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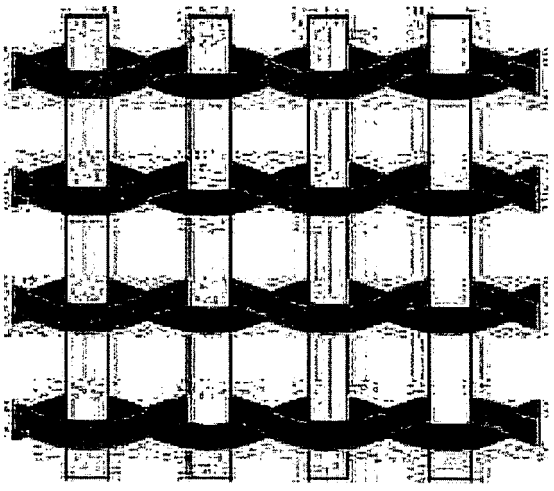
(54) Glass fiber wall covering

(57) The present invention relates to a glass fiber textile fabric which is dimensionally stable and aesthetically pleasing and which finds particular applicability as a fabric for wall coverings. More specifically, the present invention relates to a method for the production of a glass fiber textile using a Leno weaving process.

Figure 2



EP 2 339 054 A1

Description

[0001] The present invention relates to a glass fiber textile fabric which is dimensionally stable and aesthetically pleasing and which finds particular applicability as a fabric for wall coverings. More specifically, the present invention relates to a method for the production of a glass fiber textile using a Leno weaving process.

[0002] Glass fabrics woven with a pattern on a loom are known per se. For example, U.S. Patent No. 6,267,151 describes a method for producing a patterned glass fabric, especially suitable for wallpaper or similar materials having a fabric woven with glass fiber yarns. The glass fiber yarn has a titer between 130 tex and 150 tex, and preferably between 139 tex and 142 tex, which is used for the warp A glass fiber yarn with a titer between 190 tex and 400 tex, and preferably of 215 tex, is used as the filling in the fabric. The yarn is generally processed on a pattern controlled Jacquard loom. It is noted in the specification of U.S. Patent No. 6,267,151 that the processing of glass fibers on Jacquard machines has never been previously successful, but states that by adhering to the specific limiting values of the glass fiber yarns used that patterned glass fabrics can be produced on Jacquard machines.

[0003] Looms, such as Dobby looms, have been used for many decades in order to produce glass fabrics. This is also true for the production of fabrics woven with glass fiber yarns. As examples, EP 1 486 599 B1 and EP 1 441 051 B1 issued to Johns Manville, describe glass fiber woven fabrics comprising texturized warp yarns within certain titer ranges. The inventions offer high strength wall coverings which are aesthetically pleasing.

[0004] However, one of the difficulties with a glass fabric which is woven, and particularly glass fabrics intended for use as wallpaper fabrics, is the importance of aesthetics, as well as dimensionally stability and strength, while being lightweight and easy to handle for the end user. Certainly patterned fabrics can add to the aesthetics of a wall fabric, but problems have arisen in intending to achieve high strength and dimensional stability, as the fabric has generally been a bit heavier.

[0005] The currently existing woven wall coverings have a voluminous structure requiring a rather large amount of binder and paint. There is an increasing demand for more stable weave structures allowing the application of a reduced amount of chemicals, such as binder and paints, during the manufacturing but also as for the end user. This also can improve the fire rating and other secondary properties.

[0006] The dimension stability of the wall coverings produced with standard weaving technologies is rather poor due to the fact of the open structure of the weave or the use of texturized yarns. Good dimensional stability improves the manufacturing speed and increases the manufacturing efficiency. It also will improve the handling for the end-user when applying the wall covering onto the wall.

[0007] Accordingly, it is an object of the present invention to provide an improved glass textile fabric which is aesthetically pleasing, has good strength, but is also lightweight in nature to provide the soft touch and look desired, while requiring less binder and paints in order to reduce overall costs for such glass textile fabric when used as wall covering.

[0008] These and other objects of the present invention will become apparent to the skilled artisan upon a review of the following disclosure and the drawings attached hereto.

[0009] In accordance with the foregoing objectives, the present invention provides a glass fiber textile which is aesthetically pleasing, exhibits good strength, yet is lightweight, thereby providing a soft touch and feel.

[0010] The textile according to the instant invention is prepared using the Leno weaving technology.

[0011] The instant invention relates to a woven glass fiber textile having (i) a glass fiber warp yarn, (ii) a glass fiber weft yarn or yarn in the cross direction, characterized in that at least one of the warp yarn, preferably both warp yarns, having a titer of from
10 to 1200 tex, said weft yarn or yarn in the cross direction having a titer of from
30 to 1200 tex and said woven being a Leno woven.

[0012] A Leno weave means a weave in which the warp yarns are arranged in pairs with one twisted around the other between picks of filling yarn as in marquisette. A Leno weave provides 6 interlacings in a weave repeat whereas a regular plain weave provides only 4 interlacings in a weave repeat. The Leno weave glass fiber textile structures of the present invention provides a firm textile structure in which the warp yarns are arranged in pairs with one twisted around the other. In contrary to standard open weaves the Leno weave offers a woven material which has high strength and provides a stable more closed structure.

[0013] The Leno weaving technology is known for many years and several manufacturer offer Leno-type weaving looms which are principally suitable for the inventive matter. Examples are Groz Beckert's Posileno® which is an add on to the standard loom, or Dornier's Easy-leno® system.

[0014] Preferably, the glass fiber warp yarn has a titer of from 10 to 1200 tex, more preferred 30 or 500 tex, and most preferably 34 tex to 300 tex.

[0015] The warp density of the textile, which can be suitably used as a wall covering, generally ranges from 4 to 40 threads/cm, and is preferably in the range of from about 8 to 24 threads/cm, with about 6 to12 threads/cm being most preferred as the warp density.

[0016] Preferably, the glass fiber weft yarn (or yarn in cross direction) has a titer of 30 to 1200 tex, more preferred 30 to 700 tex, and most preferably 34 tex to 665 tex.

[0017] Preferably, the titer of the glass fiber weft yarn (or yarn in cross direction) is higher than the titer of the glass fiber warp yarn.

[0018] The weft yarn density of the textile ranges pref-

erably from 0.2 to 40 threads/cm, more preferably from 0.2 threads/cm to 6.0 threads/cm.

[0019] In a preferred embodiment the two warp yarns have a different titer. It is preferred that such titer differs at least by 10%. In particular, the titer of the second warp yarn differs at least by 50%.

[0020] In a particular preferred embodiment, one warp yarn having a titer of 1200 tex and the second warp yarn having a titer of 34 tex, while the weft yarn used having a titer in the range from 30 to 1200 tex.

[0021] The glass fiber textiles of the present invention, employing the warp yarns and weft yarns described above, are prepared on a Leno loom. As explained above, such Leno looms are well-known in the textile industry, and are used in some textile applications because of their firmness and strength.

[0022] In the course of the instant invention, it has been found that glass fiber textiles can in fact be woven on a Leno weaving system using the warp yarns and weft yarns in combination as described above to provide a beautifully woven, high strength glass fiber textile, perfectly suitable for wall coverings.

[0023] The glass yarns used as the warp yarn and weft yarn, independently of each other, can be comprised of sliver, super sliver, continuous yarn, roving, or texturized yarn, as long as the particular warp and weft titer are met.

[0024] Sliver, which can be characterized as a staple fiber strand or a discontinuous fiber yarn, is well-known, and is described, for example, in Fiber Glass, by J. Gilbert Mohr and William P. Rowe, 1978, van Nostrand Rinehold Company, which is hereby incorporated by reference in its entirety. The production of sliver using the so called "drum attenuation" method is also described and referenced in U.S. Patent No. 4,863,502, which is also hereby incorporated by reference in its entirety.

[0025] The glass types used in the manufacture of the glass fiber yarns are not limited. However, preferred glass types are C-glass and/or E-glass. Such chemical glass or electronic glass compositions are well-known in the industry.

[0026] The Leno woven glass fiber textile of the present invention is aesthetically pleasing to the sight and touch, and is thereby suitable as wall coverings.

[0027] The Leno woven glass fiber textile of the present invention preferably has a weight per unit area ranging from 25g/m^2 to 500g/m^2, most preferably from 90g/m^2 to 300g/m^2 with binder

[0028] The Leno woven glass fiber textile of the present invention has a good dimension stability compared to other woven glass fiber textiles in wall coverings.

[0029] The Leno woven glass fiber textile of the present invention may contain further synthetic resin yarns mixed in or with the glass fiber yarns, especially for the weft, which has been found to allow functionalities, e.g. providing additional color to the textile. Such synthetic resin fibers are well-known, and include melt-spinning resins.

[0030] Suitable polymer materials are, e.g., polyamides such as, e.g., polyhexamethylene diadipamide, polycaprolactam, aromatic or partially aromatic polyamides ("aramids"), aliphatic polyamides such as, e.g., nylon, partially aromatic or fully aromatic polyesters, such polyethylene terephthalate (PET), polyphenylene sulfide (PPS), polymers with ether and keto groups such as, e.g., polyetherketones (PEK) and polyetheretherketone (PEEK), polyolefins such as, e.g., polyethylene or polypropylene, cellulose or polybenzimidazoles. In addition to the previously cited synthetic polymers, even those polymers are suited that are spun from solution. Most preferred resins are polyesters.

[0031] The synthetic resin fibers can be dyed, e.g. by organic or inorganic pigments, to impart the color desired.

[0032] The synthetic resin yarns mixed in or with the glass fiber yarns are customizing the instant woven glass fiber textile for even more demanding environmental. Synthetic resin yarns based on polypropylene (PP) and/or polyamide (PA) are used for its hard wearing , polyethylene terephthalate (PET) helps with fabric structure and aseptic, polyurethane (PU) are used for its elastic properties. All this could help form different woven structures. The amounts of those synthetic resin fibers range from 5% to 50% (by weight). The titer of those synthetic resin fibers range from 10 tex to 700 tex, preferably from 30 tex to 600 tex. The aforementioned fibers can also be intermingled with the instant glass fibers.

[0033] It may be also desired to incorporate certain additional functions into the woven structure, such as electrical conductivity. Electrical conductivity can be achieved by adding electrical conductive fibers, such as carbon fibers or metal fibers to the woven structure or during the formation of the woven structure. In such cases, mixing conductive carbon fibers or metal fibers in with the glass fiber yarns, or substituting some of the glass fiber yarns by carbon or metal fibers can provide electrical conductivity within the fabric. The fibers providing the additional functions can also be intermingled with the instant glass fibers.

[0034] The yarn density of those fibers providing the additional functions ranges from 30 tex to 1200 tex, preferably from 30 to 700 tex, most preferably from 30 to 665 tex. The aforementioned yarn densities apply in particular for those based on Carbon. The wire range, in particular for metal fibers, ranges from 0.1 to 0.7mm.

[0035] The Leno woven glass fiber textile of the present invention can comprise several different warp yarn materials and/or weft yarn materials which can be accomplished by using two beams with different warp yarns.

[0036] In a particular preferred embodiment of the present invention one warp yarn having a titer of 1200 tex and the second warp yarn having a titer of 10 tex, said second warp yarn selected from glass, polymer, metal, carbon or mixtures thereof.

[0037] Once the Leno woven glass fiber textile of the present invention has been woven on the Leno system, the textile can be used as is, or is preferably coated/

impregnated in conventional fashion to provide the final characteristics of the wall covering product.

[0038] Inter alia, chemical treatments of glass fabrics are known to finalize/adjust such characteristics as strength, volume, stability and opacity of the final textile product.

[0039] Any such chemical treatments can be employed with regard to the glass fiber textile of the present invention.

[0040] The Leno woven glass fiber textile of the present invention requires less binder and/or coating material when used as wall covering, due to its unique textile structure of the Leno weave. Compared to state of the art woven glass fiber textiles at least 5% less binder and/or coating material are required.

[0041] The Leno woven glass fiber textile of the present invention, in a preferred embodiment, is impregnated with a chemical formulation comprised of a starch based binder, a synthetic polymeric based binder, or a wet enhancer/cross linker.

[0042] The starch binder is preferably a natural starch, such as potato starch, but also can be any suitable starch derived from other types of plant or crop materials, e.g., corn, tapioca, and pea starch

The polymeric binder employed is preferably characterized by a low glass transition temperature (Tg). Such synthetic binders can be based on vinyl acetate, and can be latex binders.

The wet enhancer or cross linker can be either an organic or inorganic material which enhances the wet properties of the final textile product.

Use of a cross linker as well, generally an inorganic cross linker such as ammonium zirconium carbonate, can improve the effect that the starch binder/polymeric binder has on the overall textile product by stabilizing the chemical mixture upon application.

[0043] The chemical formulation used to impregnate or coat the Leno woven glass fiber textile of the present invention is preferably water-based, and will in general have a dry substance percentage of between 5 and 40 weight percent and preferably between 10 and 20 weight percent in the chemical bath.

[0044] Pigments, either white or colored pigments, can also be added or used to create color fabrics.

[0045] A typical chemical formulation, calculated on a dry basis, is comprised of from 20 to 60 weight percent starch binder, from 30 to 60 weight percent polymeric binder, from 0 to 20 weight percent of the wet enhancer/cross linker, and from 0 to 20 weight percent of other components such as pigments.

[0046] The chemical formulation used to impregnate or coat the Leno woven glass fiber textile of the present invention may contain further additives and functional material, such as flameproofing agents, materials for controlling electrostatic charges, organic or inorganic pigments, especially colored pigments, electrically conductive pigments, insulation particles, especially for thermal and/or sound insulation, anti bacterial, self-adhesive, magnetic, heat-conductor, and optical.

[0047] The amount of binder applied to the Leno woven glass fiber textile of the present invention preferably is from 5g/m^2 to 200g/m^2, most preferably from 10g/m^2 to 70g/m^2 (amounts are without any additives etc).

[0048] The chemical formulation is applied to the textile by use of any appropriate impregnation or coating technique. Such techniques which are preferred include a rotary printing or a padding technique. Following the impregnation, the fabric may be conveyed to a drying means, which can be steam heated cylinders, air dryers, or any other suitable drying means which would not adversely impact the final textile material.

[0049] Such wall covering, according to the instant invention, can be either pre-glued or not, depending on the latter use. Pre-glued wall coverings as such are known per se from EP1162 306B1, for example. However, a pre-glued wall covering employing the Leno woven glass fiber textile of the present invention is not yet known.

[0050] Such wall covering, according to the instant invention, can be either strippable or not, depending on the latter use. Strippable coverings as such are known per se from EP1143064B1, for example. However, a strippable wall covering employing the Leno woven glass fiber textile of the present invention is not yet known. Due to the improved strength of the Leno woven glass fiber textile of the present invention such strippable wall covering are improved, in particular in handling.

[0051] Such wall covering, according to the instant invention, can be either strippable or not and pre-glued or not, depending on the latter use. Strippable and pre-glued coverings as such are known per se from EP1262591, for example. However, a strippable and pre-glued wall covering employing the Leno woven glass fiber textile of the present invention is not yet known. Due to the improved strength of the Leno woven glass fiber textile of the present invention such strippable and pre-glued wall covering are improved, in particular in handling.

[0052] The Leno woven glass fiber textile of the present invention used for the wall covering provides a more stable, in particular dimension stable, textile and wall covering. This allows the decorator more movement in the fabric/wall covering for adjustments when working around difficult surfaces, such as edges and corners.

[0053] It is also possible to combine the Leno woven glass fiber textile of the present invention in wall covering with standard, non-Leno woven glass fiber textiles, e.g. to have areas of higher and lower dimension stability, to obtain unique aesthetics

[0054] For among other factors, it has also been found that when a sliver is used in the weft direction a strong, yet lightweight product having excellent aesthetics is achieved.

Figure 1 depicts a scheme of a standard weave structure.

Figure 2 depicts a scheme of a standard leno weave

structure manufactured by Leno weaving technology.

[0055] Having described preferred embodiments of the invention, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.

Claims

1. Woven glass fiber textile having (i) a glass fiber warp yarn, (ii) a glass fiber weft yarn or yarn in the cross direction, **characterized in that** at least one of the warp yarn, preferably both warp yarns, having a titer of from 10 to 1200 tex, said weft yarn or yarn in the cross direction having a titer of from 30 to 1200 tex and said woven being a Leno woven.

2. Woven glass fiber textile as claimed in claim 1, wherein the glass fiber warp yarn has a titer of from 10 to 1200 tex, preferably from 30 or 75 tex, most preferably from 34 tex to 70 tex.

3. Woven glass fiber textile as claimed in claim 1, wherein the warp density of the textile ranges from 4 to 40 threads/cm, preferably from about 8 to 24 threads/cm, most preferably about 6 to 12 threads/cm.

4. Woven glass fiber textile as claimed in claim 1, wherein the glass fiber weft yarn (or yarn in cross direction) has a titer of 30 to 1200 tex, preferably 30 to 700 tex, and most preferably 34 tex to 665 tex.

5. Woven glass fiber textile as claimed in claim 1, wherein the weft yarn density of the textile ranges from 0.2 to 40 threads/cm., preferably from 0.2 threads/cm. to 6.0 threads/cm.

6. Woven glass fiber textile as claimed in claim 1, wherein the titer of the glass fiber weft yarn (or yarn in cross direction) is higher than the titer of the glass fiber warp yarn.

7. Woven glass fiber textile as claimed in claim 1, wherein the two warp yarns have a different titer, preferably such titer differs at least by 10%, most preferably at least by 50%.

8. Woven glass fiber textile as claimed in claim 1, wherein the glass yarns used as the warp yarn and weft yarn, independently of each other, comprise sliver, super sliver, continuous yarn, roving, or texturized yarn.

9. Woven glass fiber textile as claimed in claim 1, wherein the weight per unit area ranges from 25g/m^2 to 500g/m^2, preferably from 90g/m^2 to 300g/m^2 (with binder).

10. Woven glass fiber textile as claimed in claim 1, wherein the woven is coated/impregnated, preferably with a chemical formulation comprised of a starch based binder, a synthetic polymeric based binder, or a wet enhancer/cross linker, which may comprise further additives and functional material, in particular flameproofing agents, materials for controlling electrostatic charges, organic or inorganic pigments, especially colored pigments, electrically conductive pigments, insulation particles, especially for thermal and/or sound insulation, or fillers. anti bacterial, self-adhesive, magnetic, heat-conductor, and optical.

11. Woven glass fiber textile as claimed in claim 11, wherein the amount of binder applied to the woven is from 5 g/m^2 to 200 g/m^2, preferably from 10 g/m^2 to 70 g/m^2 (without any additives).

12. Woven glass fiber textile as claimed in claim 1, wherein the woven glass fiber textile contains further synthetic resin yarns/fibers mixed in or with the glass fiber yarns, especially for the weft.

13. Woven glass fiber textile as claimed in claim 1, wherein the woven glass fiber textile contains further electrical conductive fibers, preferably carbon fibers or metal fibers, mixed in or with the glass fiber yarns, especially for the weft.

14. Woven glass fiber textile as claimed in claim 1, wherein the woven glass fiber textile comprises several different warp yarn materials and/or weft yarn materials.

15. Wall covering comprising the Leno woven glass fiber textile as claimed in one or more of claims 1 to 14.

Figure 1

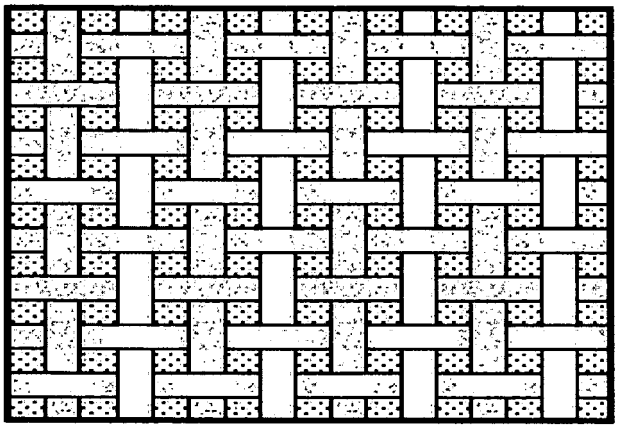
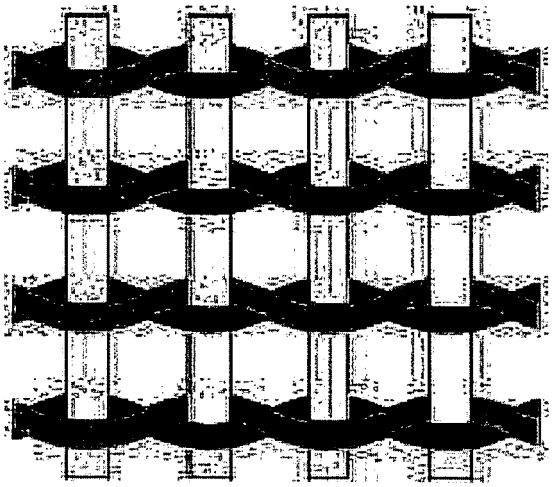


Figure 2



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EUROPEAN SEARCH REPORT

Application Number
EP 10 01 5797

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 346 826 A2 (KOLZER KLAUS KURT KOELZER KLAUS KURT [DE]) 20 December 1989 (1989-12-20) * column 7, line 19 - column 9, line 22; claims 1,4,9; figures 1,2 * -----	1-8, 10-14	INV. D03D15/00 D03D19/00 B32B27/00
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X	WO 97/29230 A1 (GIVIDI ITALIA SPA [IT]; SCARI DIEGO [IT]; SCARI MARCO [IT]) 14 August 1997 (1997-08-14) * page 5, line 4 - page 6, line 15; claim 1; figures 1,2 * -----	1,2,4,5, 8,10	
X	WO 98/06570 A1 (TENSAR CORP [US]; STEVENSON PETER EDWARD [US]; BRUNER JEFFREY W [US]) 19 February 1998 (1998-02-19) * page 17, line 26 - page 18, line 3; claims 1-6,19,20; figure 3 * -----	1,2,4,8	TECHNICAL FIELDS SEARCHED (IPC) D03D B32B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 March 2011	Iamandi, Daniela

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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