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(54) Elastic air textured yarn and its manufacturing method

(57) The present invention relates to an air textured yarn with elastic character, of which the purpose is to eliminate the shortcoming of making one comfortless while wearing clothes made of conventional air textured yarn by its lack of elasticity; the present invention is characterized in: the inner core yarn, which is made from the heat plastic fiber with self-curling elastic character, and the outer enclosing yarn, which is made from an appropriate heat plastic fiber in accordance with the function need of various fabric, are air textured processed to manufacture a high class yarn with elastic character, which is of industrial applicability.

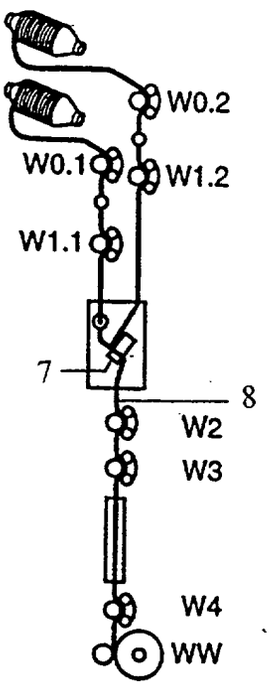

Fig 2

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Description

1. Field of the Present Invention

[0001] The present invention relates to an air textured yarn with elastic character, which is characterized in: After heat treatment, the elastic character of the air textured yarn of the present invention appears. The air textured yarn of the present invention comprises: an inner core yarn which is made from a heat plastic fiber with self-curling elastic character, and an outer enclosing effect yarn which is made from an ordinary heat plastic fiber. The air textured yarn, which is obtained from an air textured machine, is weaving-processed; then during dyeing and finishing processes, the heat plastic fiber with self-curling elastic character shrinks variedly, by utilizing the high temperature during processing, so as to endow the textile with an elastic effect.

2. Description of Prior Art

[0002] The conventional manufacturing method for air textured yarn mainly makes use of conventional polyester or polyamide synthetic profiled fiber, original fiber or processed yarn, as core yarn or effect yarn. As a result, the textile made of this kind of air textured yarn is so lack of elastic character that it is uncomfortable for all people who wears clothes made of this sort of textile.

[0003] In addition, other relevant manufacturer uses staple fiber to enclose LYCRA (Spandex) to produce staple fiber elastic covering yarn, or uses filament to singly/doubly enclose LYCRA (Spandex) or filament to be knotted with high speed air and to enclose LYCRA (Spandex) to produce long fiber elastic covering yarn. These kinds of yarn have elastic character; however, polyurethane filament (Spandex), not to mention the complexity of its process, has disadvantages listed as follows:

1. high cost due to its technical complexity on raw material and process;

2. unsuitable for dyeing and finishing due to its weak endurance against wet and heat; besides, it's apt to be brittle while modifying the color;

3. weak endurance against the base (NaOH), which slows down the processing;

4. tension during weaving, dyeing and finishing is hard to control due to its high elasticity; consequently, processing of it is extremely difficult so as to affect its quality and efficiency.

SUMMARY OF THE INVENTION

[0004] In view of said disadvantages of conventional products, the present invention discloses, after a deep research and many times of test, a high level air textured yarn which combines all advantages of various kinds of elastic covering yarn.

[0005] The self-curling elastic character of the elastic air textured yarn disclosed by the present invention does not appear before the heat treatment of dyeing and finishing, i.e., the elastic air textured yarn of the present invention has excellent dimensional stability which makes itself very easy to weave. Therefore, the elastic air textured yarn of the present invention is novel and valuably applicable to both weaving industry and clothing industry.

Brief Description of the Drawing Figures

[0006] In order to describe advantages of the present invention more in detail, the drawing figures are briefly described as follows:

Fig. 1 is a schematic process flow diagram of an air textured process utilized by the present invention.
Fig. 2 is the other schematic flow diagram of an air textured process utilized by the present invention.
Fig. 3 is a local enlarged drawing of air textured process means (7) of Fig. 1.
Fig. 4 is a schematic manufactured drawing of self-curling elastic heat plastic fiber of the core yarn of the present invention.
Fig. 5 lists some schematic section drawings of self-curling elastic heat plastic fiber of the core yarn of the present invention, which are two heat plastic polymers, with different shrinkage rate, manufactured by a compound spinning nozzle; the transverse section drawings show the characteristics of disposition.
Fig.6 shows side schematic drawing of self-curling elastic heat plastic fiber, after being heated and shrunk, of the

core yarn of the present invention.

[0007] Symbols of the drawing are described as follows:

(1) water inlet	(2) compressed air inlet
(3) core yarn	(4) effect yarn (single fiber feeding)
(5) effect yarn (doubling fiber feeding)	(6) batching up device
(7) air textured process means	(8) air textured yarn
(W1.1) feeding roller	(W1.2) feeding roller
(W2) second roller	(W3) third roller
(WW) winding roll	

Detailed Description of the Present Invention

[0008] The core yarn of the air textured yarn of the present invention mainly is manufactured through spinning two melted heat plastic polymers, in an appropriate composition, of different shrinkage rate by a compound spinning nozzle so as to make the two heat plastic polymers of different shrinkage rate have certain disposition characteristics in the transverse section of fiber. The manufacturing schematic drawing is shown as Fig. 4; Fig. 5 lists some core yarn compound fibers section schematic drawings which can be applied to the present invention. While in hot water during dyeing and finishing processes, the interface forms a spring shape screw due to the difference of shrinkage stress caused by different shrinkage rate of the two materials, which produces a self-curling elastic character.

[0009] Said effect yarn (4) is made of a single or more than one ordinary heat plastic fiber, wherein the specification and yarn type can be appropriately selected depending on the needed effect and character of texture.

[0010] In view of Fig. 1, which shows a schematic process flow diagram, said core yarn (3) and said effect yarn (4) or (5) are severally fed into an air textured process device (7) (shown as the enlarged drawing of Fig.3) to be processed through different feeding rollers ((W1.1) and (W1.2)) at different feeding rates. Said processed air textured yarn (8) is led out by the second roller (W2); finally, said yarn is wound up by controlling the feeding rate between the third roller (W3) and the winding roll (WW).

[0011] Said elastic air textured yarn (8) of the present invention can further be woven to various shapes of cloth by knitting machinery, weaving machinery with or without shuttle. The weaving character of the air textured yarn of the present invention is much better than those conventional elastic covering yarn since there is no tension problem because that the elastic effect does not appear before the treatment of hot water. The cloth made of said elastic air textured yarn of the present invention, after dyeing and finishing, appears an excellent elastic character; therefore, the clothes made of which are very comfortable to wear.

[0012] To summarize, the present invention discloses an air textured yarn with self-curling elastic character and its manufacturing method. The following examples are given to illustrate characteristics of the present invention but not to limit the invention.

Explanation on elasticity evaluation method

[0013]

Machine: INSTRON-6021 universal tension testing machine

Method:

a. cutting a test piece of 2.5 cm by 30 cm (including 10 cm of holding length for holding apparatus) at normal temperature under tensionless circumstance
b. Test Speed is 1.667 mm/sec Return Speed is 10.0 mm/sec
c. Test piece is pre-loaded with 12 g
d. Static tension is 1000 g

Calculation: elastic extension rate (at static tension 1000 g)

$$= (A2-A1)/A1 \times 100\%$$

where

A1 : length of test piece before extension
A2 : length of test piece at 1000 g of static tension

Example:

[0014] Manufacturing of 160d/300f elastic air textured yarn:

Core yarn: 50d/12fPET self-curling elastic yarn
Effect yarn: 100d/288fPET circular profiled yarn
Processing condition:

D. R Roller Speed: 300 M/Min
Core Yarn Over Feed: 8.5 %
Effect Yarn Over Feed: 21.0 %
Air Pressure: 10 kg/m^2
Elastic extension rate (at 1000 g of static tension) = 14.35 (%)

Comparative Example

[0015] Manufacturing of 170d/144f conventional air textured yarn:

Core yarn: 75d/72fPET circular profiled yarn
Effect yarn: 75d/72f PET circular profiled yarn
Processing condition:

D. R Roller Speed: 330 M/Min
Core Yarn Over Feed: 13.5 %
Effect Yarn Over Feed: 29.0 %
Air Pressure: 9.0 kg/m^2
Elastic extension rate (at 1000 g of static tension) = 5.75 (%)

[0016] From the comparison between Example and Comparative Example, we know that using heat plastic fiber with self-curling elastic character as core yarn and ordinary heat plastic fiber as effect yarn, the present invention not only maintains the original character of effect yarn, but also endows the air textured yarn with an unique elasticity, which eliminates shortcomings of conventional air textured yarn.

Claims

1. An elastic air textured yarn, comprising an inner core yarn and an outer enclosing effect yarn, wherein said core yarn is heat plastic fiber with self-curling elastic character and said effect yarn is a single or more than one ordinary heat plastic fiber.

2. An elastic air textured yarn as defined in claim 1, wherein said core yarn is manufactured, through melt-compounding two heat plastic polymers with different shrinkage rate in an appropriate composition, to be a heat plastic fiber with self-curling elastic character.

3. An elastic air textured yarn as defined in claim 2, of which the self-curling elastic character appears after heat treatment so as to form a spring shape screw.

4. An elastic air textured yarn as defined in claim 3, of which the elasticity depends on the composition ratio of core yarn and effect yarn.

5. A manufacturing method of an air textured yarn, comprising procedures as follows:

(1) to manufacture said core yarn, spinning two heat plastic polymers with different shrinkage rate by a melt compound spinning nozzle, in an appropriate composition ratio, to produce a heat plastic fiber with self-curling elastic character

(2) to manufacture said effect yarn, using a single or more than one ordinary heat plastic fiber;
(3) said obtained core yarn and effect yarn are severally fed into different rollers and then are together fed into an air textured process means at different feeding rates to be air textured processed so as to form an elastic air textured yarn; and
(4) said manufactured elastic air textured yarn is further fed into a roller and a winding roll to be wound up.

6. A manufacturing method of an air textured yarn as defined in claim 5, wherein said procedure of feeding said core yarn and said effect yarn together into an air textured process means to form an elastic air textured yarn is accomplished by injecting compressed air into through an injection and twist device of air textured process means for staggering and compounding said core yarn and said effect yarn.

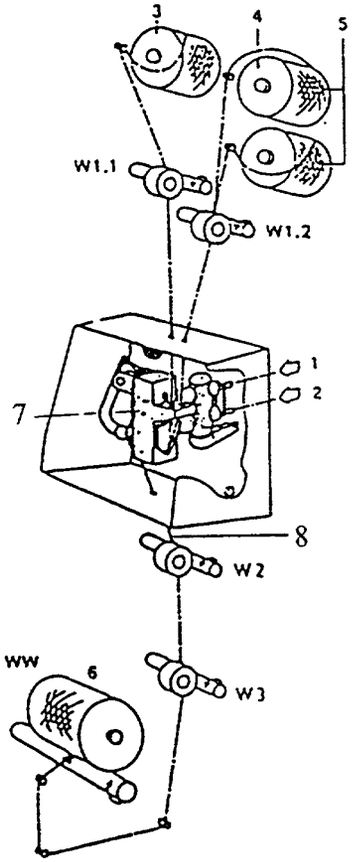

Fig 1

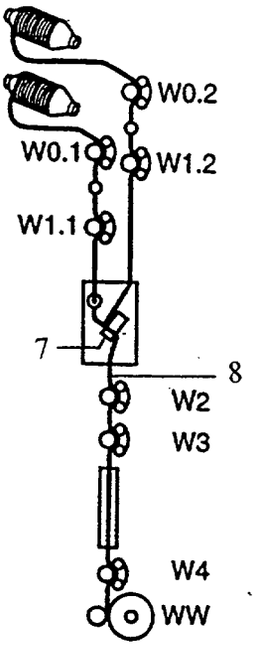

Fig 2

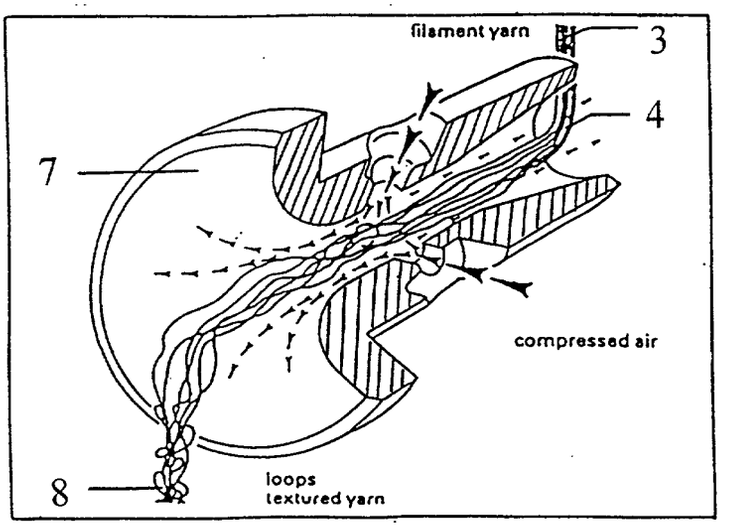

Fig 3

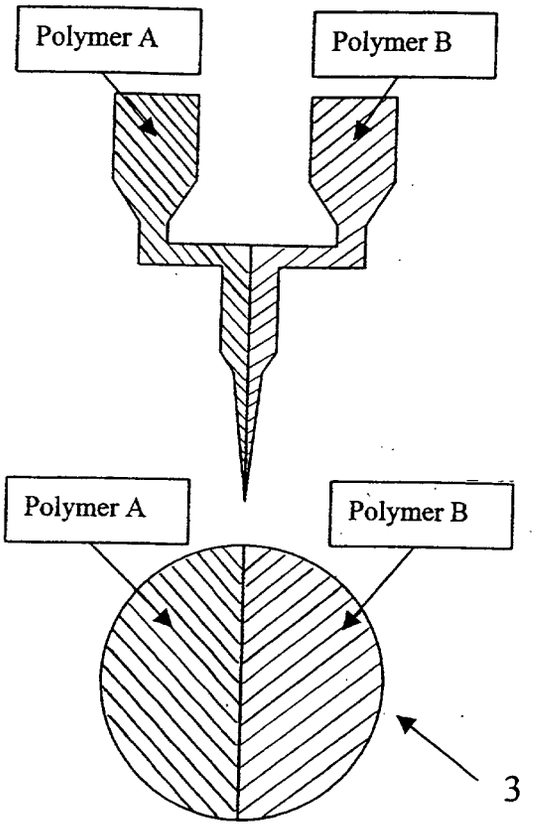

Fig 4

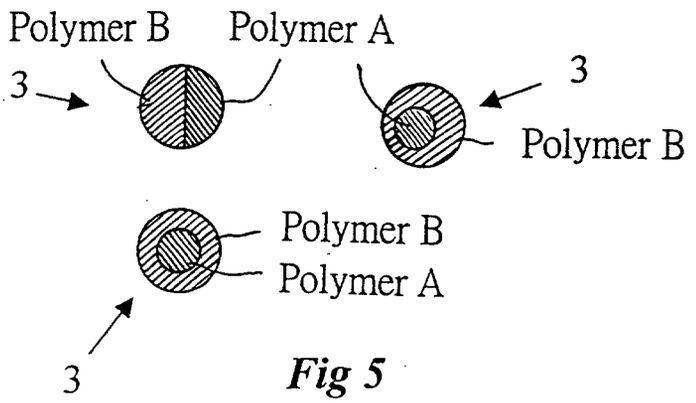

Fig 5

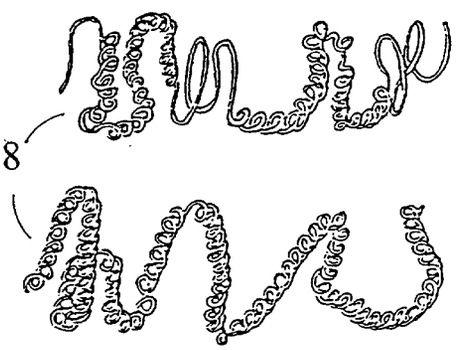

Fig 6

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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 7821

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 March 2002	V Beurden-Hopkins, S

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 7821

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