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(54) Strippable pre-glued wall covering

(57) A process for forming an improved pre-glued strippable fiber glass wall-covering and a wall-covering is described which is obtained by a process comprising providing a fiber glass fabric, forming a first dried coating on both sides of said glass fabric that are applied from an aqueous dispersion comprising starch, and a polymeric latex binder, next forming a second dried coating on said first dried coating on one side only of said glass fabric that is applied from a chemical dispersion comprising paraffin and rheology modifiers with said second dried coating being capable to enable the removal of the wall covering from the wall, and next forming a third dried coating on said second dried coating of said glass fabric that is applied from an aqueous dispersion comprising starch in the absence of a polymeric latex binder with said third dried coating being capable of serving as an adhesive for the attachment of the resulting wall covering to the wall when wetted.

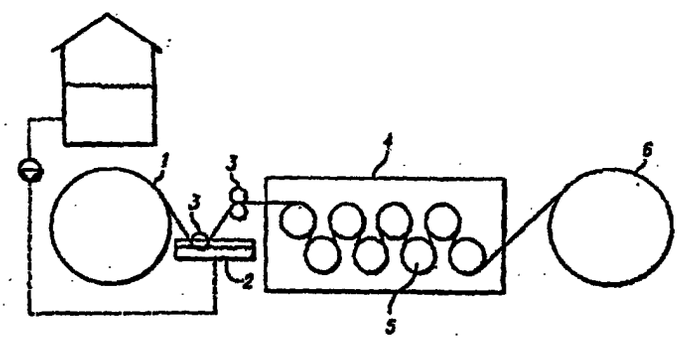

FIG. 1

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Description

Background

[0001] The benefits of using fiber glass wall covering are well known. Fiberglass wall coverings offer an unique fire resistance, easy and uncomplicated handling and flexibility in use. They exhibit good abrasion resistance and appearance following 10 painting. On the other hand fiberglass wall coverings of the prior art requires the use of special glues or adhesives with strong binding forces and require cost-intensive and time consuming painting procedures. In addition, fiberglass wall coverings cannot be removed or repainted without cost-intensive and time consuming procedures.

[0002] Typically, when covering a wall with a glass fabric, the wall as well as the fabric must be treated with a special glue or adhesive. The commonly used wet adhesive is primarily based on a starch-solution and which always contains some latex binder, and must be rolled out or sprayed onto the wall and onto the fabric. After drying, the wallcovering must be painted twice. Between the first and the second painting step the wall and the wall-covering must be dried. The paints most commonly used are standard interior wall paints, i.e. various types of latex paints.

[0003] In order to enable easy handling and use of such wall-coverings, the woven glass fabric is often impregnated with a water-based formulation which contains mainly starch, binder and inorganic cross-linker. The finished wall-covering typically contains up to 25 weight percent of such chemicals.

[0004] When re-decorating a wall, the surface structure of the glass wall covering must be filled out with a filler and sanded at least twice to get a smooth surface. This method requires filler materials, equipment and skills and results in a dusty working area.

[0005] A method to remove used glass wall coverings from the wall is by using chemicals. These chemicals penetrate the paint and dissolve the glue. After that treatment the glass fiber weave can be stripped off the wall. This method is also available using special glue/paint system to make the stripping process easier. Both methods require chemicals, which are normally irritant to the skin, and which creates a wet and messy environment.

[0006] In the past, many attempts have been made to avoid the disadvantages of standard glass weave adhesives used with glass fabrics and to reduce the complexity and time consuming procedures encountered by the end-user. W098 14 655 describes glass fiber wall coverings which employ a thermoplastic adhesive. Thermoplastic adhesive require a special temperature treatment which necessitates even additional equipment. The process by necessity is complicated and time consuming.

[0007] The necessary high temperature treatment can be avoided when using self-adhesive layers as the backing layer. DE 198 11 152 describes painted or printed glass wall coverings with an self-sticking backing. Such systems, however, cannot be removed from the wall without the use of chemicals.

[0008] EP 0 909 850 describes a finished wall covering with a multicolor print and a self adhesive backing. However, self-adhesive wall coverings are relatively expensive because they require additional production steps, e.g. the covering of the adhesive layer prior to use. In addition, the handling of such wall coverings when applied to the wall is completely different than standard application procedures.

[0009] All such non-standard systems, mentioned above, require special materials and equipment. The handling differs from standard papering procedures. For paper wall coverings a starch-based adhesive in the absence of a latex binder is most commonly used. Such starch-based adhesives can be dried and re-wetted again without a significant change in the gluing capabilities. The handling is easy and a special treatment in addition to rolling or spraying the paper and the wall with a paper glue is not necessary.

[0010] It is much desired in the art to provide an improved glass fabric wall covering that keeps the good aspects of glass fabric wall coverings, i.e. fire resistance, easy handling, flexibility, good appearance and good abrasion resistance, and which can be applied to the wall and removed from the wall using less complicated and time consuming procedures

Summary of the invention

[0011] It is accordingly an object of the present invention to provide a pre-glued fiberglass wall covering which can be handled more easily when, covering wall, which reduces the necessary processing steps for the end-user, and which can be easily removed from the substrate without requiring any special treatment by the end-user or any special gluing or painting materials. The glass weave has the same properties as standard glass fiber wall coverings, in particular, excellent fire resistance

[0012] It is another object of the present invention to provide a process for the manufacture of an improved glass fiber pre-glued and strippable fiberglass wall covering.

[0013] It is yet another object of the present invention to provide a chemical formulation for the separation layer of the pre-glued strippable fiberglass wall covering. According to a preferred embodiment of the present invention, a glass fiber fabric is produced by a process comprising the steps of providing a fiberglass fabric, applying a first aqueous dispersion onto both sides of the fabric, applying a second chemical dispersion on the back side only of the fabric to

create a thin dried layer which acts as a separation layer when the wall covering is being detached from the wall, and applying a third chemical dispersion onto the separation layer at the back side of the fabric to create a thin dried layer which acts as the adhesive layer when the wall covering is wetted for attachment to the wall.

[0014] While the preferred embodiment of the present invention utilizes fiberglass fabrics in woven rolled form, other fiberglass fabrics such as a nonwoven mat may be used.

[0015] Other objects, features and attendant advantages of the present invention will become apparent to those skilled in the art from reading the following detailed description of the preferred embodiments, together with the accompanying drawings.

[0016] Furthermore objects of the invention are the teachings of the claims 1 - 22.

Brief Description of the drawings

[0017]

Figure 1 depicts the preferred process and apparatus arrangement for applying the first coating on a continuous basis to both sides of the glass fabric.

Figure 2 depicts the preferred process and apparatus arrangement for applying the second or third coating on a continuous basis to one sides only of the glass fabric.

Detailed Description of the Invention

[0018] Figure 1 depicts a process for applying a customary coating to a glass fabric from an aqueous dispersion. Preferably, the glass fabric is a woven product that incorporates fiber glass yarn. The weave is typically a simple pattern of up to eight shafts. The weave is produced, for example, on Dornier weaving machines, Rapiers or Air-Jets, in typically two or three meter widths for collecting on roll beams of typically 1,500-6,000 meters of untreated woven fiberglass fabric. Many fiberglass yarns may be selected for use when producing the woven materials for use in the present invention. Preferred yarns include, for the warp direction continuous C-glass or E-glass of 9 - 10 microns, and 139 - 142 with approximately 315 - 340 ends per meter. An alternative warp yarn is continuous C-glass or E-glass of 6 - 9 micron, 34 - 68 tex with 680 ends per meter. For the weft direction, a preferred glass is discontinuous spun E-glass or C-glass, 8 - 11 micron, 165 - 550 tex with about 170 - 600 ends per meter. An alternative weft yarn includes continuous volumized E-glass or C-glass of 8 - 11 microns. 165 - 550 tex with about 170 - 600 ends per meter.

[0019] The present invention is also applicable to nonwoven glass fabrics, such as mat products. These can be produced, for example, by conventional wet-laid processes such as those described in U.S. Patent Nos. 4,112,174; 4,681,802 and 4,810,576, the disclosures of which are incorporated herein by reference.

[0020] In the process of the present invention, the glass fabric 1, preferred in roll form, is fed to a first impregnation bath 2, typically with the aid through rollers 3 and conventional conveyance means so as to contact on both surfaces a bath of the chemical dispersion. Alternatively, for example, a transfer or pick up roll may convey the first chemical dispersion to the glass fabric surfaces. A preferred first chemical dispersion includes the components identified in Table 1 below where concentration are provided on a weight basis.

[0021] Alternatively to the use of rollers 3, double side rotary screens may be used to apply the chemicals to the glass fabric 1. The chemical dispersion is then supplied to the interior of the two rotating screens and applied to the glass fabric by contact with the rotating screens.

Table 1

Starch binder	10-70% of dry substance
Latex binder	20-80% of dry substance
Inorganic cross-linker	0-15% of dry substance
Pigments	10-30% of dry substance

[0022] Commercially available starch binders or CMCs (carboxy-methyl cellulose) can be used. Starch binder derived from potatoes are preferred, but also corn can be used as a starch source. The polymeric latex binders are preferably copolymers of vinyl acetate and acrylics, e.g., ethylvinyl acetate and styrene acrylics. However, polyvinyl acetate (PVAs) or other polymeric latex binders can also be used.

[0023] Cross-linkers are agents that are reactive towards certain functional groups located primarily on the polymeric latex binder. Cross-linkers preferably are used in a concentration of 3 to 12 percent on a dry basis to improve important characteristics such as film formation, hydrophobicity, wet strength, etc. These reactive agents can be either organic

or inorganic types, e.g., be based on zirconium, urea/formaldehyde or glyoxal derivatives. Zirconium cross-linking agents are preferred.

[0024] The preferred formulation is the most cost effective and technically functional.

[0025] The mixture is preferably water based, and has a dry substance percentage of between 5 and 20 weight percent, preferably between 10 and 12 weight percent in the chemical dispersion. Besides white pigments colored pigments can also be added or used to create colored fabrics as well.

[0026] Following the impregnation, the fabric may be conveyed to a drying means 4, which in the preferred embodiment of Figure 1 utilizes steam heated cylinders 5. After drying the fabric can be cut into desired width, and collected for subsequent secondary treatment. A fabric length of approximately 1,000 and 6,000 meters of treated fabric can be collected into rolls at a batching stand 6 between. Alternatively, the subsequent application steps can be carried out on a continuous basis.

[0027] This first impregnation step adds additional volume and opacity to the glass fabric. This leads to a pre-painted fabric which requires only one single painting step by the end-user. The time consuming second paint which is usually necessary for glass fabrics can be omitted.

[0028] In Figure 2, a preferred method of applying the separation layer to one side only of the fabric is shown. A rotating screen 11, such as available from Stork, may be used to apply the chemicals to the glass fabric 12. The chemical dispersion 14 is supplied to the interior of the rotating screen 11. The dispersion is applied to the glass fabric by contact with the rotating screen. The chemicals can also be applied by a transfer or pick-up roller without any drawbacks.

[0029] A preferred chemical dispersion mixture consists of those components set out in Table 2 below.

Table 2

Paraffin dispersion 80-99%	of dry substance
Rheology modifier	1-20% of dry substance

[0030] Preferably, the paraffin dispersion is free of metal salts. Alternatives to the Paraffin dispersion include stearates, specifically calcium silicate, sodium stearate, zinc stearate, ammonium stearate, fluoro carbons and other hydrophobical agents, i.e. chemicals with a water repellant effect. The paraffin dispersion preferably contains ethylene paraffin wax with molecule chain lengths of C 20-34. The aqueous dispersion typically contains up to 40% paraffin and includes some commonly used dispergating and stabilizing agents. A rheology modifier (thickener) may be used to stabilize and to enhance the processability of the paraffin wax dispersion resulting in a separation layer on one side of the glass fabric. Rheology modifiers can be selected from the known groups of acrylic thickeners, poly-urethane thickeners or cellulose thickeners.

[0031] Typically, 10 - 60g of the dispersion per square meter is sufficient to obtain an optimum adhesion strength combined with moderate tear forces. The wanted tear force can be adjusted by the amount of the applied dispersion. It also depends on the type and structure of the used fabrics. The optimum adhesion strength is necessary to obtain the same wear resistance and the same fire resistance as standard glass fiber wall covering.

[0032] Following the application of the dispersions to the fabric surface, the fabric may be conveyed to a drying means, which in the preferred embodiment of Figure 2 is depicted as air dryers 16. Alternatively heated cylinders can be used without any drawbacks. After drying the fabric can be cut collected for subsequent secondary treatment. Alternatively, the subsequent application step can be carried out on a continuous basis.

[0033] After the application of the second chemical dispersion which leads to a separation layer at the back side of the wall covering a third chemical treatment follows. This can be done as an "online" process in a continuous manner. It can, however, also be carried out as a separate process. Referring also to Figure 2, a preferred method of applying the third gluing layer to the fabric is shown. Such application to one side only is on top of the previously applied first and second layer. A rotating screen 11, such as available from Stork, may be used to apply the chemicals to the glass fabric 12. The chemical dispersion 14 is supplied to the interior of the rotating screen. The dispersion is applied to the glass fabric by contact with the rotating screen. The chemicals can also be applied by pick-up roller without any drawbacks.

[0034] A preferred chemical dispersion mixture consists of those components set out in Table 3 below.

Table 3

Starch	70-100% of dry substance
Inorganic compounds	0-25 % of dry substance
Color additives	0-5 % of dry substance

[0035] The starch component that is present may be derived from any source that gives a good tack in gelatinized wetted form. For instance, potato, corn, wheat starches or the combination thereof may be utilized. A combination potato starch and corn starch is most preferred.

[0036] Inorganic compounds (e.g., in a concentration of 5 to 15% of dry substance) may be added to improve the functionality and appearance of the chemical treatment and the resulting product, e.g., opacity and water absorbability. An example of a compound to improve the latter is sodium nitrate, or other hygroscopic Compounds. Opacity can be obtained from a variety of fillers and pigments, preferably based on dioxide, aluminum hydroxide, calcium carbonate, and other inorganic salts.

[0037] Typically, 10 - 50 g of the adhesive of Table 3 per square meter is sufficient to obtain an optimum adhesion strength. The necessary amount of adhesive depends on the type and texture of the used fabrics. The optimum adhesion strength is necessary to obtain the same performance as standard glass fiber wall covering.

[0038] Following the third application of the chemical dispersions to the fabric surface, the fabric may be conveyed to a drying means, which in the preferred embodiment of Figure 2 is depicted as air dryers 16. Alternatively heated cylinders can be used without any drawbacks.

[0039] After drying, the fabric is commonly cut into desired width, and collected for subsequent secondary treatment, for example, into rolls at a batching stand 18 of between 1,000 and 6,000 meters of treated weave.

[0040] This third chemical treatment is a one-side coating with the dried gluing material which is placed on top of the first and second layer. It leads to an adhesive layer which faces the wall. A colored additive enables the end-user to distinguish between the front side and the pre-glued back side of the wall covering

[0041] The suggested adhesive layer does not contain any latex components. Instead it is formulated from two different starches types, originating from different crops. The usage of these two starches allows the combination of an excellent tack with a very good film formation. Using this formulation the resulting adhesive force between the wall and the wall covering is superior to that of the normal wall covering system. This renders redundant the use of standard polymeric latex binder.

[0042] For the product of the present invention to work satisfactory it is important that the starch formulation mentioned in the paragraph above quickly absorbs the water applied to the surface. In order to achieve this a small additional quantity of inorganic compound is recommended. The functioning of this compound results in a pre-activating of the starch formulation, i.e. making the starch more quickly accessible for the water.

[0043] The product of the novel process described above is typically supplied to an end user in roll form having a length of approximately 50 meters for application to a wall of other interior structures. After cutting the layers to the desired length only water must be sprayed or otherwise applied onto the pre-glued fiberglass wall-covering of the present invention. Dipping the fabric in a water bath is not necessary and even not recommended. When exposed to water the adhesive layer swells rapidly and becomes sticky. Only water is needed when attaching the fabric to the wall which offers a significant advantage for the end-user. The wetted fabric can be attached to the wall within minutes and the opposite surface can be painted immediately afterwards. A separate drying step is not necessary. All types of paints which can be used for standard fiberglass wall coverings can be applied to the novel product. Only one painting steps is necessary to achieve the desired result leading to significant time and cost savings. The product has the same fire resistance rating as standard fiber glass weaves and exhibit a superior adhesion to the wall.

[0044] The wall covering can be easily removed from the wall. The novel product can be simply lifted off the wall a few centimeters at the highest or lowest point by using a knife or similar tool and then pulled by hand from the wall.

Example

[0045] A glass woven fabric consisting of 139 tex texturized warp yarns with 34 yarns/10cm and 165 tex texturized glass staple fiber yarns with 190 yarns per meter is produced and is coated and impregnated on both sides with a aqueous chemical dispersion comprising 25 of a potato starch, 47% of acrylic latex binder, 6% of zirconium cross linker, and 22% of a white titanium oxide pigment on a dry basis. After drying to form a first dried coating a second chemical dispersion is applied to one side using rotary screens. The second dispersion contains, based on dry substance, 95% paraffin wax and 5% of a rheology modifier. After drying to form the second layer a third chemical dispersion is applied on top of the second layer. The dispersion contains 60% potato starch, 30% corn starch, 7% sodium nitrate, and 3% of a colorant on dry basis. The third dispersion next is dried to form the third coating that is capable of serving as an adhesive for the attachment of the resulting wall covering following the simple application of water by spraying to the third dried coating. All concentrations are expressed on a dry weight basis.

[0046] Although the invention has been described with a preferred embodiment, it is to be understood that variations and modifications may be resorted to as will be apparent to those skilled in the art. Such variations and modifications are to be considered within the purview and scope of the claims appended hereto.

Claims

1. A process for forming an improved pre-glued strippable fiber glass wall-covering comprising

   * providing a fiber glass fabric,
   * forming a first dried coating on both sides of said glass fabric that are applied from an aqueous dispersion comprising starch, and a polymeric latex binder,
   * next forming a second dried coating on said first dried coating on one side only of said glass fabric that is applied from a chemical dispersion comprising paraffin and rheology modifiers with said second dried coating being capable to enable the removal of the wall covering from the wall, and
   * next forming a third dried coating on said second dried coating of said glass fabric that is applied from an aqueous dispersion comprising starch in the absence of a polymeric latex binder with said third dried coating being capable of serving as an adhesive for the attachment of the resulting wall covering to the wall when wetted.

2. A process according to claim 1 whereas said fiber glass fabric is a woven fabric.

3. A process according to claim 1 whereas the fiber glass fabric is a nonwoven.

4. A process according to claim 1 whereas the fiber glass fabric is in rolled form.

5. A process according to 1 whereas said starch component of the first coating is potato starch.

6. A process according to 1 whereas said polymeric latex binder component of the first coating is an acrylic latex binder.

7. A process according to 1 whereas said aqueous dispersion of the first coating includes a cross-linking agent.

8. A process according to 7 whereas said cross-linking agent of the first coating is a zirconium cross linker.

9. A process according to 1 whereas said aqueous dispersion of the first coating additionally includes a pigment.

10. A process according to 9 whereas said pigment of the first coating is titanium dioxide.

11. The process of claim 1 whereas the dispersion of the second coating comprises a mixture of paraffin and rheology modifiers.

12. The process of claim 1 wherein the dispersion of the second coating comprises 80-99% paraffin and 1-20% rheology modifiers of dry substance.

13. The process of claim 1 wherein the third chemical dispersion comprises starch.

14. The process of claim 13 wherein said starch component of the third coating is a mixture of potato starch and corn starch.

15. The process of claim 1 wherein the said aqueous dispersion of the third coating includes an inorganic compound that serves to enhance the water absorbability of said third dried coating.

16. The process of claim 15 wherein the said inorganic compound is sodium nitrate.

17. The process of claim 1 wherein the said aqueous dispersion of the third coating does not include any latex binder.

18. A process according to 1 whereas the aqueous dispersion of the first and second coating is applied in a continuous process with drying being conducted immediately following contact with the dispersions.

19. A process according to 1 whereas the aqueous dispersion of the first, second and third coating are applied in a continuous process.

20. A wall covering formed by the process of claim 1 which can be readily attached to the wall following the simple application of water by spraying to said third dried coating.

21. A wall covering formed by the process of claim 1 which can be easily removed from the wall.

22. A glass fiber rolled good formed by a process of claim 1 comprising a fiber glass fabric impregnated and coated with a first died coating, having applied thereon two additional layers to one of the surfaces of the fabric, whereby the first applied additional layer acts as separation layer when removing the fabric from a substrate, and the second applied additional layer acts as a pre-glued layer when being wetted and attached to a substrate.

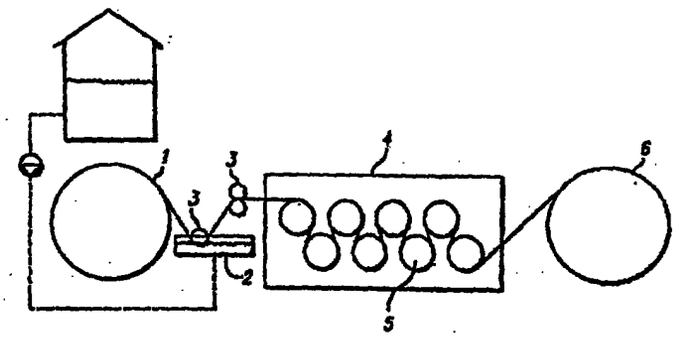

FIG. 1

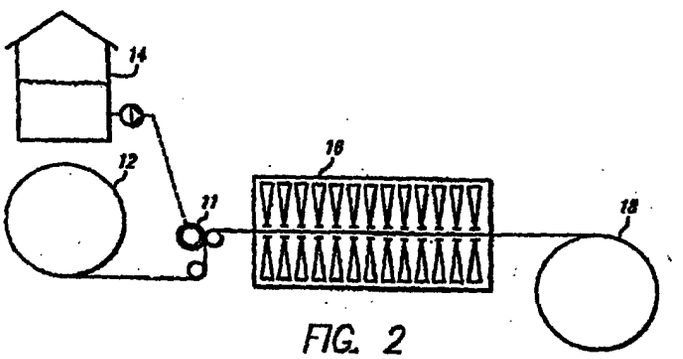

FIG. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 11 3463

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D06N
C09J
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 November 2001	Pamies Olle, S

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