This invention, the producing method for the non woven silk fabric, of the characteristics to include the major processes of obtaining the pure filaments from the silk worm cocoons, of beating the of the pure filaments and of evaporating the Korean abelmosk glue onto the surface of the sheets of the filaments beaten to make as the stable fibrous tissue of the non woven fabric is based on the idea to find out the new way of using the silk material otherwise than the conventional one as the woven fabric for thousands years. Such attempt could be met with solving the technical tasks of dis-organizing the natural non woven fabric of the cocoons itself and reorganizing it to the human needs. Eventually, we have come to get the non woven silk fabric, the new natural resources for the padding of the garments, the wall paper and the purifying filters, e.t.c.
Manufacturing process flow chart

☐ the cutting process
☐ the boiling process
☐ the washing process
☐ the drying process
☐ the beating process
☐ the adhesive agent jetting process
☐ the drying process
☐ the ironing process
☐ the trimming process
☐ the completion
Proper machine system design
PRODUCING METHOD FOR NON WOVEN SILK FABRIC

BRIEF DESCRIPTION OF DRAWINGS

[0001] 1. Drawing 1 shows the manufacturing process of the non woven silk fabric flow chart according to the invention.

<The Explanation on the Indicating Numbers of the Major Parts of Drawing 1>

[0002] 10: the process of the cutting of the cocoons
[0003] 20: the process of the boiling
[0004] 40: the process of the drying
[0005] 60: the process of the jetting of the adhesive agent
[0006] 70: the process of the drying
[0007] 90: the process of the trimming

[0008] 2. Drawing 2 shows the proper machine system for the manufacturing of the non woven silk fabric according to the invention.

<The Explanation on the Indicating Numbers of the Major Parts of Drawing 2>

[0009] ① and ②: the beating device
[0010] ④: the jetting of the adhesive agent device
[0011] ⑤: the drying device
[0012] ⑦ and ⑧: the trimming device

PRECISE DESCRIPTION OF THE INVENTION

1. Technical Field

[0013] This invention regarding to the manufacturing method for the non woven silk fabric, is more concretely about the mechanical produce of the non woven silk fabric with splitting of the cocoon, getting rid of the wax composite at the high temperature and pressure, extracting of the only fibroin, the pure fabric materials, the primary forming through the beating and the completion of the shape with the adhesive agent, the Korean paper mulberry glue.

[0014] 2. Background Art

[0015] As already known wide, the silk fabric was developed some thousands years ago and the way to acquire the silk fabric that the cocoons constructed by the silk worm are boiled, the yarn is drawn manually or by machine from the boiled cocoons and the silk fabric is woven with the yarn and the thread is continuously inherited for thousands years.

[0016] Besides such traditional know how to get the silk fabric, it seems very rare idea to try to procure practically not the woven but the non woven fabric from the cocoons, let alone the theory.

[0017] As the result of looking over the key word, “non woven silk fabric” through the automatic researching system of Korea Institute of Patent Information under Korean Intellectual Properties Office, it becomes found that the following 2 patents had been registered.


[0019] The gist of this invention is regarding to the method of getting sort of the non woven silk fabric, the alternative sheet-like cocoon instead of the normal oval one, which the silk worms that are ready to pour out the drainage of the liquid

yarn after the fifth silk worm age at the 26th days around from the birth make on the silk worm web, the vertical wall of which is not built, under the human surveillance.

[0020] 2. Non-Woven Fabric comprising ultra-fine fibre of the silk-like materials and the making method thereof, of Application No. 10-2003-7011871 of Application Date, the 9 Nov. 2003

[0021] The contents of this invention is regarding to the non woven fabric from the silk fibroin and/or the ultra fine fibre of the silk-like material being dissolved in the hexafluoroacetoeten hydrate or the solvent, the main component of which is the hexafluoroacetoeten hydrate is electrospun and formed of the filaments.

[0022] Except the above, the other invention is the “manufacturing method of the non woven fabric hard to inflame” (the application no. 20-2003-0039912, the application date of Dec. 23, 2003), which has been applied by the inventor of this know how. The idea of the above patent is about the manufacturing method for the non woven silk fabric, which is to obtain the pure fibroin from the silk worm cocoons cut a piece, boiled at the high pressure and temperature, to clean, wash and beat it, to dissolve it fractured and segmented again in the water, to add the adhesive glue to it, to scoop up it of the sheet shape with the wooden web wire for the Korean paper mill, to dry it and finally to get the non woven silk fabric, so to speak utterly manually.

DISCLOSURE OF INVENTION

[0023] As might be known in the above, this invention can be one of the most suitable way to automate the production of the non woven silk fabric, being the utmost method to acquire the non woven silk fabric more effectively with lesser efforts and costs than the any other conventional ones.

[0024] The silk worm cocoon is composed of some wax, sericin part and the filaments of the fibroin of the pure protein over 77%. As it were, the silk worms make the cocoon, the natural non woven fabric from their filaments fixed in its own way. Since such non woven fabric can’t be utilized to the human needs, there arises the necessity to disorganize and to reorganize it to our want. Upon such basic premise, the 3 following technical tasks for this invention to achieve can be referred.

[0025] The first one is the technique of the separation of the 2 major composition of the cocoon. The way adopted by this invention to this effect is to execute the process of dissolving and removing the waxen part at the water of the high degree of the temperature under the high pressure.

[0026] The second one is that of the prime forming of the separated pure filaments as the base of the non woven fabric. To solve this task, we intended to apply the beating machine which has been used to handle the cotton and developed the beating system to meet the treatment of the new material.

[0027] The third one is that of the setting of the filaments primarily formed through the process of the beating into the more stable tissue of the fabric. This task could be reached at last by applying the Korean paper glass glue used at the traditional Korean paper mill (the vegetable adhesive made from the roots of the Korean abelmosk).

[0028] Upon the solve of the technical tasks as the above, we come to give the birth to the non woven silk fabric, totally
different from the natural nonwoven silk fabric in the point of view of the shape and the components.

**BEST MODE FOR CARRYING OUT THE INVENTION**

[0029] This invention is precisely explained as follows, with the reference to the drawing 1 and the drawing 2 affixed.

[0030] If the basic composition of this invention is examined at first, we can say the producing method for the nonwoven silk fabric by this invention has the characteristics to include, at the manufacture of it, the process of the split of the silk worn cocoons and the procure of the filament materials (10);

[0031] the process of boiling of the filament material procured through the above process (10) in the process tank at the high temperature and tension for the appropriate time and claiming of the filaments with the removal of the pollution and the waxen component (20);

[0032] the process of washing of the filaments claimed through the above process (20) in the industrial laundry and in the flowing distilled water (30);

[0033] the process of drying of the filaments washed through the above process (30) with the hot air (40);

[0034] the process of the 3 times, vertical and horizontal beating of the filaments dried through the above process (40)(50);

[0035] the process of evaporating the adhesive agent in the shape of the fog onto the filaments primarily formed through the process of the beating (50), which become more stable fibrous tissue thereafter (60);

[0036] the process of drying of the nonwoven fabric finally formed through the process of jetting of the glue (60), with letting it pass between the hot tubes (70);

[0037] the process of ironing of the nonwoven fabric dried hot through that of the drying (70)(80);

[0038] the process of trimming of the nonwoven fabric ironed through that of the ironing(80)(90).

[0039] Let us more precisely describe on this invention according to the desirable example of the conduct as follows.

[0040] The silk worm cocoons, regardless of the classifiable or not, and the other by-products of them can be used and the oval ones have to be cut in half, from which the larvae with the shield membranes are removed.

[0041] For the next process, the pieces of the cocoons split into two through the above process of the cutting (10) is boiled in the 135°C hot water of the tanker of the 3 M/T to 3.5 M/T tension for 2 and half hours and the pure filaments, which are the collective of the fibrous constituted of the amino acid protein are obtained from the fragments of the cocoons through this process. As these fibroins are known to be composed of lots of fibrin, the hyper ultra fine threads in the range of nano meter thickness, at which the numberless pores can be observed with the aid of the electronic microscope, such structure could be declared to be one of the reasons why the nonwoven silk fabric has the nature to be of the affinity to the surrounding environment and to be beneficial to the human body.

[0042] After the filaments held together in the shape of the wad of the cotton wool are taken away from the boil of these cocoons, they meet the process of the washing (30), that has the two sub processes of boiling the wad of the filaments again at the 100°C hot water in the industrial laundry for 30 minutes and of letting it cleaned in the running water, purified like the diluted during 24 hours. The wad of the filaments, washed and cleaned through the process of the washing (30) is dried fully through the process of the drying (40) and thereafter, bears the appearance of the fibrous tissue interlocked densely.

[0043] As the wad of the filaments is evenly spread in front of the inlet of the beating machine, the process of the beating (50) that the beating devices beat and elongate it 3 times vertically and horizontally to make the outlook of the soft cotton wool follows.

[0044] The next important process is that of jetting of the adhesive agent (60), i.e., that the Korean paper glue made from the roots of the Korean abelmosk in the shape of the fog is permeated evenly onto the surface (in the case of the nonwoven silk fabric for the filter or the wall paper) or the both faces (in the case of the nonwoven silk fabric for the padding of the garments) of the filaments sheet already formed in a certain breadth and thickness through the previous process of beating (50), while it passes the glue evaporating system and the stabilized fibrous tissue as the nonwoven fabric is fixed finally.

[0045] Thereafter, through the process of the drying (70) that the nonwoven silk fabric almost completed through the process of the glue jetting (60) is dried with going between the heated iron tubes and through that of ironing (80) to make the appearance and the shape neat and that of the trimming (90) to adjust the edge and the measure, the make of the nonwoven silk fabric is finished.

[0046] The nonwoven silk fabric manufactured through the above processes can be roughly classified 2 kinds of the one in the shape of the flat sheet and the another in the form of the sheet felt like downy with some thickness according to the way of the adhesive agent evaporation and be used for the filters, wall papers and the garments padding e.t.c., respectively according to the shape and form.

**INDUSTRIAL APPLICABILITY**

[0047] The human kind has got the new material which is affiliated to the environment as a natural substance, beneficial to the human body, hard to inflame when set fire to and at the same time, incomparably surpassing in the easiness of being tailored, sewed and filled between the outer fabric of the clothes and the interlining when used as the padding of the garments, compared with the similar kind of the padding material as the cotton wool, the wool, the duck down and the goose down, e.t.c.

1. At producing of the nonwoven silk fabric, the producing method that has the characteristic to comprise the following proper processes:

   - the process of cutting of the cocoons (10), that the cocoons be split half and the innate larvae with the surrounding protect membranes be removed;

   - the process of the boiling (20), to obtain the refined filaments with boiling the filaments material got through that of cutting of the cocoons (10) in the hyper pressure tank at the pressure of 3 to 3.5 metric tons at the high temperature of 135°C for 2.5 hours and with the impurities such as the tainted materials and the waxen component being got rid of;

   - the process of the washing (30), to clean the filaments obtained through that of the boiling (20) in the industrial laundry with the hot water of 100°C for 30 minutes and to wash thereafter in the pure or distilled water running for 24 hours;
the process of the drying (40), to dry the filaments cleaned and washed through that of the washing (30) in the hot air dryer;
the process of the beating (50), to beat the filaments dried through that of the drying (40) 3 times vertically and horizontally for the wad of the filaments to make 1.5 mm thick after beaten;
the process of jetting of the adhesive agent (60), to jet the vaporized Korean paper mulberry glue evenly onto the surface of the filaments (in the case of the non woven fabric for the filters or the wall paper) or the both faces of the filaments (in the case of the non woven fabric for the padding of the garments) formed in a certain breadth and thickness primarily through that of the beating (50) to make the stable fibrous tissue of the final forming with letting the filaments pass through the jetting device;
the process of the drying (70), to dry the non woven silk fabric formed through that of jetting of the adhesive agent (60) between the hot iron tubes;
the process of the ironing (80), to iron the non woven silk fabric dried through that of the drying (70);
the process of the trimming (90), to trim the non woven silk fabric ironed through that of the ironing (80).

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