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METHOD FOR PRODUCING GARMENT FABRIC

Abstract

A method for manufacturing garment fabric F includes: a removal process S**1** of removing a first layer L**1** from a used garment fabric F having a multilayer structure with the first layer L**1** and a second layer L**2**, the second layer L**2** containing fibers; a defibrating process S**3** of defibrating the second layer L**2** using a dry method and of extracting the fibers; a mixing process S**4** of mixing the fibers with a treatment agent to form a mixture containing no coloring agents; a depositing process S**5** for creating a web W as a new second layer L**2** by depositing, in air, the mixture on an air-permeable fabric N**1** that becomes a new first layer L**1**; and a forming process S**7** of forming by pressing and heating the fabric N**1** and the web W.

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Background/Summary

[0001] The present application is based on, and claims priority from JP Application Serial Number 2024-024356, filed Feb. 21, 2024, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

[0002] The present disclosure relates to a method for producing garment fabric.

2. Related Art

[0003] In recent years, various recycling techniques have been studied in order to promote effective utilization of resources and reduction of wastes. In particular, when garments are colored, it is relatively difficult to recycle the clothes into garment fabric, and thus it is desired to establish a recycling technique. For example, JP-A-2011-94265 shows a method for producing de-inked pulp for reusing recorded matter.

[0004] However, when the technique described in JP-A-2011-94265 is applied to the recycling of clothes, there is a problem that it is difficult to recycle the garments into a nonwoven fabric. Specifically, depending on the type of the coloring agents and the degree of coloring, the de-inking performance may not be sufficient for fabric, and it may be difficult to obtain pulp suitable for garment fabric. In other words, there has been a demand for a technique for repeatedly recycling garment fabric.

SUMMARY

[0005] A method for producing garment fabric includes a removal process of removing a first layer from a used garment fabric having a multilayer structure with the first layer and a second layer, the second layer containing fibers; a defibrating process of defibrating the second layer using a dry method and of extracting the fibers; a mixing process of mixing the fibers with a treatment agent to form a mixture containing no coloring agents; a depositing process for creating a web as a new second layer by depositing, in air, the mixture on an air-permeable fabric that becomes a new first layer; and a forming process of forming by pressing and heating the fabric and the web.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** is a schematic cross-sectional view showing a configuration of garment fabric according to a present embodiment.

[0007] FIG. **2** is a schematic cross-sectional view showing another embodiment of the garment fabric.

[0008] FIG. **3** is a flow chart showing a method for producing garment fabric.

[0009] FIG. **4** is a schematic view showing a configuration of a fabric manufacturing apparatus used for manufacturing garment fabric.

[0010] FIG. **5** is a table showing the manufacturing conditions, evaluation results, and the like for garment fabric according to embodiments.

[0011] FIG. **6** is a table showing the manufacturing conditions, evaluation results, and the like for garment fabric according to comparative examples.

DESCRIPTION OF EMBODIMENTS

[0012] In the embodiment described below, a method for producing garment fabric which can be repeatedly reused will be exemplified and described with reference to the drawings. In each of the following drawings, XYZ axes are given as coordinate axes orthogonal to each other as necessary, a direction indicated by each arrow is set as a +direction, and a direction opposite to the +direction

is set as a −direction. The Z axis is a virtual axis along the vertical direction, and the +Z direction is the upward direction and the −Z direction is the downward direction.

[0013] In a fabric manufacturing apparatus **1** applied to the garment fabric manufacturing method of the present embodiment, the destination in the transport direction of the raw material, fabric, web, garment fabric, and the like may be referred to as downstream, and the side opposite in the transport direction may be referred to as upstream. For convenience of illustration, the size of each component differs from the actual size.

1. GARMENT FABRIC

[0014] As shown in FIG. **1**, the garment fabric F manufactured by the garment fabric manufacturing method of the present embodiment has a multilayer structure including a first layer L**1** and a second layer L**2**. The first layer L**1** includes a substrate layer L**1***b* and an adhesion layer L**1***a*. In the garment fabric F, the substrate layer L**1***b* of the first layer L**1**, the adhesion layer L**1***a* of the first layer L**1**, and the second layer L**2** are laminated in this order from the lower side to the upper side. When the garment fabric F is processed into a garment, either the first layer L**1** or the second layer L**2** may be used on the front side of the garment.

[0015] The thickness of the garment fabric F is appropriately set according to the use and form of the garment to which the garment fabric F is applied. The thickness of the garment fabric F is not particularly limited, but is, for example, not less than 0.30 mm and not more than 1.50 mm. According to this, flexibility and strength of the garment fabric F are improved.

[0016] The first layer L**1** has air permeability. When the second layer L**2** also has air permeability, since the first layer L**1** does not hinder air permeability, air permeability is imparted to the garment fabric F. By this, when the garment fabric F is used for garment, stuffiness and the like during wear can be suppressed.

[0017] In the manufacture of the garment fabric F, the air permeability of the first layer L**1** can be used to promote the formation of fibers and the like, which form the second layer L**2**, on the first layer L**1**. To be specific, by sucking air, in which the fibers and the like are dispersed, through the first layer L**1**, the formation of the web including the fibers is promoted. The manufacturing method and manufacturing processes of the garment fabric F will be described later in the section on the method for producing garment fabric.

[0018] In the present specification, air permeability is defined by the amount of air passing through a test piece according to the JIS air permeability test (L1096 2010 8.26.1 A method). The term “having air permeability” as used herein means that the amount of air measured by the above test method is 10 cm.sup.3/cm.sup.2.Math.sec or more.

[0019] The thickness of the first layer L**1** are not particularly limited, but is preferably, for example, not less than 0.01 mm and not more than 0.20 mm. This makes it possible to improve the flexibility and strength of the garment fabric F.

[0020] The substrate layer L**1***b* has air permeability. The substrate layer Lib is one surface of the garment fabric F. Incidentally, the second layer L**2** is the other surface of the garment fabric F.

[0021] The substrate layer L**1***b* is a sheet such as a woven fabric, a knitted fabric, or a nonwoven fabric containing polyester. By this, since polyester is relatively excellent in strength, the thinness and strength of the garment fabric F can be further improved.

[0022] The substrate layer L**1***b* is not limited to being made of polyester and may be a sheet containing polyester and other resins or may be a sheet made of resins other than polyester.

[0023] The adhesion layer L**1***a* is disposed between the substrate layer L**1***b* and the second layer L**2**. Since the first layer L**1** and the second layer L**2** are adhered to each other by the adhesion layer L**1***a*, the adhesive strength between the first layer L**1** and the second layer L**2** is secured.

[0024] The adhesion layer L**1***a* includes an adhesive. Examples of the material of the adhesive include known pressure sensitive adhesives such as polyester resins, acrylic resins, silicone resins, and urethane resins, and known adhesives such as epoxy-based, acrylic-based, cyanoacrylate-based, urethane-based, and vinyl acetate-based. The adhesive of the adhesion layer L**1***a* may be one

that is cured by heat applied in the forming process of the manufacturing process of the garment fabric F described below.

[0025] Here, when the garment fabric F is reused after use, the first layer L**1** and the second layer L**2** are peeled off in a removal process (to be described later). Then, the second layer L**2** separated from the used garment fabric F is reused as a raw material for the second layer L**2** of a new garment fabric F. Therefore, the adhesive strength between the first layer L**1** and the second layer L**2** is set in consideration of the reuse of the second layer L**2**.

[0026] Specifically, it is preferable that a part of the second layer L**2** is not attached to the separated first layer L**1**. To be specific, it is preferable that the adhesion layer L**1***a* and the second layer L**2** undergo interfacial peeling in the removal process. In a case where an impurity other than the fibers is removed when the fibers are extracted from the second layer L**2** during the manufacture, a small amount of the first layer L**1** may be attached to the recycled second layer L**2**.

[0027] The adhesive strength between the first layer L**1** and the second layer L**2** is adjusted by the material of the adhesion layer L**1***a*, the thickness as the dimensions along the Z-axis, and the like. Although not particularly limited, for example, by using polyester resins as the material of the adhesion layer L**1***a* and setting the thickness of the adhesion layer L**1***a* to about 80 μm, interfacial peeling can be caused at the interface between the adhesion layer L**1***a* and the second layer L**2**.

[0028] The adhesion layer L**1***a* also has air permeability. To be specific, the adhesion layer L**1***a* is formed so as not to inhibit the air permeability of the first layer L**1**. Examples of the form of the adhesion layer L**1***a* include a form in which the pressure sensitive adhesive, the adhesive, or the like is applied in a planar mesh shape, and a form having a plurality of holes penetrating in the direction along the Z axis.

[0029] Note that the adhesion layer L**1***a* is not an essential component, and the first layer L**1** may be formed of only the substrate layer L**1***b*. In this case, the first layer L**1** and the second layer L**2** are bonded to each other by pressurization and heating at the forming process in the manufacturing process of the garment fabric F. Even when the first layer L**1** does not include the adhesion layer L**1***a*, the adhesive strength between the first layer L**1** and the second layer L**2** is set in consideration of the reuse of the second layer L**2**.

[0030] The first layer L**1** may be colored. When the substrate layer L**1***b* and the adhesion layer L**1***a* are formed of the above-described materials, the substrate layer L**1***b* and the adhesion layer L**1***a* generally have a whitish color. Therefore, when the second layer L**2** is colored, the color tones of the first layer L**1** and the second layer L**2** are relatively significantly different from each other. When the garment fabric F is processed into garment, the difference in color between the first layer L**1** and the second layer L**2** is likely to be conspicuous. On the other hand, when the first layer L**1** is colored in a hue close to that of the second layer L**2**, the difference in hue can be made inconspicuous when processed into a garment. When the first layer L**1** is used so as to be on the surface side of the garment, coloring the first layer in various colors improves the design. It should be noted that the coloring mentioned here includes not only coloring with a single color but also forming an image such as a text, a pattern, a picture, or a photograph by printing or the like.

[0031] The first layer L**1** may be colored on one of the surfaces of the garment fabric F. The coloring of the first layer L**1** is not particularly limited but known methods such as digital printing or analog printing, including inkjet methods, can be applied. The coloring of the first layer L**1** may be performed at the manufacturing process of the first layer L**1**, or may be performed in the process of manufacturing the garment fabric F.

[0032] The second layer L**2** is a nonwoven fabric that includes a plurality of defibrated fibers and a treatment agent such as a binder. In the following description, a plurality of defibrated fibers may be simply referred to as fibers. From the viewpoint of versatility of the garment fabric F to be recycled and newly manufactured, the fibers of the second layer L**2** are preferably composed of white fibers.

[0033] Here, the second layer L**2** may include fibers that have been pre-dyed with a dye. In order to

facilitate the reuse of the second layer L**2**, the fibers constituting the second layer L**2** may be dyed with a dye. On the other hand, the second layer L**2** preferably does not contain coloring agents such as a pigment. Note that “not containing coloring agents” means “not containing coloring agents intentionally added”. The second layer L**2** may contain coloring agents such as pigment particles that have been unintentionally mixed in.

[0034] The basis weight of the second layer L**2** is preferably not less than 100 g/m.sup.2 and not more than 180 g/m.sup.2. The basis weight is the number of grams per square meter of the surface area along the XY plane in one sheet of the garment fabric F. When the basis weight of the second layer L**2** is within the above range, it is possible to secure a balance between thinness and strength in the second layer L**2**. Therefore, the thinness and strength of the garment fabric F can be further improved. The basis weight of the second layer L**2** also affects the ease of peeling at the interface between the first layer L**1** and the second layer L**2**.

[0035] The basis weight of the second layer L**2** is adjusted by the deposition amount of the web to be formed, that is, the thickness of the web, in the depositing process during the manufacture of the garment fabric F.

[0036] The thickness of the second layer L**2** is not particularly limited, but is preferably, for example, not less than 0.20 mm and not more than 0.80 mm. This makes it possible to improve the flexibility and strength of the garment fabric F. The thickness of the second layer L**2** is adjusted not only by the thickness of the web described above but also by the pressing conditions of the web in the forming process during the manufacture of the garment fabric F.

[0037] When the thickness of the second layer L**2** is less than the lower limit of the above range, unevenness is likely to occur due to variations in thickness. Therefore, when the second layer L**2** is used on the surface side of the garment, the first layer L**1** on the back surface may be seen through. Therefore, it is preferable to suppress variation in the thickness of the second layer L**2**. However, the second layer L**2** may have areas with non-uniform thickness.

[0038] In the second layer L**2**, a first face SF**1** in contact with the first layer L**1** or a second face SF**2** opposite to the first face SF**1** may be pretreated with a surface treatment or the like. Various physical properties such as abrasion resistance are improved by the surface treatment.

[0039] The surface treatment is not particularly limited, and examples thereof include a softening treatment, a water-repellent treatment, a wrinkle-proof treatment, and an abrasion-resistant treatment. For these surface treatments, known fiber treatment agents and the like can be applied. For example, when an abrasion-resistant treatment is performed, it is possible to suppress fluffing of the surface due to rubbing of the garments and to keep the appearance of the garments good.

[0040] The surface treatment may be performed during the manufacturing process of the garment fabric F or may be performed after the garment fabric F has been manufactured. In particular, when a surface treatment is performed on the first face SF**1**, the second layer L**2** and the first layer L**1** are individually manufactured. Then, after the first face SF**1** of the second layer L**2** is subjected to the surface treatment, the first layer L**1** and the second layer L**2** may be bonded together to manufacture the garment fabric F.

[0041] The fiber is one of the main components of the second layer L**2** and affects physical properties such as the mechanical strength of cushioning material together with the binder. The fibers of a second layer L**2** that were separated from used garment fabric F are reused as fibers of the second layer L**2**. When the garment fabric F is first produced, a material obtained by defibrated cloth is used as a raw material of the fiber. From the viewpoint of recycling of resources, it is preferable to use waste clothes such as old clothes as the cloth. Fibers derived from the second layer L**2** may be mixed with fibers derived from other cloth.

[0042] The cloth includes knit fabric, plain weave fabric, pile fabric, and the like. The cloth may also include a nonwoven fabric.

[0043] Examples of the fibers from natural product fibers such as cotton, hemp, wool, silk, regenerated cellulose material, and from synthetic fiber such as polypropylene, polyester, and

polyurethane.
[0044] These fibers may be used alone or in combination of two or more. In particular, among the above-mentioned fiber materials, the cloth preferably contains cotton or wool from the viewpoint of easy availability of old clothes or the like, physical properties of the fiber, and the like.
[0045] The weight-average fiber length of the defibrated fibers is preferably not less than 0.5 mm or not more than 2.0 mm. According to this, since the fibers are not excessively shortened, the fibers moderately entangle with each other, and the mechanical strength of the second layer L**2** is improved. The weight-average fiber length is determined by a method in accordance with ISO 16065-2:2007.
[0046] The binder bonds fibers to each other in the second layer L**2**. As the binder, a thermoplastic or thermosetting resin is used. Examples of resins include, in addition to thermoplastic synthetic resins such as such as polyester, natural resins such as shellac, pine resin, dammar, polylactic acid, polybutylene succinate from vegetable origin, plant-derived polyethylene, PHBH® (Poly (3-hydroxybutyrate-co-3-hydroxyhexanoate)) from Kaneka Corp. The binder may be used alone or in combination of two or more.
[0047] Examples of a treatment agent other than binder include various additives. Examples of the additives include flame retardant, antioxidant, ultraviolet absorbent, aggregation inhibitor, antimicrobe agent, antifungal agent, wax, and release agent.
[0048] As shown in FIG. **2**, the garment fabric F may have a multilayer structure including a first layer L**1**, a second layer L**2**, and a third layer L**3** as a form different from the above-described two-layer structure. The garment fabric F of the present embodiment, that has a three-layer structure, is formed by sandwiching the second layer L**2** between the lower first layer L**1** and the upper third layer L**3**. The first layer L**1** and the second layer L**2** have the same configuration as mentioned above. When the garment fabric F of the present embodiment is processed into a garment, either the first layer L**1** or the third layer L**3** may be used on the front side of the garment.
[0049] The thickness of the garment fabric F in the present embodiment is appropriately set according to the use and form of the garment to which the fabric is applied. The thickness of the garment fabric F in this embodiment is not particularly limited, but is, for example, not less than 0.30 mm and not more than 1.50 mm. This makes it possible to improve the flexibility and strength of the garment fabric F.
[0050] The third layer L**3** includes an adhesion layer L**3***a* and a substrate layer L**3***b*. The third layer L**3** is not particularly limited, and the first layer L**1** may be applied. In other words, in the third layer L**3**, the adhesion layer L**1***a* of the first layer L**1** corresponds to the adhesion layer L**3***a*, and the substrate layer L**1***b* of the first layer L**1** corresponds to the substrate layer L**3***b*. The first layer L**1** is turned upside down in the direction along the Z-axis with respect to the second layer L**2** and is adhered as the third layer L**3**. Also in this case, the adhesion between the adhesion layer L**3***a* and the second layer L**2** has the same characteristics as the adhesion between the adhesion layer L**1***a* and the second layer L**2**, in consideration of the separation from the second layer L**2**.
[0051] The third layer L**3** may be colored. For example, when the color tone of the first layer L**1** and the color tone of the third layer L**3** are different from each other, the color tone changes between the surface side and back side of the garment, enhancing the design.

2. METHOD FOR PRODUCING GARMENT FABRIC

[0052] The method for producing the garment fabric F according to the present embodiment is an example of the method for producing garment fabric of the present disclosure. The method for producing the garment fabric F includes a method for separating the second layer L**2** from the used garment fabric F, extracting fibers from the second layer L**2**, and reusing the fibers for the new second layer L**2** of a new garment fabric F.
[0053] As shown in FIG. **3**, the method for producing the garment fabric F according to the present embodiment includes a removal process S**1**, a material supply process S**2**, a defibrating process S**3**, a mixing process S**4**, a coloring process S**11**, a depositing process S**5**, an adhering process S**6**, a

forming process S**7**, and a cutting process S**8**.
[0054] In the method for manufacturing the garment fabric F, the garment fabric F is manufactured through each process in the above order from the upstream removal process S**1** to the downstream cutting process S**8**.
[0055] A specific example of the method for manufacturing the garment fabric F will be described together with the fabric manufacturing apparatus **1** for manufacturing the garment fabric F. The fabric manufacturing apparatus **1** of the present embodiment is an example and is not limited to the configuration described below.
[0056] As shown in FIG. **4**, the fabric manufacturing apparatus **1** includes, from upstream to downstream, a feed section **5**, a rough shredding section **10**, a defibrating section **30**, a mixing section **60**, a depositing section **100**, a web transport section **70**, a forming section **150**, and a cutting section **160**. The fabric manufacturing apparatus **1** is also provided with a control section **28** for integrally controlling the operation of the above-described components. The fabric manufacturing apparatus **1** manufactures the garment fabric F from raw material C.
[0057] The removal process S**1** is performed manually or by an apparatus (not shown) other than the fabric manufacturing apparatus **1**. In the removal process S**1**, the first layer L**1** is removed from the garment fabric F of the used clothes to obtain a second layer L**2**. In the removal process S**1**, the used garment fabric F that was tailored into garments or the like is handled. Since the clothes collected as used garments are assumed to be different in form, size, and the like, the removal process S**1** may be performed manually.
[0058] To be more specific, after the sewing thread and the like is removed, the first layer L**1** and the second layer L**2** are separated from the end section and the like of the garment fabric F. When the garment fabric F has the third layer L**3**, the second layer L**2** and the third layer L**3** are also separated from each other.
[0059] In the removal process S**1**, as described above, it is preferable that the first layer L**1** and the third layer L**3** do not adhere to the separated second layer L**2**. A device having the same function as the above-described manual operation may be attached to the fabric manufacturing apparatus **1**.
[0060] The separated second layer L**2** becomes the raw material C for a new second layer L**2**. The fibers extracted from the raw material C are recycled to the new second layer L**2** of the new garment fabric F. Then, the process proceeds to the material supply process S**2**.
[0061] The material supply process S**2** is performed in the feed section **5**. The feed section **5** supplies the raw material C to the rough shredding section **10**. The feed section **5** includes, for example, an automatic feeding mechanism (not shown), and continuously and automatically feeds the raw material C to the rough shredding section **10**.
[0062] The rough shredding section **10** shreds the raw material C supplied from the feed section **5** into small pieces in an atmosphere such as the air. The rough shredding section **10** is a shredder, a cutter mill, or the like having a rough shredding blade **11**. The raw material C is shredded by the rough shredding blade **11** into small pieces of the raw material C. The shape of the surface of the small pieces is, for example, several millimeters square or irregular. The small pieces are collected in a quantitative supply section **50**.
[0063] The quantitative supply section **50** weighs the small pieces and supplies them to a hopper **12** in a fixed quantity. The quantitative supply section **50** is, for example, a vibration feeder. The small pieces supplied to the hopper **12** are transported through a pipe **20** to an inlet **31** of the defibrating section **30**. Then, the process proceeds to the defibrating process S**3**.
[0064] The defibrating process S**3** is performed in the defibrating section **30**. In the defibrating process S**3**, the small pieces derived from the second layer L**2** are defibrated using a dry method to extract fibers contained in the small pieces of the material C. The defibrating section **30** includes the inlet **31**, an outlet **32**, a stator **33**, a rotor **34**, and an airflow generating mechanism (not shown). The small pieces of the raw material C are introduced into the interior of the defibrating section **30** through the inlet **31** by the airflow of the airflow generation mechanism. The term “dry method” as

used herein refers to a treatment performed in air such as the atmosphere, not in a liquid such as water.

[0065] The stator **33** and the rotor **34** are arranged inside the defibrating section **30**. The stator **33** has a substantially cylindrical inner side surface. The rotor **34** rotates along the inner side surface of the stator **33**. The small pieces of the raw material C are sandwiched between the stator **33** and the rotor **34** and are defibrated by a shearing force generated between the stator **33** and the rotor **34**.

[0066] The fibers produced by the defibrating section **30** are discharged from the outlet **32** into a pipe **40**. The pipe **40** communicates with the inside of the defibrating section **30** and the inside of the depositing section n **100**. The fibers are transported from the defibrating section **30** to the depositing section **100** by the airflow generated by the airflow generation mechanism. The mixing section **60** is arranged at the pipe **40** between the defibrating section **30** and the depositing section **100**.

[0067] Although not shown, the fabric manufacturing apparatus **1** may include a sorting mechanism for removing impurities and the like contained in the defibrated fibers between the defibrating section **30** and the mixing section **60**. Examples of the sorting mechanism include known devices such as a sieve. According to the sorting mechanism, it is possible to reduce the content of impurities and supply fibers with high purity to a new second layer L**2**. Then, the process proceeds to the mixing process S**4**.

[0068] The mixing process S**4** is performed in the mixing section **60**. In the mixing process S**4**, a treatment agent or the like, which serves as a binder, is mixed with fibers to produce a mixture that does not contain any coloring agents. The mixing section **60** includes hoppers **13** and **14**, supply pipes **61** and **62**, and valves **65** and **66**. The mixing section **60** generates a mixture by mixing fibers with a treatment agent, which is a binder, in air. The term “containing no coloring agents” used herein means that no coloring agents are intentionally added to the mixture. Therefore, the above-mentioned coloring agents does not contain coloring agents such as dyes that penetrate the fibers or unintended coloring agents.

[0069] The hopper **13** communicates with the inside of the pipe **40** via the supply pipe **61**. In the supply pipe **61**, the valve **65** is arranged between the hopper **13** and the pipe **40**. The hopper **13** supplies binder into the pipe **40**. The valve **65** adjusts the mass of the binder supplied from the hopper **13** to the pipe **40**. By this, the mixing ratio between the fibers and the binder is adjusted. The binder may be supplied in the form of powder or particles or may be supplied in a molten state.

[0070] The hopper **14** communicates with the inside of the pipe **40** via the supply pipe **62**. In the supply pipe **62**, the valve **66** is arranged between the hopper **14** and the pipe **40**. The hopper **14** feeds the additive into the pipe **40**. The valve **66** regulates the mass of additive supplied to the pipe **40** from a hopper **14**. By this, the mixing ratio of the additive to the fibers and the binder is adjusted. Note that the additive may be mixed with the binder in advance and supplied from the hopper **13**.

[0071] The fibers, the binder, and the like are mixed into a mixture while being transported to the depositing section **100** through the pipe **40**. In order to promote the formation of the mixture in the pipe **40** and to improve the transportability of the mixture, a blower or the like for generating an air flow may be arranged in the pipe **40**. The mixture is introduced into the depositing section **100** from the pipe **40** via the coupling section **42**. Then, the process proceeds to the depositing process S**5**.

[0072] When the first layer L**1** of the garment fabric F that is produced is to be colored, the coloring process S**11** is performed prior to the depositing process S**5**. The coloring process S**11** will be described later.

[0073] The depositing process S**5** is performed in the depositing section **100**. In the depositing process S**5**, the mixture is deposited, in the air, on the air-permeable fabric N**1** to form a web W that becomes a new second layer L**2**. The fabric N**1** becomes a new first layer L**1** of the garment fabric F to be manufactured. In the following description, the new first layer L**1** and the new

second layer L**2** of the garment fabric F to be manufactured are also simply referred to as the first layer L**1** and the second layer L**2**, respectively.

[0074] The depositing section **100** deposits the mixture on the air-permeable fabric N**1** serving as the first layer L**1** in the air and generates the web W serving as the second layer L**2**. In other words, the second layer L**2** is formed by depositing the mixture containing the defibrated fibers and the treatment agent on the fabric N**1** serving as the first layer L**1** in the air. By this, the web W of the second layer L**2** can be easily formed. In addition, the basis weight can be easily changed.

[0075] The depositing section **100** includes a drum section **101**, a housing section **102** that houses the drum section **101**, and a fabric feed section **71** that supplies the fabric N**1**. The depositing section **100** takes the mixture from the pipe **40** into the drum section **101**. Then, the mixture is deposited using a dry method on the fabric N**1** supplied from the fabric feed section **71**.

[0076] The web transport section **70** including a mesh belt **122** and a suction mechanism **110** is arranged below the depositing section **100**. The suction mechanism **110** is arranged opposite the drum section **101** with the mesh belt **122** interposed in between in the Z-axis direction.

[0077] The drum section **101** includes a blade member **101***a* that is rotary driven by a motor (not shown), and a substantially cylindrical sieve section **101***b* that primarily covers mainly the lower portion of the blade member **101***a*. The blade member **101***a* detangles the intertwined fibers while rotating. The sieve section **101***b* allows particles such as fibers and mixtures smaller than the size of the openings of the mesh of the sieve section to pass through from the inside to the outside. By this, the fibers of the mixture intertwined in the drum section **101** are untangled and dispersed in the air inside the housing section **102**.

[0078] The fabric feed section **71** continuously feeds the roll-shaped fabric N**1** onto the mesh belt **122**. At this time, an adhesion layer L**1***a* of the fabric N**1** is the surface facing upward. By this, the adhesion layer L**1***a* is brought into contact with the web W. When a release paper is attached to the adhesion layer L**1***a* of the fabric N**1**, the fabric feed section **71** may include a separation mechanism that separates the release paper from the fabric N**1**.

[0079] Here, the coloring process S**11** is performed before the depositing process S**5**. In the coloring process S**11**, the fabric N**1** is colored to be the new first layer L**1** with a pigment ink. By this, since the first layer L**1** is colored in the manufacturing process for the garment fabric F, it is easy to cope with multi-kind and small-quantity production. The coloring process S**11** is not limited to coloring the entire surface of the fabric N**1** with a single color. In the coloring process S**11**, an image such as a text, a pattern, a picture, or a photograph may be printed.

[0080] Although not shown in the drawings, a coloring device that performs the coloring process S**11** is arranged between the fabric feed section **71** and the depositing section **100**. The fabric N**1** is colored from the surface facing downward by the coloring device while the fabric is fed from the fabric feed section **71** and reaches the depositing section **100**.

[0081] The coloring device is not particularly limited, and examples thereof include known devices such as an ink ejecting device and an ink applying device. Here, the fabric manufacturing apparatus **1** includes the ink ejecting device with an inkjet head. By this, it is possible to easily print an image such as a color pattern, text, picture, or photograph on fabric N**1** with high definition.

[0082] Here, a pre-colored fabric N**1** may be applied as the fabric N**1**. In this case, the coloring process S**11** can be omitted. The coloring process S**11** is not an essential step in the method for manufacturing the garment fabric F, and the coloring device may be omitted.

[0083] A pretreatment process may be performed before the coloring process S**11**. In the pretreatment process, the surfaces of the fabric N**1** that becomes the new first layer L**1** are pretreated. To be specific, a surface treatment such as a fixing process is performed on the fabric N**1** as a pretreatment. By the pretreatment, the fixability of the pigment ink is improved, and the abrasion resistance and the washing fastness of the garment fabric F to be produced can be improved.

[0084] The pretreatment process may be performed on the fabric N**1** before the fabric N**1** is

mounted on the fabric feed section **71** or may be performed on the upstream side of the coloring device after the fabric is fed from the fabric feed section **71**. When the pretreatment process is performed in the fabric manufacturing apparatus **1**, a pretreatment device is arranged between the fabric feed section **71** and the coloring device.

[0085] The pretreatment device is not particularly limited, and examples thereof include known devices such as a pretreatment liquid ejecting device and a pretreatment liquid applying device.

[0086] Returning to the depositing process S**5**, the mixture containing the fibers is dispersed into the air in the housing section **102** from the inner side of the sieve section **101***b*. Then, the mixture containing the fibers is randomly deposited on the upper side of the fabric N**1** transported on the mesh belt **122**. Therefore, the fibers are less likely to be oriented in a specific direction in the web W.

[0087] The sieve section **101***b* may not have a function of sorting out large fibers and the like in the mixture. In other words, the drum section **101** may loosen the fibers of the mixture and discharge the entire mixture to the inside of the housing section **102**. The mixture dispersed in the air within the housing section **102** accumulates on the upper surface of the fabric N**1** by gravity and the suction force of the suction mechanism **110**.

[0088] The basis weight of the garment fabric F is adjusted by the weight per unit area of the fabric N**1** and the web W. The weight per unit area of the web W is adjusted by the number of rotations of the blade member **101***a*, the amount of the mixture supplied to the depositing section **100** per unit time, the transport speed of the fabric N**1** by the mesh belt **122**, and the like.

[0089] The mixing ratio of the fibers and the treatment agent is not particularly limited and is appropriately adjusted according to the type of the treatment agent. For example, when a binder is used as the treatment agent, the mass ratio of the fibers to the binder in the web W is preferably in the range of 9:1 to 5:5 (fibers vs. binder). By this, the balance of various physical properties of the garment fabric F can be secured.

[0090] The web transport section **70** includes a mesh belt **122** and the suction mechanism **110**. The web transport section **70** promotes the deposition of the mixture on the fabric N**1** by the suction mechanism **110**. The web transport section **70** transports the web W formed from the mixture downstream by rotation of the mesh belt **122**.

[0091] The suction mechanism **110** is arranged below the drum section **101**. The suction mechanism **110** draws air from the housing section **102** through the plurality of holes in the mesh belt **122** and the air-permeable fabric N**1**. By this, the mixture discharged to the outside of the drum section **101** is sucked downward together with air and is deposited on the upper surface of the fabric N**1**. A known suction device such as a blower is used for the suction mechanism **110**.

[0092] The plurality of holes of the mesh belt **122** allow air to pass through, but do not easily allow fibers, binder, and the like contained in the mixture to pass through. The mesh belt **122** is an endless belt and is applied with tension by four tensing rollers **121**.

[0093] The upper surface of the mesh belt **122** moves toward downstream by rotation of the tensing rollers **121**. In other words, the mesh belt **122** rotates clockwise in FIG. **4**. As the mesh belt **122** is rotated by the tensing rollers **121**, the mixture is continuously deposited to form the web W. The web W contains a relatively large amount of air and is soft and swollen. The web W is transported downstream together with the fabric N**1** as the mesh belt **122** moves.

[0094] A moistening device **130** may be arranged downstream of the depositing section **100**, and the web W may be moistened by spraying water. By this, scattering of fibers, binder, and the like contained in the web W is suppressed. In addition, a water-soluble treatment agent may be contained in the water used for moistening, and the web W to become the second layer L**2** may be subjected to a surface treatment in parallel with the moistening.

[0095] The web W and the fabric N**1** are transported downstream by the mesh belt **122**, and they are separated from the mesh belt **122**, and drawn past a dancer roller **141**. The dancer roller **141** is provided to secure the processing time of the downstream forming process S**7**. In detail, since the

forming process S**7** is a batch process, the dancer roller **141** is moved up and down with respect to the web W and the fabric N**1** continuously supplied from the depositing section **100** to secure the processing time of the forming process S**7**. The web W and the fabric N**1** travel downstream through the dancer roller **141**.

[0096] Here, when the garment fabric F having the above-described third layer L**3** is manufactured, the adhering process S**6** is performed after the depositing process S**5** and before the forming process S**7**. In the adhering process S**6**, a fabric N**2**, which become a new third layer L**3**, is adhered to be the upper surface of a web W. By this, it is possible to manufacture the garment fabric F of the other form described above.

[0097] The adhering process S**6** is performed by a fabric feed section **72** and an adhering device (not shown). The fabric feed section **72** continuously feeds the roll-shaped fabric N**2** above the web W. At this time, in a case where the fabric N**2** includes the adhesion layer L**3***a*, the adhesion layer L**3***a* of the fabric N**2** is a surface facing downward. By this, the adhesion layer L**3***a* is brought into contact with the web W. In a case where a release paper is attached to the adhesion layer L**3***a* of the fabric N**2**, the fabric feed section **72** may include a separation mechanism that separates the release paper from the fabric N**2**.

[0098] The adhering device adheres the upper surface of the web W to the lower surface of fabric N**2**. The adhering device is, for example, a pressure roller, and adheres the web W and the fabric N**2** to each other while suppressing wrinkling and the inclusion of large air bubbles.

[0099] The fabric N**2** may be dyed by the fabric manufacturing apparatus **1** in the same manner as the fabric N**1**, or pre-dyed fabric N**2** may be used. When the fabric N**2** is colored in the fabric manufacturing apparatus **1**, a coloring device similar to that for the fabric N**1** is arranged between the fabric feed section **72** and the adhering device.

[0100] When a garment fabric F having no third layer L**3** is to be produced, the adhering process S**6** is omitted. In this case, the fabric manufacturing apparatus **1** may omit the fabric feed section **72** and the adhering device. The adhering process S**6** may be performed upstream of the dancer roller **141**. Then, fabric N**1**, web W, and fabric N**2** are integrated and proceed to forming process S**7**.

[0101] The forming process S**7** is performed in the forming section **150**. In the forming process S**7**, the fabrics N**1**, N**2**, and the web W are pressed and heated to form a belt-shaped garment fabric F. The forming section **150** is a heating press device and includes an upper circuit board **152** and a lower circuit board **151**. The upper circuit board **152** and the lower circuit board **151** sandwich and pressurize the web W and the fabrics N**1**, N**2**, and heat the web W and the fabric N**1**, N**2** by built-in heaters. The forming process S**7** may be continuously performed using a heating roller pair or the like.

[0102] The web W is compressed from the vertical direction by pressurization to increase the density, and the binder is melted by heating to fluidly spread between the fibers. When the heating is finished in this state and the binder solidifies, the fibers are bound to each other by the binder. In addition, when the fabrics N**1**, N**2** and the web W are adhered to each other, the fabric N**1** becomes the first layer L**1**, the web W becomes the second layer L**2**, and fabric N**2** becomes the third layer L**3**.

[0103] The pressurization and heating conditions in the forming section **150** are appropriately adjusted according to the desired density of the garment fabric F, the melting point or curing temperature of the binder, and the like. Although not particularly limited, the pressurization condition is, for example, 0.01 MPa or more, and the heating condition is, for example, 90° C. or more. By the forming section **150**, the fabrics N**1**, N**2** and the web W are formed into a belt-shaped garment fabric F. Then, the process proceeds to the cutting process S**8**.

[0104] The cutting process S**8** is performed in the cutting section **160**. The cutting section **160** adjusts the shape of the sides at both ends of the belt-shaped garment fabric F. The cutting section **160** includes a longitudinal blade (not shown).

[0105] The longitudinal blade cuts the belt-shaped garment fabric F in a direction along the

transport direction. By this, both ends of the garment fabric F are trimmed evenly. Then, the belt-shaped garment fabric F is wound into a roll shape to form a roll of cloth. The cutting section **160** may be provided with a lateral blade for cutting in a direction intersecting with the transport direction of the garment fabric F. In this case, the garment fabric F is cut into a cut form sheet shape such as a substantially rectangular shape. Thus, the garment fabric F is produced.

[0106] According to the present embodiment, the following effects can be obtained.

[0107] The garment fabric F that can be easily reused repeatedly can be produced. More specifically, the garment fabric F to be manufactured includes a first layer L**1** that can ensure design by coloring, and a non-colored second layer L**2**. Therefore, by separating the first layer L**1** and the second layer L**2**, fibers that do not require de-inking treatment are obtained from the second layer L**2**. The obtained fibers can be easily reused for a new second layer L**2**. Therefore, it is possible to provide a method for manufacturing a garment fabric F that is easy to reuse repeatedly.

[0108] For example, it becomes easy to recreate clothes or the like which are personally cherished into new garment fabric for clothing. By this, it becomes easy to regenerate an old garment, remake it into a new garment, and continue to reuse it over generations.

3. EMBODIMENTS AND COMPARATIVE EXAMPLES

[0109] Hereinafter, the effects of the present disclosure will be described more specifically with reference to embodiments and comparative examples. FIGS. **5** and **6** show layer structures, manufacturing conditions, evaluation results, and the like of embodiments 1 to 6 and of comparative examples 1 to 5. In the following description, the embodiments 1 to 6 may be collectively and simply referred to as embodiments, and the comparative examples 1 to 5 may be collectively and simply referred to as comparative examples. It should be noted that the present disclosure is not limited to the following embodiments.

3.1. Making Garment Fabric for Recycling

[0110] As shown in FIGS. **5** and **6**, in the embodiments and the comparative examples, first, a garment fabric F**0** for recycling was created. Specifically, in the embodiments 1 to 5 and the comparative examples 1 and 2, the two-layer structure shown in FIG. **1** was applied as the garment fabric F**0** for recycling. In the embodiment 6 and the comparative examples 3 to 5, the three-layer structure shown in FIG. **2** was applied as the garment fabric F**0** for recycling. In the following description, the garment fabric F**0** for recycling is also simply referred to as fabric F**0**.

[0111] In the embodiment 1, a white cotton cloth was used as the fabric C for the material of the second layer L**2**. To be specific, as the material supply process S**2**, the fabric C was roughly shredded into substantially small rectangular pieces with long sides ranging from 1 mm to 30 mm by a cutter mill manufactured by Makino Sangyo Co., Ltd. In the production of the garment fabric F**0**, the removal process S**1** in the above embodiment was omitted, and the fabric C that had not undergone the removal process S**1** was used. Next, as the defibrating process S**3**, the small pieces were defibrated into fibers in the same manner as the defibrating process S**3** of the above embodiment.

[0112] Next, in the mixing process S**4**, the fibers and the binder were mixed at a weight ratio of 10:3 by air stirring. A thermoplastic resin was used as the binder.

[0113] Next, prior to the depositing process S**5**, the coloring process S**11** was performed on the white fabric N**1**. As fabric N**1**, a 0.1 mm-thick polyester nonwoven fabric was used. The fabric N**1** has a substrate layer L**1***b* made of polyester fibers and an adhesion layer L**1***a* containing thermo-plastic polyester. In the coloring process S**11**, not the entire surface of the fabric N**1** was colored, but an image was printed.

[0114] First, the surface of the fabric N**1** opposite to the adhesion layer L**1***a*, that is, the front side of the substrate layer L**1***b*, was pretreated. As the pretreatment liquid, a stock solution liquid of a pretreatment liquid PREGEN PCC for pigments manufactured by Epson Como Printing Technologies S.r.l. was diluted 10 times with pure water. Then, the pretreatment liquid was uniformly applied to the fabric N**1** with a bar coater. This was dried at 100° C. for 10 minutes as a

pretreatment.
[0115] Thereafter, using a textile inkjet printer ML-8000 manufactured by Seiko Epson Co., a picture of a fresh green forest was printed on the pretreated surface of the fabric N**1**. Then, the fabric N**1** was dried at 160° C. for 3 minutes to obtain fabric N**1** with the substrate layer L**1***b* surface colored.
[0116] Next, as the depositing process S**5**, the mixture was deposited on the surfaces of the adhesion layer L**1***a* of the fabric N**1** in the air to form a web W. At this time, the deposition amount of the mixture was adjusted so that the basis weight of the second layer L**2** was 130 g/m.sup.2.
[0117] Next, the adhering process S**6** for the three-layer structure was omitted, and the forming process S**7** was performed. In the forming process S**7**, the web W and the fabric N**1** were hot-pressed. At this time, AF-54TEN (product name) manufactured by Itsumi Co. was used as a heating press machine, and the heating condition was set to 150° C. for 1 minute, and the pressing condition was set such that the second layer L**2** in the fabric F**0** was 0.31 mm thick. In the embodiment 1, the second layer L**2** was not subjected to surface treatment. Then, as the cutting process S**8**, the cloth was cut into a cut form sheet of 250 mm in length and 100 mm in width by a cutter to prepare the fabric F**0** of the embodiment 1.
[0118] In the embodiment 2, a fabric F**0** was prepared as in the embodiment 1.
[0119] In the embodiment 3, the fabric C serving as the material for the second layer L**2** was changed from that of the embodiment 1. Specifically, a blue cotton cloth dyed with a dye was used as the fabric C. In other words, the second layer L**2** was white in the embodiment 1, whereas the second layer L**2** was blue in the embodiment 3. A fabric F**0** of the embodiment 3 was produced in the same manner as in the embodiment 1 except for the above.
[0120] In the embodiment 4, the fabric C as the raw material for the second layer L**2** was changed from that in the embodiment 3. Specifically, a red cotton cloth dyed with a dye was used as the fabric C. In other words, the second layer L**2** was blue in the embodiment 3, while the second layer L**2** was red in the embodiment 4. A fabric F**0** of the embodiment 4 was produced in the same manner as in the embodiment 1 except for the above.
[0121] In the embodiment 5, with respect to the embodiment 1, the deposition amount of the mixture was adjusted so that the basis weight of the second layer L**2** was 100 g/m.sup.2. The fabric F**0** of the embodiment 5 was produced in the same manner as in the embodiment 1 except for the above.
[0122] In the embodiment 6, a three-layer structure was applied to the embodiment 1 having a two-layer structure. Specifically, after performing the steps up to the depositing process S**5** as in the embodiment 1, the adhering process S**6** was performed. To be specific, the fabric N**1** for the first layer L**1** that was used in the embodiment 1, is applied as the fabric N**2** that becomes the third layer L**3** to form a three-layer structure. Therefore, the surfaces of the substrate layer Lib of the first layer L**1** and the surfaces of the substrate layer L**3***b* of the third layer L**3** are colored. A fabric F**0** of the embodiment 6 was produced in the same manner as in the embodiment 1 except for the above.
[0123] In the comparative example 1, a fabric F**0** was produced in the same manner as in the embodiment 1.
[0124] In the comparative example 2, the fabric F**0** was produced as in the embodiment 3.
[0125] In the comparative examples 3, 4, and 5, the fabric F**0** was produced in the same manner as in the embodiment 6.
3.2. Evaluation of Peelability in the Removal Process
[0126] For each fabric F**0** of the embodiments and comparative examples, the ease of peeling between the second layer L**2** and the other layer in the removal process S**1** was evaluated as the evaluation of the peelability. To be specific, each fabric F**0** was subjected to any one of the following peeling methods **1** to **3** and evaluated according to the following evaluation criteria. The evaluation results are shown in FIGS. **5** and **6**. In comparative examples 1, 2, and 5, the removal process S**1** was omitted, and the two-layer or three-layer garment fabric F**0** was directly evaluated

as described below. In the comparative example 3, the removal process S**1** was performed only on the third layer L**3** of the three-layer structure, and the first layer L**1** remained integrated with the second layer L**2**. In the comparative example 4, the removal process S**1** was performed only on the first layer L**1** of the three-layer structure, and the third layer L**3** remained integrated with the second layer L**2**.

Peeling Method

[0127] 1: A claw was used to catch on the end section of the substrate layer L**1***b*, and the first layer L**1** and the second layer L**2** were peeled off from the end portion.

[0128] 2: The surface of the substrate layer Lib was heated for 2 minutes with a dryer, and then the first layer L**1** and the second layer L**2** were peeled off from the end section. With respect to the fabric F**0** of the comparative examples 5 and 6, the surface of the layer to be peeled was peeled by heating in the same manner as described above.

[0129] 3: The surface of the substrate layer L**1***b* was heated for 2 minutes with a dryer, and then the first layer L**1** and the second layer L**2** were peeled off from the end section. Next, the surface of the substrate layer L**3***b* was heated for 2 minutes with a dryer, and then the third layer L**3** and the second layer L**2** were peeled off from the end section.

Evaluation Criteria

[0130] A: Interfacial peeling occurred between the second layer L**2** and another layer.

[0131] B: Cohesive failure did not occur in the second layer L**2**, but cohesive failure occurred in other layers, and a small amount of a part of the first layer L**1** or the third layer L**3** remained on the second layer L**2**.

[0132] C: Cohesive failure occurred in the second layer L**2**. Alternatively, cohesive failure of other layers was significant, and most of the first layer L**1** and the third layer L**3** remained on the second layer L**2**.

3.3. Manufacture of Garment Fabric with Recycled Cloth

[0133] A new garment fabric F**1** was produced using the second layer L**2** separated as described above, the fabric F**0** as it was, and the second layer L**2** with the other layers left. To be specific, as the removal process S**1**, production was started from the material supply process S**2** for both the standard at which the above evaluation was performed and the standard at which all or a part of the peeling was omitted. In each of the embodiments and the comparative examples, the method for preparing the fabric F**0** was applied again to prepare garment fabric F**1**. In the following description, a newly produced garment fabric F**1** is also referred to simply as the fabric F**1**.

3.4. Evaluation of Color Tone

[0134] For each fabric F**1** of the embodiments and the comparative examples, the color tone of the second layer L**2** was evaluated. To be specific, the color tone of the second layer L**2** of the fabric F**1** and the color tone of the fabric C used for the second layer L**2** of the fabric F**0** were visually compared and evaluated according to the following evaluation criteria. The evaluation results are shown in FIGS. **5** and **6**. The color tone of the fabric C is the color tone of the fibers used in the fabric C.

Evaluation Criteria

[0135] A: Color tones of both look the same.

[0136] C: There is a difference between the two color tones, and they do not look the same.

3.5. Evaluation of Designability

[0137] Garments were produced from each fabric F**1** of the embodiments and the comparative examples, and a sensory evaluation was performed on the designability of the garments at each level. Specifically, the design of the produced garments was evaluated according to the following evaluation criteria. The evaluation results are shown in FIGS. **5** and **6**.

Evaluation Criteria

[0138] A: The color tone of the fabric and the printed image are as intended by the designer.

[0139] C: The color tone of the fabric and the printed image are not as intended by the designer.

3.6. Summary of Evaluation Results

[0140] As shown in FIG. **5**, all embodiments were rated B or

[0141] higher for peelability, which is considered acceptable. In particular, in the embodiments other than the embodiments 1 and 3, the evaluation was A corresponding to good, and it was shown that the garment fabric F**0** for recycling has excellent peelability. In the evaluation of color tone, all embodiments were evaluated as A, which corresponds to good, and it was shown that the second layer L**2** of the new garment fabric F**1** maintained the color tone of the fabric C used as the starting material. In the evaluation of designability, all embodiments e rated as A, which corresponds to good, and it was shown that there was no change in the color tone of the second layer L**2**, and the designability and the degree of freedom thereof were improved.

[0142] On the other hand, in the evaluation of the peelability of the comparative examples, good peelability was confirmed in the comparative examples 3 and 4 as in the embodiments.

[0143] In the evaluation of color tone of the comparative examples, the evaluation was C, which corresponds to failure, at all levels. In the comparative examples 1, 2, and 5, since the layers other than the second layer L**2** were reused without being removed, the colors of the printing of the other layers were mixed. Further, also in the comparative examples 3 and 4, since one of the layers was left as the second layer L**2** and reused, the color of the print of the remaining layer was mixed.

[0144] In the evaluation of the designability of the comparative examples, the evaluation was C, which corresponds to failure, at all levels, and it was found that the influence of the color tone of the second layer L**2** influences the designability.

Claims

1. A method for producing garment fabric comprising: a removal process of removing a first layer from a used garment fabric having a multilayer structure including the first layer and a second layer, the second layer having fibers; a defibrating process of defibrating the second layer using a dry method and of extracting the fibers; a mixing process of mixing the fibers with a treatment agent to form a mixture containing no coloring agents; a depositing process for creating a web as a new second layer by depositing, in air, the mixture on an air-permeable fabric that becomes a new first layer; and a forming process of forming by pressing and heating the fabric and the web.

2. The method for producing garment fabric according to claim 1, wherein the fibers are composed of white fibers.

3. The method for producing garment fabric according to claim 1, further comprising: after the depositing process and before the forming process, an adhering process of adhering a fabric, which becomes a third layer, to the surface of the web.

4. The method for producing garment fabric according to claim 1, further comprising: before the depositing process, a coloring process of coloring the fabric to be the new first layer with a pigment ink.

5. The method for producing garment fabric according to claim 4, further comprising: before the coloring process, a pretreatment process of performing pretreatment on the fabric that becomes the new first layer.