hide but has handling and pliability characteristics, and above all a markedly "textile" reverse side

or back, which make it non-recommendable or unsuitable for many uses.

An improved artificial hide is produced with a coagulation process developed by recent techniques. With such a process, the textile base of the artificial hide is impregnated with a solution of polyurethane in dimethylformamide (DMF) in concentrationsranging from 10% to 15%. The solvent is then fully removed by using water and by taking advantage of the high solubility of DMF in water. Thus, a polyurethane foam-impregnated textile base is obtained which gives the finished product a "feel" which is much closer to that of a natural hide, with a good clean cut, and an acceptable back although not quite satisfactory for many applications.

However, the coagulation process, requires owing to cost considerations, that the DMF be completely recovered by means of a specifically provided filtration, distillation and purification system, which involves investments of the same order of magnitude as those required by the production plant.

It is an object of the present invention to provide a novel method of preparing an artificial hide or hide backing having very good "feel", cut, folding, softness, and appearance characteristics comparable with those of natural hide.

Another object of the present invention is to provide a system for the production of synthetic hide or hide backing which is relatively simple and easy to monitor, makes it possible to attain a high production

rate, and may be fully automated.

A further object of the present invention is to provide a system which has a reduced number of processing stations, is capable of operating on a continuous basis, and has relatively low maintenance requirements, whereby it can be produced and run at relatively low costs.

According to a first aspect of the present invention, there is provided a method for preparing an artificial hide or hide backing which method comprises the steps of applying a solvent-free liquid pre-polymer chosen between pre-polymers of polyurethane, polyether and polyester onto a textile base or weave, treating the base thus coated with water or steam at a temperature in the 25°C to 100°C range to cause foaming and cross-linking of the pre-polymer, and drying the thus treated base.

According to another aspect of the present invention, there is provided an apparatus for implementing the above method, which apparatus comprises a liquid pre-polymer applicator unit for applying the pre-polymer on a textile base or weave, a processing chamber or tank provided with guiding cylinders adapted to define a path through which the base is exposed to hot steam or water, and a drier unit for drying the treated product coming from the processing chamber or tank.

According to another aspect of the present invention, there is provided a backing for artificial hides which comprises a weave or base in the form

of a fabric, and is characterized in that the said weave is impregnated with a polymer or foam obtained from a liquid state polyurethane, polyester or polyether polymer precursor containing an active cross-linking site.

Further aspects and advantages of the present invention will be more readily understood from the following detailed description with reference to the accompanying drawing, in which the single figure illustrates a system for the production of an artificial hide or a backing for artificial hides in accordance with this invention.

To prepare an artificial hide or a backing for artificial hides in accordance with this invention, a textile weave is used which may be, for example, a warp-and-weft weaved fabric, a knitted fabric, a non-woven fabric, either of the elastic variety or otherwise. If a high quality final product is desired, such as when dealing with a napped backing it is advantageous to subject the fabric first to brushing so as to remove any lint and processing residues. Then a liquid state resin is applied to the fabric, e.g. a pre-polymer of polyurethane, which includes a compound comprising active isocyanic groups which may be either aromatic or aliphatic in nature. A polyether or polyester pre-polymer can also be used. A suitable polyurethane pre-polymer of the type useful in the present invention is one available commercially under the tradename A.E.G.E. 100SL, a product from Tojo Polymer-Osaka, Japan. The application of that pre-

polymer on the supporting base weave may be effected in several ways, such as by spreading with a doctoring blade, by impregnation with an impregnating foulard, by spraying air or a pressurized liquid, by reverse roll or rotogravure printing, or by silk-screening printing.

Various agents, such as suitable dyes, softeners, plasticizers, mineral fillers, bubble and foam preventing agents, to control stability over time of the final product, and the like may be added to the pre-polymer.

The textile weave with the pre-polymer applied thereto, for example the polyurethane pre-polymer, is then transferred to a damp environment (either a tank or chamber containing saturated steam) at temperatures in the 25°C to 100°C range. The pre-polymeric material, upon entering the damp environment, undergoes cross-linking and foaming and is transformed into a micro-porous foam. The foam structure may be controlled, and hence determined, by acting on the reaction ambient conditions, that is on the temperature of the water or steam, and on the time of exposure. Control of the foam bubble size is a determining factor in establishing the extent of the finished material porosity. At high ambient temperatures and short processing times, large bubbles tend to be formed in the foam, whereas at low processing temperatures and long exposure times a fine cell formation is achieved.

For some applications, it may be useful to improve the appearance of the foamed backing thus produced by

subjecting it to a fluffing operation, e.g. by means of conventional equipment.

At the end of the processing time, the foamed product is dried by causing it to first pass through a squeezer unit and then through a drier in which removal of the water contained in the foam takes place. The drier may be, for example, either of the flap or chain type (rameuse).

To further clarify the foregoing discussion, some Examples are given hereinbelow to illustrate resin compositions applied to a textile base prior to foaming and cross-linking. The compositions have been applied to textile base and treated for foaming and cross-linking as set forth above.

EXAMPLE 1

65% by weight of a polyurethane pre-polymer additivated with 27% by weight of a mineral charge comprising calcium carbonate was used, to which was added 7% by weight of an iron oxide-based mineral pigment for dyeing the final product, as well as 1% by weight of a silicone-based bubble preventing agent (e.g. of the type of Nopco NXZ, a produce of NYMCO S.p.A. of Milan, Italy). A knitted cotton fabric raised on both sides was used as a base. The bath coagulation temperature was 50°C. The pre-polymer was applied to the base by reverse roll printing.

A backing for artificial hides was obtained which had a medium "feel", a microporosity which depends on the coagulating or foaming conditions,

medium foam resiliency, and medium abrasion resistance, dry sensation.

EXAMPLE 2

90% by weight of a polyether-polyester polyurethane pre-polymer additivated with 9% by weignt of a dyeing pigment and 1% by weight of bubble preventing agent were used. The base was a non-woven textile napped on both sides. The bath coagulation temperature was 60°C. The pre-polymer was applied to the textile by means of a doctoring blade.

A material was obtained which had a softer feel than that of Example 1 above, a more plastic feel owing to the absence of the mineral charge, a high resiliency accompanied by a good abrasion resistance and a porosity which depends on the coagulation conditions.

EXAMPLE 3

50% by weight of a liquid polyether-polyester polyurethane pre-polymer was used, along with 40% by weight of talcum powder and 9% by weight of deying pigments. The used textile was a knitted non-run fabric made of synthetic fibers. The coagulation temperature of the bath was 40°C. The resin was applied by immersion process.

A material was obtained which was stiffer than that of the composition in Example 2, having an even drier feel, reduced resiliency, and only fair abrasion resistance.

EXAMPLE 4

30% by weight of a liquid polyurethane pre-polymer

was used along with 69% by weight of calcium carbonate and 1% by weight of bubble-preventing agent. The used textile was a napped fabric as in Example 2. The coagulation temperature of the bath was 70°C. The resin was applied by spreading. Following coagulation, a stiff product was obtained which had poor resistance to abrasion but could be well used for fabric dressing, for stiffening other materials, and for protecting textile products employed in the industry as well as for producing excellent lightweight filler layers (foamed size). The final product was whitish in colour, since no dyeing pigments were present.

EXAMPLE 5

93% by weight of a liquid polyether-polyester polyurethane pre-polymer, 2% by weight of organic dyes, 4% by weight of a charge comprising calcium lactate, and 1% by weight of bubble-preventing agents were used. The base used was a knitted fabric. A pre-treatment with saturated steam at 100°C was carried out. The resin was applied by immersion in water at 50°C by a reverse roll technique.

The coagulation step gave a highly resilient product which was abrasion-resisting and had a bright glossy colour. The cell structure was much more uniform than with the other compositions described above.

All of the products obtained in conformity with the foregoing Examples had characteristics such that they could be cut without fraying, showed good resistance to wear, cold, weathering, and in general good flexibility and good imperviousness to air. The

product is ideal for use as an imitation hide backing, to which it imparts consistency and highly valuable aesthetic properties as it takes up colour well and forms a back or reverse side which quite closely resembles that of real hide. Furthermore, the resulting product can also form in itself an imitation hide, e.g. a napped one (felt), whether it be treated on one side or both sides, and where two supports identical to one another are laminated, such as by means of a suitable cement.

A suitable apparatus for implementing the above-described method, and capable of producing a backing for imitation hide having the above-discussed features, is illustrated diagrammatically in the accompanying drawing. The drawing actually shows a complete system for the production of a backing material for imitation hide, starting from a roll of a suitable fabric.

The system shown in the drawing is an apparatus for the production on a continuous basis of a backing for imitation hide. It essentially comprises two stations, one for the preparation of the textile material and the application of the liquid resin to it, and the other comprising a processing chamber or tank adapted to cause coagulation or foaming of the resin. These two stations are advantageously followed by a drier assembly for removing processing water from the product.

More specifically, and as illustrated in the drawing, it will be noted that the first station includes a textile material roll 50, whence a suitably

selected fabric 51 which may be of various types as mentioned above, is unwound. The fabric 51 is supplied to a brushing unit, generally indicated at 52, for removing processing residues or any lint therefrom which are first raised by specially provided brushes 53 and then drawn up into a hood 54. From the brushing unit 52, the fabric is passed to a station 55, where the liquid polyurethane pre-polymer is applied on the fabric. Shown schematically in the drawing is an application station by impregnation, but it should be appreciated that the application may be effected with any other suitable method, such as by spreading with a doctoring blade, spraying on with either air or a pressurized liquid, roll impression, silk-screening, and the like.

After undergoing impregnation at the station 55, the web 51 is fed to a processing tank 56. The tank 56 is provided with a plurality of rollers 57 which delimit a constrained path for the resin-charged web 51. During the initial portion of said path, arrangements may be made for the guiding rollers 57 not to contact the treated side or the side whose appearance has little or no importance for the final product. The tank 56 may be filled with water, or alternatively, form an evaporator chamber in which it is preferred to work with saturated steam rather than by immersion.

From the tank 56, and after going through a pair of squeezer rollers 58, the treated product is supplied to a drying station which comprises a guided flap chamber 59 advantageously followed by a drier, such as a tenter

(rameuse) 60 when a high production rate is aimed at with a product of some weight, in order to provide a gentle and slow drying process. The treated backing picked up from the output end of the drier 60 is then wound around a roller 61.

The invention as conceived and described herein above, is susceptible to many modifications and variations without departing from its scope.

CLAIMS

1. A method for preparing an artificial hide or hide backing, comprising the steps of applying a solvent-free liquid pre-polymer chosen between pre-polymers of polyurethane, polyether and polyester onto a textile base or weave, treating the thus coated support with an acqueous medium at a temperature in the 20°C to 100°C range to cause foaming and cross-linking of the pre-polymer, and drying the thus treated product.

2. A method according to Claim 1, characterized in that said treatment is effected by immersion in water.

3. A method according to Claim 1, characterized in that said treatment is effected in a saturated steam medium.

4. A method according to Claim 1, characterized in that said treatment is effected both by immersion in water and exposure to saturated steam.

5. A method according to any of the preceding claims, characterized in that it further comprises a brushing step carried out ahead of the pre-polymer application step in order to scrape the fabric free of any undesired residue or lint.

6. An apparatus for implementing the method claimed in any of Claims 1 to 5, characterized in that it comprises an applicator unit for applying a liquid pre-polymer onto a textile support to form a preliminary artificial hide or hide backing, a processing chamber or tank provided with guide rollers

arranged to define a path of hot exposure of said hide or hide backing to either steam or water, and a drier unit for drying the oncoming treated hide or hide backing from the processing chamber or tank.

7. An apparatus according to Claim 6, characterized in that the guide rollers inside the processing chamber or tank define an initial path of exposure of just one side of the textile support.

8. An apparatus according to Claim 6 or 7, characterized in that it further comprises a textile support brushing station located upstream of the applicator unit.

9. An apparatus according to any of Claims 6 to 8, characterized in that it comprises a tenter type of machine.

10. A backing for artificial hides, comprising a weave in the form of a fabric, and characterized in that the weave is impregnated with a foam formed from a liquid polyurethane pre-polymer containing an agent composed of active isocyanic groups.

11. A backing according to Claim 10, characterized in that it comprises 30% to 95% polyurethane pre-polymer.

12. A backing according to Claim 10, characterized in that it comprises up to 75% by weight of a mineral charge.

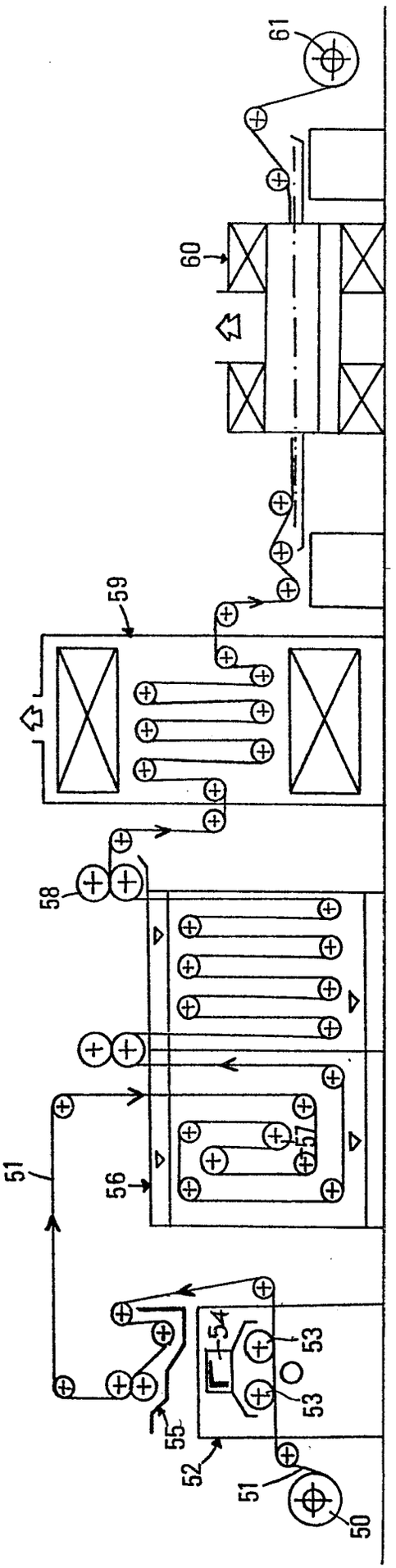
13. A backing according to any of Claims 10 to 12, characterized in that it comprises up to 15% of dyeing pigments.

14. A backing according to Claim 13, characterized

in that the mineral pigments are composed of iron oxides.

15. A backing according to Claim 13, characterized in that the dyeing pigments are organic pigments.

16. A backing according to any of Claims 10 to 1 , characterized in that it further comprises 0.5% to 10% by weight of a bubble-preventing agent.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