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(54) **NON-WOVEN FIBROUS FABRIC AND PRODUCTION EQUIPMENT THEREFOR**

(57) The invention discloses a kind of nonwoven fabric, which contains the directly-formed fibers disposed in fabric and arranged in a V-shaped pattern, and 65-75% of every fiber is melt-blown and the rest is polyester staple fiber so that it can form continuous, fluffy and resilient fabric structure without large voids; it also discloses a kind of nonwoven fabric manufacturing apparatus, comprising a receiver, a carding machine located at the upper of the left side of the receiver and a screw extruder located

at the upper of the right side of the receiver, also a spinneret plate connected to the bottom of the screw extruder, and a lapper between the carding machine and the receiver with an electrostatic generating device below the spinneret plate. Looked over the longitudinal and vertical cross-sections, this fabric is in a V-shaped arrangement, with high degree of filling as well as the desired bulkiness and uniformity.

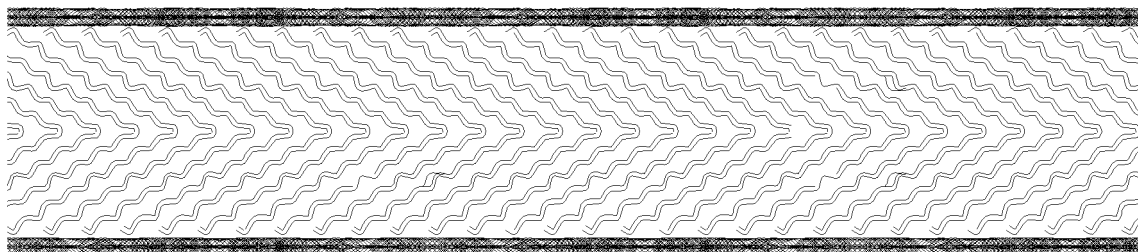


FIG.1

## Description

### Technical Field

**[0001]** The invention relates to a kind of nonwoven fabric, especially relates to a kind of melt-blown nonwoven fabric in a V-shaped arrangement when it is observed from the longitudinal and vertical cross-sections, also relates to a V-shaped nonwoven fabric manufacturing apparatus.

### Background Art

**[0002]** Nonwoven products is common enough in everyday life, such as diapers, sanitary pads, rags, products in filter categories and so on, and a number of important performance of nonwoven products should be implemented through superfine fiber net, so the melt-blown quality of superfine fiber net is the difficult point of the nonwoven fabric machining.

**[0003]** The nonwoven fabric in the current technology is mainly melt-blown from polypropylene fiber filled with the air in high temperature and high pressure, then looked over the cross section of the product, the center part of the fiber is arranged in chaotic irregular form, so that it is difficult to gain desired bulkiness and uniformity, and the degree of filling is relatively low.

### Disclosure of the invention

**[0004]** The invention aims to provide a kind of melt-blown nonwoven fabric in a V-shaped arrangement observed from its longitudinal and vertical cross-section.

**[0005]** In order to solve the technical problems, the invention employs the following technical solution: a kind of nonwoven fabric, which contains the directly-formed fibers disposed in fabric and arranged in a V-shaped pattern, and 65-75% of every fiber is melt-blown and the rest is polyester staple fiber so that it can form continuous, fluffy and resilient fabric structure without large voids.

**[0006]** The light transmittance of such a fabric allows no more than 2% of change.

**[0007]** The geometric diameter of the directly-formed fabric allows no more than 10 $\mu$ m.

**[0008]** The fabric has no more than 10cm in thickness, less than 50Kg/m<sup>2</sup> in density, and more than 100 MKS rays in acoustic resistivity.

**[0009]** The invention aims to provide a manufacturing apparatus to produce V-shaped melt-blown nonwoven fabric.

**[0010]** In order to solve the technical problems, the invention employs the following technical solution: a kind of nonwoven fabric manufacturing apparatus, comprising a receiver, a carding machine located at the upper of the left side of the receiver and a screw extruder located at the upper of the right side of the receiver, also a spinneret plate connected to the bottom of the screw extruder, and a lapper between the carding machine and the receiver

with an electrostatic generating device below the spinneret plate.

**[0011]** Furthermore, the electrostatic generating device comprises an electrostatic generator installed at the left side under the spinneret plate and an electrostatic receiver installed at the right side under the spinneret plate.

**[0012]** Moreover, the Voltage between the electrostatic generator and the electrostatic receiver is 60-100Kv, and the Frequency is 20-30KHz, and the Current is 0.2-0.8mA.

**[0013]** Beneficial effects of the invention: during the operation of this apparatus, melt-blown fibers go from the screw extruder to the spinneret plate, then go down under the effect of air in high temperature and high pressure, goes by the electrostatic generating device and then falls on the receiver; after carding by the carding machine and lapping by the a lapper, the polyester staple fibers fall down to the electrostatic generating device, which is between the electrostatic generator and the electrostatic receiver and loads charges by electric field, so imports the polyester staple fibers to the melt-blown fibers; the mixture eventually interwine into nonwoven fabric which is in a V-shaped arrangement when observed from the longitudinal and vertical cross-sections. The nonwoven fabric of this invention has relatively high degree of filling, the desired bulkiness and uniformity, and fine sound and heat insulation.

### Brief Description of Drawings

#### **[0014]**

Figure 1 is the sectional view for the nonwoven fabric of the invention;

Figure 2 is the structure diagram for the manufacturing apparatus of the invention.

### Best Mode for Carrying out the Invention

**[0015]** The invention will be further described in detail with the help of attached drawings.

**[0016]** As shown in Figure 1, the invention discloses a kind of nonwoven fabric, which contains the directly-formed fibers disposed in fabric and arranged in a V-shaped pattern, and 65-75% of every fiber is melt-blown and the rest is polyester staple fiber so that it can form continuous, fluffy and resilient fabric structure without large voids, PP fibers and PET fibers should occupy 65% and 35% respectively in the first specific embodiment, then 75% and 25% in the second specific embodiment, then 70% and 30% in the third embodiment. The nonwoven fabric of this invention has high degree of filling, the desired bulkiness and uniformity, and fine sound and heat insulation with following detailed indicators: The light transmittance of such a fabric allows no more than 2% of change, and the geometric diameter of the directly-formed fabric allows no more than 10  $\mu$ m, and the fabric

has no more than 10cm in thickness, less than 50Kg/m<sup>2</sup> in density, and more than 100 MKS rayls in acoustic resistivity.

**[0017]** The surface characteristic of the fabric of the invention can be similar to that of other kinds of nonwoven fabric, and the characteristic changes from rather open and porosity to tight in various degrees and decreasing porosity; the fiber insulativity of the fabric of the invention is normally irrelevant to the materials it is made up from; the fibers used in this invention can be formed from the materials almost forming any kind of fibers, and the typical polymers to form melt-blown microfibers include polypropylene, polyethylene, polyethylene terephthalate, polyamide, and other widely-known polymers in this technological field, and all these materials can be used to form other kinds of fibers.

**[0018]** As shown in Figure 2, the invention discloses a manufacturing apparatus to produce V-shaped melt-blown nonwoven fabric, comprising a receiver 4, a carding machine 1 located at the upper of the left side of the receiver 4 and a screw extruder 2 located at the upper of the right side of the receiver 4, also a spinneret plate 3 connected to the bottom of the screw extruder 2, and a lapper 7 between the carding machine 1 and the receiver 4 with an electrostatic generating device below the spinneret plate 3. The electrostatic generating device comprises an electrostatic generator 5 installed at the left side under the spinneret plate 3 and an electrostatic receiver 6 installed at the right side under the spinneret plate 3, and the Voltage between the electrostatic generator 5 and the electrostatic receiver 6 is 60-100Kv, and the Frequency is 20-30KHz, and the Current is 0.2-0.8mA.

**[0019]** During the operation of this apparatus, (PP) slice goes from the screw extruder 2 to the spinneret plate 3, then leads the melt-blown fibers to go down under the effect of air in high temperature and high pressure, goes by the electrostatic generating device 5 and then falls on the receiver 4; after carding by the carding machine 1 and lapping by the a lapper 7, the polyester staple fibers fall down to the electrostatic generating device, which is between the electrostatic generator 5 and the electrostatic receiver 6 and loads charges by electric field, so imports the polyester staple fibers to the melt-blown fibers; the mixture gathers in the direction of the electrostatic receiver 6 when it is falling down, eventually interwine into nonwoven fabric which is in a V-shaped arrangement when observed from the longitudinal and vertical cross-sections.

fabric structure without large voids.

2. The nonwoven fabric as claimed in Claim 1 features that the light transmittance of such a fabric allows no more than 2% of change.
3. The nonwoven fabric as claimed in Claim 2 features that the geometric diameter of the directly-formed fabric allows no more than 10μm.
4. The nonwoven fabric as claimed in Claim 3 features that the fabric has no more than 10cm in thickness, less than 50Kg/m<sup>2</sup> in density, and more than 100 MKS rayls in acoustic resistivity.
5. A kind of nonwoven fabric manufacturing apparatus as claimed in Claim 1 features that it comprises a receiver (4), a carding machine (1) located at the upper of the left side of the receiver (4) and a screw extruder (2) located at the upper of the right side of the receiver (4), also a spinneret plate (3) connected to the bottom of the screw extruder (2), and a lapper (7) between the carding machine (1) and the receiver (4) with an electrostatic generating device below the spinneret plate (3).
6. A manufacturing apparatus as claimed in Claim 5 features that the electrostatic generating device comprises an electrostatic generator (5) installed at the left side under the spinneret plate (3) and an electrostatic receiver (6) installed at the right side under the spinneret plate (3).
7. A manufacturing apparatus as claimed in Claim 6 features that the Voltage between the electrostatic generator (5) and the electrostatic receiver (6) is 60-100Kv, and the Frequency is 20-30KHz, and the Current is 0.2-0.8mA.

## Claims

1. A kind of nonwoven fabric features that it contains the directly-formed fibers disposed in fabric and arranged in a V-shaped pattern, and 65-75% of every fiber is melt-blown and the rest is polyester staple fiber so that it can form continuous, fluffy and resilient

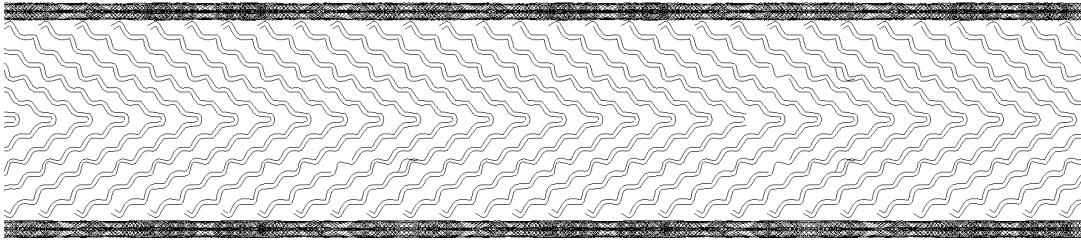


FIG.1

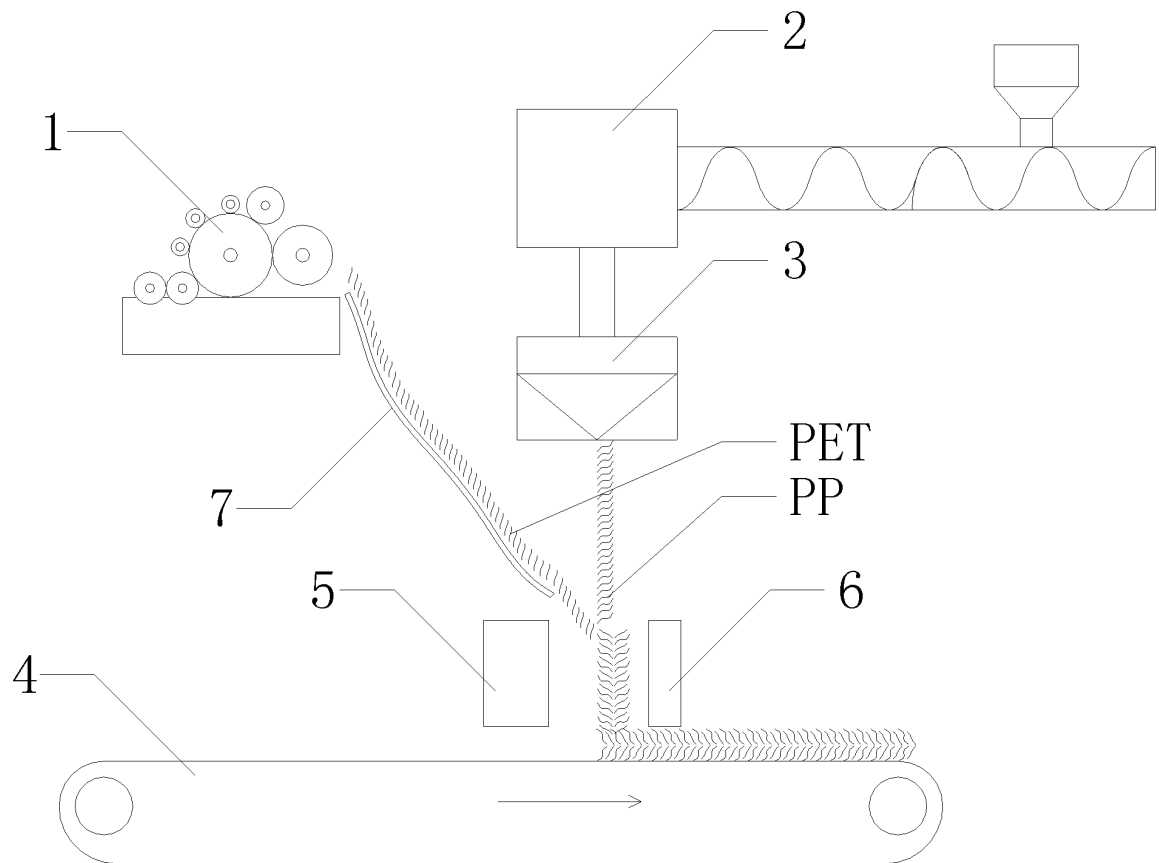


FIG.2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/001269

## A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: D04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CNPAT, WPI, EPODOC: POLYESTER, PP, PET, EXTRU+, MELT w BLOWN, CUT w FIB?R?, STAPLE, SHORT w FIB?R?

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                  | Relevant to claim No. |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| PX        | CN 102560895 A (GUANGZHOU SUNTAI AUTO INTERIOR MATERIAL CO., LTD.) 11 July 2012 (11.07.2012) claims 1-7                             | 1-7                   |
| PX        | CN 202390637 U (GUANGZHOU SUNTAI AUTO INTERIOR MATERIAL CO., LTD.) 22 August 2012 (22.08.2012) description, pages 1-2 and figure 1  | 1,5-7                 |
| X         | CN 101230521 A (CHANGSHU WEICHENG NON WOVEN EQUIPMENT CO., LTD.) 30 July 2008 (30.07.2008) description, embodiment, figures 1-4     | 1                     |
| X         | CN 201165591 Y (CHANGSHU WEICHENG NON WOVEN EQUIPMENT CO., LTD.) 17 December 2008 (17.12.2008) description, embodiment, figures 1-4 | 1                     |
| A         | JP 201064010 A (JAPAN VILENE CO., LTD.) 25 March 2010 (25.03.2010) the whole document                                               | 1-7                   |

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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| * Special categories of cited documents:                                                                                                                                | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                              |
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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Date of the actual completion of the international search<br>04 December 2012 (04.12.2012)                                                                                                                   | Date of mailing of the international search report<br><b>07 February 2013 (07.02.2013)</b> |
| Name and mailing address of the ISA<br>State Intellectual Property Office of the P. R. China<br>No. 6, Xitucheng Road, Jimenqiao<br>Haidian District, Beijing 100088, China<br>Facsimile No. (86-10)62019451 | Authorized officer<br>LIU, Liyan<br>Telephone No. (86-10) <b>62085534</b>                  |

Form PCT/ISA /210 (second sheet) (July 2009)

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/CN2012/001269**

| Patent Documents referred<br>in the Report | Publication Date | Patent Family  | Publication Date |
|--------------------------------------------|------------------|----------------|------------------|
| CN 102560895 A                             | 11.07.2012       | None           |                  |
| CN 202390637 U                             | 22.08.2012       | None           |                  |
| CN 101230521 A                             | 30.07.2008       | CN 100587146 C | 03.02.2010       |
| CN 201165591 Y                             | 17.12.2008       | None           |                  |
| JP 201064010 A                             | 25.03.2010       | None           |                  |

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/001269

Continuation of: A. CLASSIFICATION OF SUBJECT MATTER

D04H 1/728 (2012.01) i

D04H 13/00 (2006.01) i