MANUFACTURING PROCESS AND ITS PRODUCT FOR CONDUCTIVE FABRIC

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ABSTRACT

The invention relates to a manufacturing process and product for conductive fabric. The process uses metallic yarn and natural fiber as raw material. Metallic yarn is subject to a braiding step to wrap around staples (like natural wool, rabbit hairs or far IR treated wool or rabbit hairs etc.). In this step, silk (like rubber silk, stainless steel silk, wool etc.) is added to enhance the durability and also form conductive fabric in large size. Besides, color selection is made for the conductive fabric through a dying step for the yarn, which is prior to the formation of conductive fabric. Further, when it is for medical application, the object fabricated by the said conductive fabric can be connected to a current controller for appropriate current supply to attain electrotherapy effect. Since conductive fabric is formed by natural staples, its surface provides a long product life by repeated use directly.

- Raw material selection
- Braiding
- Weaving
- Product
Fig 1
Raw material selection → Dying

Braiding

Weaving

Product

Fig 4
MANUFACTURING PROCESS AND ITS PRODUCT FOR CONDUCTIVE FABRIC

FIELD OF THE INVENTION

[0001] The present invention relates to a fabrication technology that is used for conductive fabric. Especially, it is a new process that is distinguished from the traditional process for conductive fabric.

BACKGROUND OF THE INVENTION

[0002] Regarding current electronic pulse massagers on the market of medical care equipment, the dominant products have the practical function in electrotherapy, which uses small power and low current to generate neural stimulation to certain spots of human body and promote blood circulation. The product is mainly composed of conductive fabric having contacts with human skin and a controller having functional options and wire connection. Wherein, the conductive fabric is made from a composite layer that contains a substrate, nickel and copper sulfide. In addition, on end of the electroplated conductive fabric has conductive adhesive, while the other end has conductive fastener. The adhesive is used for positioning on human skin, while the conductive fastener uses connection between wires and a controller to attain electrotherapy effect.

[0003] Although the present electronic pulse massager may achieve certain electrotherapy effect and possesses value to medical application, it is found to have the following shortcomings after the inventor’s careful review.

[0004] 1. The conductive adhesive is not made of environment-friendly material and causes the problem with environmental protection after disposal. Besides, the conductive adhesive has poor gas permeability, so patients with sensitive skins will get skin allergy easily and have very uncomfortable feeling.

[0005] 2. The small size of the conductive fabric results in limited therapy area and poor therapy effect. Further, due to the limitation on conductive adhesive quantity, repeated use is necessary. Further, there exists a potential hygiene problem and an additional cost for re-purchase of the conductive adhesive.

[0006] 3. Furthermore, since conductive adhesive is required for the electroplated conductive fabric to obtain conductivity, water rinse for hygiene reason causes function loss for the conductive adhesive.

[0007] Therefore, from the above discussion, it is necessary to improve the traditional electrical pulse massager. Besides, with the rapid change in a new era, the importance of simple and easy medical auxiliary equipment at home becomes increasingly apparent. In many situations, the easy access to such products provides a great help to users, especially when most people accept the products mostly with electrotherapy function and their performance.

[0008] In view of this, to make easy use of such electrical pulse massager by the general population and assure the therapy effect after using such equipment, the inventor used various kinds of raw materials and process to conduct experiments and improvement. Finally, the inventor accomplished an innovation about “a manufacturing process and its product for conductive fabric”.

SUMMARY OF THE INVENTION

[0009] The primary objective for the invention of “a manufacturing process and its product for conductive fabric” is to improve the electroplated conductive fabric, which is made by the traditional manufacturing process and has structural shortcomings, such as being unwashable, failing to meet hygiene and environmental protection requirements, and even poor performance in use. The invention provides a new manufacturing process for conductive fabric and the finished products made of such conductive fabric. For example, when ceramic powder is blended into fabric products, it has advantages like strong adhesion and durability. When consumers buy such fabric products, they are exposed to the far IR irradiated from ceramic powder and achieve the medical effect on promoting blood circulation.

[0010] Another objective for the present invention of “a manufacturing process and its product for conductive fabric” is to dye the natural fiber to fabricate it into large conductive fabric with the preferable color for end users, which allows a comfortable feel and a broad range of color selections.

[0011] To make the examiners to further understand the present invention of “a manufacturing process and its product for conductive fabric” regarding the objective, characteristics and advantages, the following description will provide details for the entire process in the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 shows a flow diagram for the present invention.

[0013] FIG. 2 shows a type diagram for a preferable embodiment in the present invention.

[0014] FIG. 3 shows a decomposition diagram for a preferable embodiment in the present invention.

[0015] FIG. 4 shows another flow diagram for the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] The present invention provides a manufacturing process and its product for conductive fabric. The contents will include two parts, the manufacturing process and the products made from the conductive fabric. Please refer to FIG. 1 and the following description:

[0017] (1) Manufacturing Process: First, raw material selection should be considered.

[0018] The raw materials include metallic yarn with good conductivity and preferably diameter range within 0.035~0.08 mm. They can be natural (staple) fiber such as wool and rabbit hairs, or far IR treated silk, or elastic silk etc. Since far IR beam is a kind of physical irradiation, which features in strong warming and heating function that significantly helps on metabolism, blood circulation, enzyme growth and tissue recovery etc., it is frequently used for medical purpose. For the same reason, to enhance the therapy effect of the product from the conductive fabric made
in the said manufacturing process, it is desirable to use far IR silk as the raw material for conductive fabric.

[0019] Second consideration is the processing equipment:

[0020] With the use of the above raw materials like metallic yarn and natural fiber, a special equipment for yarn feeding is adopted for yarn braiding operation, which allows the natural fiber to be wrapped up by metallic yarn to an extent (without broken yarn) that 3–25 coils of metallic yarn wrap up 1 cm natural fiber. Thus, uniform flatness of the metallic yarn surface can be achieved to increase the application stability for electrical pulse massager.

[0021] Then, it is the fabrication of the conductive fabric.

[0022] The above coiled metallic yarn is subject to a weaving process through yarn feeding apparatus. Meanwhile, adding silk, such as rubber silk, stainless steel silk, far IR silk and wool can enhance durability. Therefore, when large conductive fabric is formed, it has antiseptic and odor preventive characteristics in addition to uniformity, durability and compliance with environmental protection requirement.

[0023] (2) Products:

[0024] The above-mentioned conductive fabric is fabricated into different types of products to meet requirements in practical application such as medical therapy by electrical pulse massager. For further details, please refer to FIGS. 2 and 3, which disclose an auxiliary handheld device 10 that the conductive fabric is fabricated into cylindrical shape with seamless airtightness. At a proper position of the said device 10 there is a male conductive fastener 11 connected with a matching female conductive fastener 12 by wire 13, together with a controller 14 to regulate the current through the conductive fabric. When electrotherapy is underway, electric current of appropriate intensity is continuously discharged to stimulate patient’s terminal nerves in certain areas. In the meantime, the far IR silk inside the conductive fabric is activated due to heat generated from continuous current passage, which further promotes patient’s blood circulation and metabolism.

[0025] It is worth to mention that the said manufacturing process for conductive fabric was developed by the inventor based on many times of careful experiment and the derived optimum data about coiling metallic yarn around natural fiber. It was found that 1 cm natural fiber wrapped up with 3–25 coils of metallic silk is the best suitable configuration in the manufacturing process for the present invention. Accordingly, conductive fabric with optimal density and flatness is obtained to provide a stable and desired therapy.

[0026] Again, please refer to FIG. 4 for the flow diagram for another embodiment, which describes that in the above-mentioned fabrication process for conductive fabric, natural fiber is subject to direct dying, followed by the existing braiding and weaving operation to make finished products. Thus, conductive fabric can be made with any kind of color. So the finished products will have broad range of color selection and achieve an aesthetic sense without monotonous impression.

[0027] Besides, the braided finished products can be used to many different applications, such as static elimination, electromagnetic wave shielding, cutting resistance, raw materials for conductive yarn and electrical pulse massager therapy etc.

[0028] To summarize the above, the finished products of conductive fabric should have the following advantages:

[0029] 1. Large contact area
[0030] 2. Suitable for any part of human body
[0031] 3. Good gas permeation, soft, comfortable and easy to use
[0032] 4. Antiseptic, odor prevention and good hygiene effect
[0033] 5. Good for repeated wash and compliant with environmental protection requirement

[0034] 6. Low cost

[0035] In general, the manufacturing process and its product for conductive fabric in the present invention show excellent performance as applied practically, which is sufficient to be considered as an innovation. Accordingly the application is submitted for approval.

1. A manufacturing process and its product for conductive fabric, characterized by following procedures:

A. Raw material selection:

Raw materials include conductive metallic yarn and natural (staple) fiber, or far IR treated silk or elastic rubber silk;

B. Braiding:

Special equipment is used for braiding operation to wrap up natural fiber with metallic yarn to an extent that optimum density is achieved.

C. Weaving:

Then above-mentioned coiled metallic yarn is subject to weaving operation through a special yarn-feeding device. In said process, rubber silk, stainless steel silk and wool are added to increase durability and fabricate into large area of conductive fabric with desired flatness, uniformity and durability.

2. The manufacturing process and its product for conductive fabric of claim 1, wherein diameter of metallic yarn is between 0.035–0.08 mm.

3. The manufacturing process and its product for conductive fabric of claim 1, wherein natural fiber is wrapped up with metallic yarn to an extent that 1 cm natural fiber has 3–25 coils of metallic yarn.

4. The manufacturing process and its product for conductive fabric of claim 1, wherein said conductive fabric can be fabricated into any type of finished products having conductive fasteners at a proper position and is connected through wire with a controller.

5. The manufacturing process and its product for conductive fabric of claim 1, wherein said natural fiber raw material is subject to direct dying treatment, followed by braiding operation and weaving operation before finished products are made, thus, conductive fabric with broad range of color selection can be made.