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(54) **METHOD FOR FABRICATING GLASS FIBER-BASED STRUCTURE**

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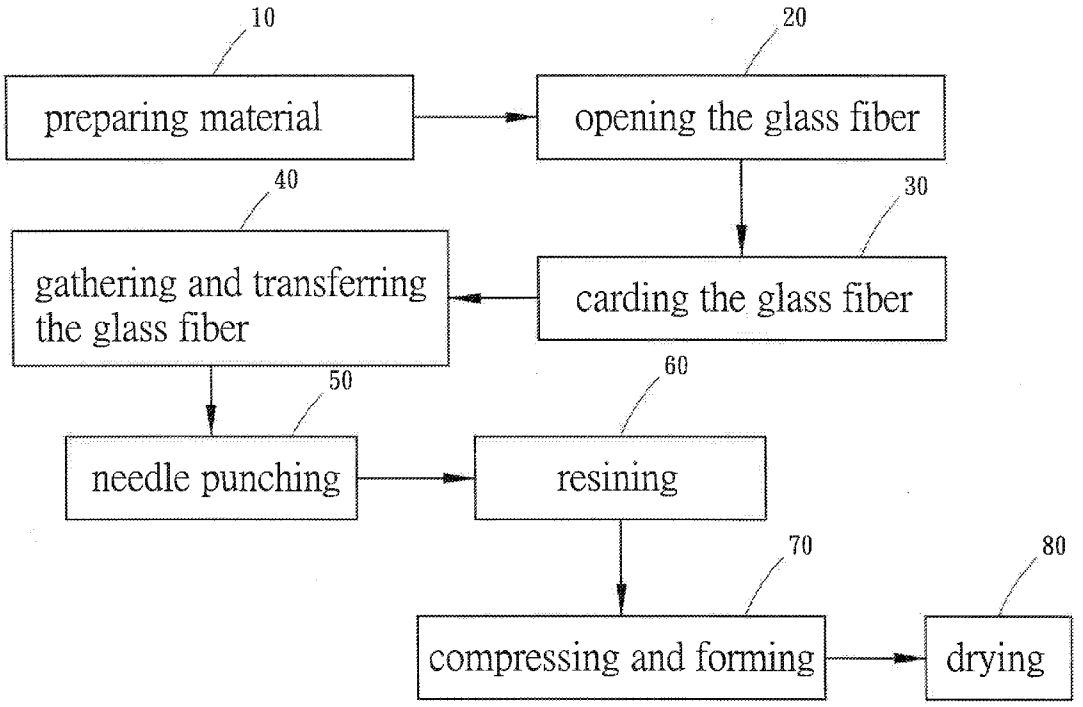
(57) **ABSTRACT**

A method for fabricating a glass fiber-based structure comprises steps: using glass fiber as material; using a fiber opening machine to disperse the glass fiber to make them loose; using a carding machine to card the dispersed glass fiber to make them finer and more even; using a fiber gathering machine to gather the carded glass fiber at a specified thickness and width; using a needle punching machine to punch the gathered glass fiber to fabricate the glass fiber into a glass-fiber felt; applying a resin to the glass-fiber felt to form a resined layer; compressing the resined glass-fiber felt to compact the glass-fiber felt in a fixed shape; and drying the fixed glass-fiber felt in a dryer to form a glass fiber-based structure, which is light but has a great thickness and a low density, and is sound-absorbing, sound-insulating, heat-resistant, heat-insulating, heat-preserving, cold-preserving, fireproof, and electricity-insulating.



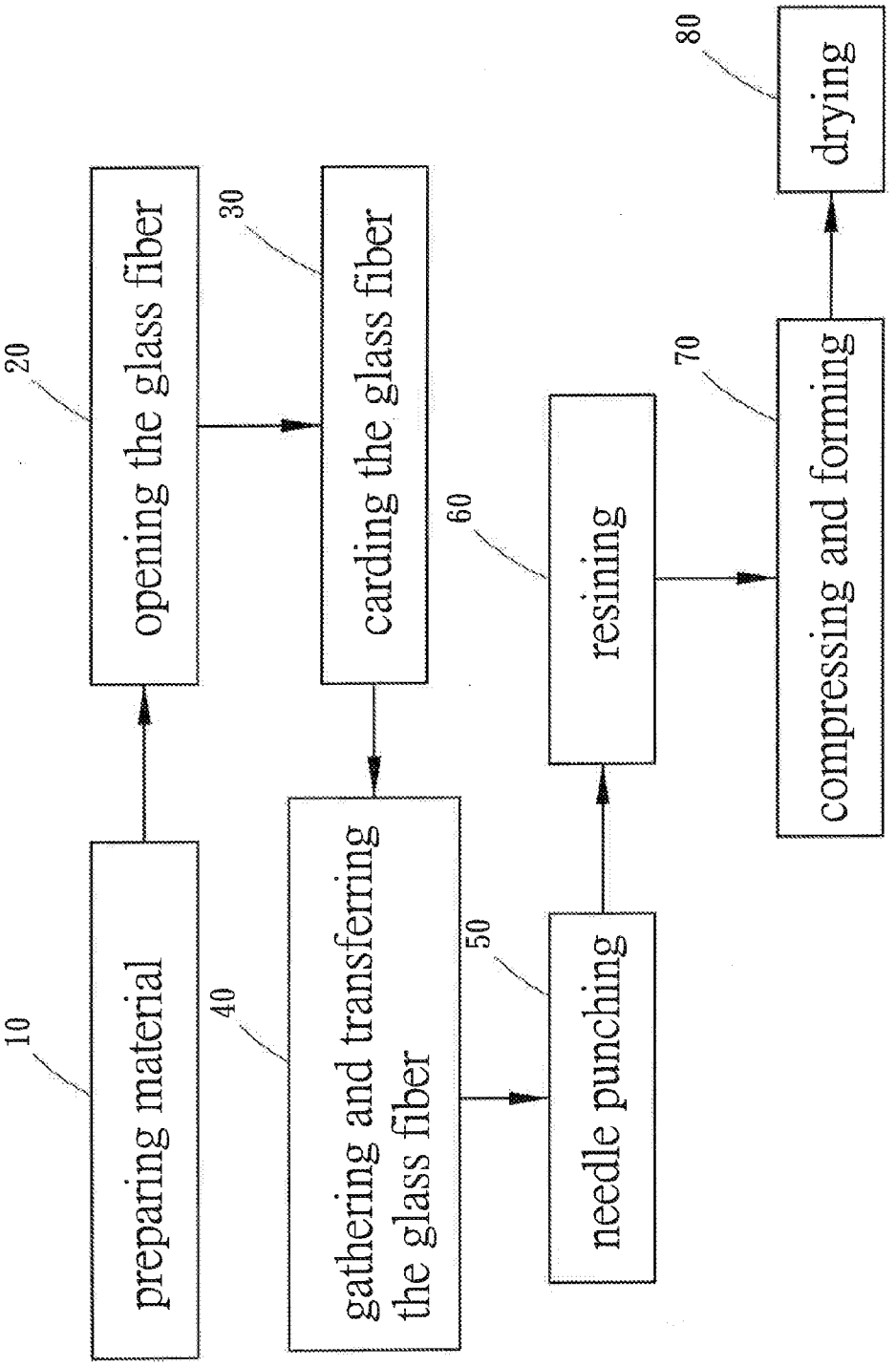

preparing material
10
opening the glass fiber
20
carding the glass fiber
30
gathering and transferring the glass fiber
40
needle punching
50
resining
60
compressing and forming
70
drying
80

Fig . 1

METHOD FOR FABRICATING GLASS FIBER-BASED STRUCTURE

FIELD OF THE INVENTION

[0001] The present invention relates to a method for fabricating a glass fiber-based structure, which is light, sound-absorbing, sound-insulating, heat-resistant, heat-insulating, heat-preserving, fireproof, and electricity-insulating.

BACKGROUND OF THE INVENTION

[0002] Glass is popularly regarded as hard and brittle, and unsuitable to be a structural material. However, after the glass is drawn into fiber, the smaller the diameter of a glass fiber, the higher the strength of the glass fiber. Glass fiber features heat resistance, soundproof, electric insulation, and chemical (acid and alkali) resistance, light weight, and flexibility. Therefore, glass fiber is extensively applied to the fields of heat preservation, heat insulation, sound insulation, sound absorption and cold preservation.

[0003] Thus, glass fiber is a very good substitute for metal. With rapid development of market economy, glass fiber has been an indispensable material in the industries of architecture, traffic, electronics, electrical appliance, chemistry, metallurgy, environmental protection, and defence. Therefore, people pay more and more attention on glass fiber. The demand for glass fiber and the market thereof will persistently grow for a long term.

[0004] Based on many years' experience and research in the glass fiber-related field, the Inventor finally proposes a method for fabricating a glass fiber-based structure, which will be very promising in the international market.

SUMMARY OF THE INVENTION

[0005] The primary objective of the present invention is to provide a method for fabricating a glass fiber-based structure, which fabricates a glass fiber-based structure via opening, carding, gathering and needle punching the glass fiber to form a glass-fiber felt, and further applies resin to, compresses and dries the glass-fiber felt, thereby the glass fiber-based structure has low density, high flexibility and great thickness, and endures a temperature of as high as 700° C.

[0006] To achieve the above-mentioned objective, the present invention proposes a method for fabricating a glass fiber-based structure, which comprises steps: using glass fiber as material; using a fiber opening machine to disperse the glass fiber to make the glass fiber loose; using a carding machine to card the dispersed glass fiber to make the glass fiber finer and more even; using a fiber gathering machine to gather the carded glass fiber at a specified thickness and a specified width; using a needle punching machine to punch the gathered glass fiber to fabricate the glass fiber into a glass-fiber felt; applying a resin such as acrylic, phenol formaldehyde resin or acrylic resin onto the glass-fiber felt to form a resined layer in a spray method or an immersion method according to the density and thickness of the glass-fiber felt; using a hot-pressing machine to compress the resined glass-fiber felt at a temperature of 180-210° C. to compact the glass-fiber felt at a fixed shape; and drying the fixed glass-fiber felt in a dryer to form a glass fiber-based structure, which is light but has a great thickness and a low density, and is sound-absorbing, sound-insulating, heat-resistant, heat-insulating, heat-preserving, cold-preserving, fireproof, and electricity-insulating.

[0007] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, in the resining step, the resin is applied to the glass-fiber felt in a spray method or an immersion method according to the density and thickness of the glass-fiber felt.

[0008] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the resin is dilute acrylic, phenol formaldehyde resin, or acrylic resin.

[0009] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the resin is diluted by a ratio of 5-20%.

[0010] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the resined glass-fiber felt is compressed and formed by weight, rollers, or an oil hydraulic machine.

[0011] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the resined glass-fiber felt is compressed at a pressure of 60 kg/cm^2.

[0012] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the glass fiber has a diameter of 3-9 μm.

[0013] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, needle punching is undertaken at a frequency of 200 times per minute.

[0014] In one embodiment of the method for fabricating a glass fiber-based structure of the present invention, the distance of travel of needle punching is 90 cm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** shows a flowchart of a method for fabricating a glass fiber-based structure according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] The technical means to achieve the objectives of the present invention will be demonstrated with embodiments and drawings below. Refer to FIG. **1** for a flowchart of a method for fabricating a glass fiber-based structure according to one embodiment of the present invention. The method for fabricating a glass fiber-based structure of the present invention comprises steps:

[0017] a. preparing material (Step **10**): using glass fiber having a diameter of 3-9 μm as material;

[0018] b. opening the glass fiber (Step **20**): using a fiber opening machine to disperse the glass fiber to make the glass fiber loose;

[0019] c. carding the glass fiber (Step **30**): using a carding machine to card the dispersed glass fiber to make the glass fiber finer and more even;

[0020] d. gathering and transferring the glass fiber (Step **40**): using a fiber gathering machine to gather the carded glass fiber at a specified thickness and a specified width, and transferring the gathered glass fiber for needle punching;

[0021] e. needle punching (Step **50**): using a needle punching machine to punch the gathered glass fiber with a distance of travel of 90 cm and at a frequency of 200 times per minute to fabricate the glass fiber into a glass-fiber felt;

[0022] f. resining (Step **60**): applying a resin to the glass-fiber felt to form a resined layer, wherein the resin is applied to the glass-fiber felt in a spray method or an immersion method according to the density and thickness of the glass-fiber felt, and wherein the resin is a dilute acrylic, phenol formaldehyde resin or acrylic resin, and wherein the acrylic, phenol formaldehyde resin or acrylic resin is diluted by a ratio of 5-20%;

[0023] g. compressing and forming (Step **70**): using a hot-pressing machine to compress the resined glass-fiber felt at a temperature of 180-210° C. and a pressure of 60 kg/cm^2 to compact the glass-fiber felt at a fixed shape, wherein the resined glass-fiber felt is compressed and formed by weight, rollers, or an oil hydraulic machine; and

[0024] h. drying (Step **80**): drying the fixed glass-fiber felt in a dryer.

[0025] As the glass fiber is loose and porous, the glass-fiber felt can fully absorb the acrylic, phenol formaldehyde resin or acrylic resin in a capillary way via a spray method or an immersion method to increase the density thereof with a resined layer to facilitate compression in the succeeding step.

[0026] Via the above-mentioned steps, the surface of each glass fiber is resined and compressed at a temperature of 180-210° C., whereby the burrs of the glass fiber can be removed to provide flexibility and smoothness. Therefore, the present invention can easily and fast fabricated and feature light weight, great thickness, low density, sound absorption, sound insulation, heat resistance, heat insulation, heat preservation, cold preservation, fire proof, and electric insulation.

[0027] In conclusion, the present invention improves the conventional technology and proposes a method for fabricating a glass fiber-based structure. The embodiments described above are only to exemplify the present invention but not to limit the scope of the present invention. Any equivalent modification or variation according to the spirit or characteristic of the present invention is to be also included within the scope of the present invention.

What is claimed is:

1. A method for fabricating a glass fiber-based structure, comprising steps of:

a. preparing material: using glass fiber as material;

b. opening the glass fiber: using a fiber opening machine to disperse the glass fiber to make the glass fiber loose;

c. carding the glass fiber: using a carding machine to card the dispersed glass fiber to make the glass fiber finer and more even;

d. gathering and transferring the glass fiber: using a fiber gathering machine to gather the carded glass fiber at a specified thickness and a specified width, and transferring the gathered glass fiber for needle punching;

e. needle punching: using a needle punching machine to punch the gathered glass fiber to form a glass-fiber felt;

f. resining: applying a resin to the glass-fiber felt to form a resin layer;

g. compressing and forming: using a hot-pressing machine to compress the resined glass-fiber felt at a temperature of 180-210° C. to compact the glass-fiber felt in a fixed shape; and

h. drying: drying the fixed glass-fiber felt in a dryer.

2. The method for fabricating the glass fiber-based structure according to claim **1**, wherein in the resining step, the resin is applied to the glass-fiber felt in a spray method or an immersion method according to the density and thickness of the glass-fiber felt.

3. The method for fabricating the glass fiber-based structure according to claim **2**, wherein the resin is dilute acrylic, phenol formaldehyde resin, or an acrylic resin.

4. The method for fabricating the glass fiber-based structure according to claim **3**, wherein the resin is diluted by a ratio of 5-20%.

5. The method for fabricating the glass fiber-based structure according to claim **1**, wherein the resined glass-fiber felt is compressed and formed by weight, rollers, or an oil hydraulic machine.

6. The method for fabricating the glass fiber-based structure according to claim **5**, wherein the resined glass-fiber felt is compressed at a pressure of 60 kg/cm^2.

7. The method for fabricating the glass fiber-based structure according to claim **1**, wherein the glass fiber has a diameter of 3-9 μm.

8. The method for fabricating the glass fiber-based structure according to claim **1**, wherein the needle punching is undertaken at a frequency of 200 times per minute.

9. The method for fabricating the glass fiber-based structure according to claim **1**, wherein a distance of travel of needle punching is 90 cm.

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