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(54) NATURAL FIBER-CONTAINING SUTURE-FREE SHIRT AND MANUFACTURING METHOD THEREFOR

(57) The present invention refers to a kind of natural fiber-containing suture-free shirt and a manufacturing method therefor, belonging to the shirt field, wherein the suture-free shirt is characterized in that a collar piece, a front piece, a back piece, a shoulder piece, a sleeve piece, a hem piece and a cuff piece, a placket piece and a pocket piece are jointed or cover-seamed together via hot melt adhesive technology, and a finished suture-free shirt is obtained through the polyurethane adhesive materials connecting all the pieces together, and then cooling is performed by three-dimensional ironing stereotypes. The method of shirt production directly connecting pieces with polyurethane adhesive materials replaces sewing threads and sewing machines without using any sewing thread. The production process is simple and saves a lot of resources and workers. Wherein the shirt seams are smoothness, beautiful, soft, have good stereo sense, the color effect is good, wearing is comfortable. By the joints of shirt, both of the two sides can be worn, so that a garment is multi-purpose and improves the added value of the shirt, wherein good non-ironing seams truly achieve the effect of non-ironing and non-wrinkling.

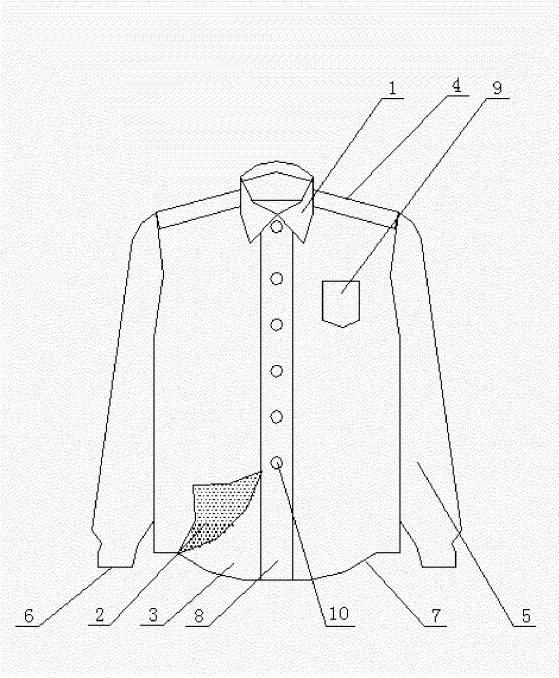

Fig. 1

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Description

Technical field

[0001] The present invention belongs to the shirt field and relates to a kind of natural fiber containing, suture-free shirt and its producing method.

Technical background

[0002] Conventionally, a shirt is made by using sewing thread, but this kind of shirt has some defects in the production and use process that are specified as follows:

First, in the process of sewing, machine needles inevitably leave holes in the sewing stitches places and easily break yarn fabrics, so resulting in that the shirt joint strength is decreased,

Secondly, the sewing thread has extensibility, so in debugging process a stitch is caused that is not beautiful,

Thirdly, the sewing thread color and fabric color are easily provided in deviating colors,

Fourthly, shirt seams with sewing thread are easily wrinkled, especially when using natural fiber fabrics with non-iron finishing, the juncture places with sewing thread are more serious,

Fifthly, most shirts with sewing thread stitches have a face side and a reverse side, wherein the reverse side stitches and sewing allowance are not beautiful, so that the shirt can only be worn in face side and cannot be used as reversible shirt wearable on both sides.

[0003] In order to reduce seam wrinkles after sewing shirts, some tapes are joined in the seams of non-iron finished shirts, but the bonding strength of the tape is so low, that it cannot meet the strong strength of the shirt. Therefore it still needs the use of sewing thread connecting pieces. Some chemical fiber fabrics of clothing adopt the melt adhesive fabric technology to stick relative garment pieces together, wherein the fabric has a single color, simple structure, concise style, but the fabric is not breathable, so that wearing is uncomfortable, and especially adhesive strength of the garment connection is low and therefore cannot meet the required joint strength, Currently there appeared some seamless knitting garment without sewing thread, wherein the knitting fabric is woven into a garment directly and belongs to fabric weaving technology, wherein such technologies are generally used for the production of underwear, but not suitable for shirt production.

[0004] Yet there not yet appeared a non-iron shirt with high strength, joint natural fiber, wherein the present technical invention therefore aims to solve the above problems.

Summary of the invention

[0005] According to the above deficiency of existing technology, the present invention aims to solve the technical problem by providing a suture-free shirt and a production method thereof, wherein the different parts can be stuck together by means of a polyurethane hot melt adhesive, and its strongpoint is high joint strength, good anti-wrinkling, wherein the whole shirt uses natural fiber without using sewing thread.

[0006] The present invention is a kind of natural fiber, suture-free shirt, which is characterized in having a collar piece, front piece, back piece, shoulder piece, sleeve piece, hem piece and cuff piece, wherein a placket piece and pocket piece are jointed or cover-seamed together via hot melt adhesive technology, and the fabric is a natural fiber.

[0007] The suture-free shirt does not use any sewing thread, and uses hot melt adhesive technology connected into a complete whole, therefore both the seams are uniform, beautiful, have good flatness, and no difference between the face side and inverse side is observable, thus allowing double-face wearing, so that a garment is multi-purpose, and improves the added value of the shirt.

[0008] A face breast pocket is set on the front piece of the garment, as well as an inner pocket. By setting the face and inverse side breast pocket on both sides of garment, the wearing of the suture-free shirt is made convenient and practical.

[0009] The content of natural fiber in the fabric is 65% ~ 100%, wherein the natural fiber is made of cotton, linen, wool, silk or others. Because the fabric is a natural fiber, the suture-free shirt is comfortable in wearing, breathable healthy and environmentally protective.

[0010] The production method of a suture-free shirt from natural fiber includes the following steps:

(1) Cutting process: cutting natural fiber fabrics into garment pieces, wherein the garment pieces comprise a collar piece, front piece, back piece, shoulder piece, sleeve piece, cuff piece, hem piece, placket piece and breast pocket piece, wherein all or part of the pieces are cut using conjoined cutting,

(2) connection bonding process: adjacent pieces are joint by adhesion, wherein a half cover-seam, parallel or stuck outside connection is used, wherein all of the various joints of garment pieces are performed by the hot melt adhesive technology, wherein polyurethane adhesive materials are used to connect all the pieces into a whole,

(3) The three-dimensional ironing process: select the arc-match stereo ironing machine to iron and mold all of the joints,

(4) Cooling process: by using a gas suction device, the products are quickly cooled down to room temperature.

[0011] When cutting the pieces, there is a need to adopt polyurethane adhesive materials to stick on fringes of the shirt pieces. Also all shirt fringes or part fringes need to be folded into smooth cloth fringes, and then the shirt fringes or smooth cloth fringes are bonded by polyurethane adhesive materials. Specific operation modes need to be carried out according to different clothing:

When producing the normal shirts, the polyurethane adhesive materials need to stick on fringes of shirt pieces and then two pieces of fringes are folded, wherein the piece of adhesive seam allowance is folded into a smooth cloth fringe, and then the smooth cloth fringe is bonded by the polyurethane adhesive materials.

[0012] When producing casual shirts, the polyurethane adhesive materials need to be stuck on fringes of shirt pieces and then only one piece of fringe is folded, so that forming into a casual shirt with fringes, and also the fringes of shirt pieces are directly connected, so that the casual shirts are formed.

[0013] In the step (1) the pieces of fabric can be cut directly, or as alternative, before cutting the pieces of fabric can be resin finished.

[0014] In all of the stereo pressing processes, the press parameters are set as following: temperature 150 ~ 180 °C, pressure 2 ~ 8 kg/cm^2, time 4 ~ 15 seconds. The use of the above parameters can make the bonding performance of polyurethane adhesive materials conform to the requirements of the bonding strength of suture-less shirts and can prevent the shirt fabrics from being damaged.

[0015] The polyurethane adhesive materials can be a solid polyurethane adhesive material, having the shape of membrane, star, strip, mesh, dot, mesh, broken-thread, etc., or can also be liquid polyurethane adhesive materials. Models of polyurethane adhesive materials are 3410, 3206 d, 3410 c, 3412, 3415, 3412, 3106, 3302, 3914, 3916 or 3918, which are produced in Hong Kong BEMIS company. Polyurethane adhesive materials are colorless, transparent, have high strength and are environmentally friendly, on the one hand, and can be used for all the colors of the natural fiber fabrics, because there will not be any color difference phenomenon, On the other hand, the adhesive strength is above 200N per inch, so that the adhesion strength of the suture-free shirt is higher than that of the normal shirt with sewing threads.

[0016] For many years, shirts are made by sewing threads. However, the present invention provides a changed production method for shirts, replacing a sewing thread and sewing machine. The end of the history of the shirt using a sewing thread, makes clothing production become simple, saves a lot of resources and artificial, wherein a suture-free shirt is obtained by this method, wherein the seam has smoothness and good appearance, stereoscope shape, is beautiful, comfortable, wherein seam wrinkling of conventional shirts with sewing threads for sewing together by existing technology, needle holes, slippage, color differences etc. are avoided. Fabrics mainly use natural fibers that provide simple craft, environmental friendly materials, cost savings, and achieve the goal of being comfortable and fashionable.

[0017] Compared with the existing technology, the beneficial effects of the invention are:

1. The suture-free shirt replaces a sewing thread and sewing machine, wherein the manufacturing method of a shirt is changed by using polyurethane adhesive materials to connect shirt pieces without a sewing thread. On the one hand, they provide simple craft, save a lot of resources and artificial, and on the other hand, the seam is smoothness and has a good appearance, stereoscope shape and is comfortable.

2. There is no difference between the face side and inverse side for the suture-free shirt and the seam stitches are even, so that the shirt can be worn in double face, achieving multi-purpose and improves the added value of the shirt.

3. The polyurethane adhesive materials are used in joint seams which are characterized in having high strength, being environmentally protective, colorless and transparent, so that seam adhesion strength of suture-less shirts is higher than that of the normal shirt with sewing threads, and the suture-less therefore is durable. There will not be any color difference phenomenon and the polyurethane adhesive materials can be used in any fabric.

4. The hot melt point of polyurethane adhesive materials is 150°C~180°C, belongs to high temperature adhesion and adapts to high temperature washing and ironing, providing smooth seams without wrinkles.

5. Fabrics mainly comprise natural fiber fabrics, so that shirt wearing is comfortable, provides permeability and is healthy and the shirt is environmentally protective.

Appended drawings

[0018]

Figure 1 is a schematic structure diagram of a suture-free shirt without sewing thread according to the present invention,

Figure 2 is a structure diagram of a shirt according to the prior art,

Figure 3 is a schematic structure diagram of a shirt seam by a half-cover seam method,

Figure 4 is a structure diagram of pieces joint adhesion by parallel method,

Figure 5 is a structure diagram of a shirt seam pasting from outside adhesive.

Detailed description of the embodiments

[0019] Combined with the appended drawings an exemplary embodiment is given below for further description of the invention:

As shown in figure 1, the suture-free shirt comprises a collar 1, front 2, back 3, shoulder 4, sleeve 5, cuff 6, hem 7, placket 8, breast pocket 9 and botton10, wherein all the pieces are joint, wherein the joint or sewing in all connections is done by hot melt adhesive technology to form a shirt, wherein the pieces of the fabric are formed with natural fibers.

[0020] A positive breast pocket is set on the front piece, as well as a corresponding positive inner breast pocket, to make the suture-less shirt convenient and practical when allowing double-face wearing. In the fabrics the described content of natural fiber is 65% ~ 65%, including natural fibers of cotton, linen, wool, silk, wherein one or several individual pieces or a single piece can include the same kind of natural fiber but also different fibers. Due to the use of natural fiber fabrics, the suture-free shirt is comfortable in wearing, provides good permeability and is healthy and environmentally protective.

[0021] Figure 1 shows that the suture-less shirt has no traces of sewing thread stitching. Figure 2 shows the structure diagram of a traditional shirt using sewing threads, wherein the dotted lines represent sewing thread stitches. The figure shows that the seams of the shirt, pasting seam or cover-seam, all use sewing thread sewing, so having sewing stitches of the sewing thread on the double-face. Comparison of figures 1 and 2 reveals that, when the present invention is compared with the traditional shirt adopting sewing thread, the strongpoint of the suture-less shirt is characterized in smoothness, beauty, strong stereo sense. Moreover, the sutureless shirt, wherein both the positive and negative seams are uniform and beautiful, can be worn on both sides, realizing the effect of multi-purpose and thus can improve the added value of the shirt.

[0022] The manufacturing method of the suture-less shirt with natural fiber includes the following steps:

(1) cutting process: cutting the natural fiber fabrics into shirt pieces, including a collar piece 1, front piece 2, back piece 3, shoulder piece 4, sleeve piece 5, cuff piece 6, hem piece 7, placket piece 8 and chest pocket piece 9, wherein all or part of the pieces are cut using a conjoined cutting mode,

(2) connection bonding process: adjacent pieces can be stuck together by half-cover seam mode (as shown in figure 3), parallel mode (as shown in figure 4) or pasting from outside (as shown in figure 5), and all shirt pieces are bonded by the hot melt adhesive technology, wherein polyurethane adhesive materials are used for connecting all the pieces into a shirt,

(3) stereo press ironing process: using arc-match stereo pressing to iron and mold all of the joints, the fitting joints and cover seams,

(4) cooling and molding processes: using a gas suction device, so that when cooled down to room temperature, a finished suture-less shirt is obtained.

[0023] After cutting of the pieces, polyurethane adhesive materials are applied to stick on fringes of the shirt pieces. Then all shirt fringes or part of the fringes are folded into smooth cloth fringes, and then the shirt fringes or smooth cloth fringes are connected by polyurethane adhesive materials. Specific operation modes need to be carried out according to different clothing:

When producing normal shirts, the polyurethane adhesive materials are used to stick on fringes of shirt pieces and then two pieces of fringes are folded, wherein the piece of adhesive seam allowance is folded into a smooth cloth fringe, wherein the smooth cloth fringe is bonded by polyurethane adhesive materials,

[0024] When Producing casual shirts, the polyurethane adhesive materials are adopted to stick on fringes of shirt pieces and then only one piece of fringe is folded, forming into a casual shirt with fringes, also directly connect fringes of shirt pieces, so that the casual shirts are formed.

[0025] In the step (1), as alternatives, the pieces of fabric can be either cut directly or can be resin finished before cutting.

[0026] For all of the stereo pressing processes, the press parameters are set as following: temperature 150 ~ 180 °C, pressure of 2 ~ 8 kg/cm^2, time 4 ~ 15 seconds. By using the above parameters the bonding performance of polyurethane adhesive materials can be made conform to the requirements of the bonding strength of suture-less shirts and can prevent the shirt fabrics from being damaged.

[0027] The polyurethane adhesive materials can be a solid polyurethane adhesive material comprising the shape of membrane, star, strip, mesh, dot, mesh, brokenthread, etc., but can also be liquid polyurethane adhesive materials. Models of polyurethane adhesive materials are 3410, 3206 d, 3410 c, 3412, 3415, 3412, 3106, 3302, 3914, 3916 or 3918, which are produced in Hong Kong

BEMIS company. Polyurethane adhesive materials are colorless, transparent, have high strength and are environmentally protective, on the one hand, and can be used for all the colors of natural fiber fabrics because there will not be any color difference phenomenon, On the other hand, the adhesive strength is above 200N per inch, so that the adhesion strength of the suture-less shirts is higher than that of a normal shirt with sewing threads.

[0028] In combination with the examples below, specific methods of suture-free shirt production are described:

Embodiment 1 (double-face wearing suture-free shirt from cotton fabric):

Use 100% cotton non-iron fabrics and cut pieces, use polyurethane adhesive materials, wherein according to different parts the width of polyurethane adhesive materials is respectively chosen from 2 mm, 4 mm to 6 mm, having a thickness of 0.02 mm and 0.04 mm, set a face breast pocket on the front piece of the garment, and similarly also set an inner pocket, stick on fringes of shirt pieces and then fold two pieces of fringes, wherein the piece of adhesive seam allowance is fold into a smooth cloth fringe, and then connect smooth cloth fringe by polyurethane adhesive materials, use arc-match stereo pressing to iron and mold all of the joints, wherein the press parameters are: temperature 165 °C, pressure 3 kg, for 8 seconds, and then cooling and molding, so that finally a double-side wearable suture-less shirt from 100% cotton fabrics is obtained.

In accordance with the provisions of the national sampling standard (GB - T2660-2008) to sample the suture-less shirt involves the following aspects: fiber content of fabrics and accessories, content of free formaldehyde, PH value, color fastness and washing fastness, (resistance to dry cleaning and washing), odor and biodegradable aromatic amine dyes, etc., and further involving the permissible range of clothing fabric defects of various parts, limit deviation of specification test, limit difference between symmetrical lines, stripes and checks, etc., wherein all of the above aspects must be tested rigorously, and only the qualified products are issued certificates and packed for leaving factory.

Afterwards, the non-iron performance of the suture-less with cotton fabrics has been tested in accordance with the test methods, wherein the woven fabric seam burst strength was tested, wherein the seam strength is up to 245 n. Performing AATCC143-2001 washing and drying conditions and set 20 times of washing, the seam smoothness is extremely well and up to 4.5 grade (achieve optimal grade standards), Melting adhesive materials inside the seam allowance and outer fabrics are still their selves, avoiding the color difference between the sewing thread and the fabric, so as to enhance the seam color effect. The other performances of the suture-less shirt provided by the present invention are all equal or larger than the qualified product.

Embodiment 2 (double-face wearable suture-free shirt from linen fabric):

Use linen fabric and cut pieces, use polyurethane adhesive materials, wherein according to different parts the width of polyurethane adhesive materials was respectively chosen as 8 mm and 10 mm and the thickness was 0.04 mm, set a face breast pocket on the front piece of the garment and also set an inner pocket, stick on fringes of shirt pieces and then connect the fringes by the polyurethane adhesive materials, use arc-match stereo pressing to iron and mold all of the joints, wherein the press parameters are: temperature 155 °C, pressure 2.5 kg, for 10 seconds, and then cooling and molding, so that finally a double-side wearable in casual occasion suture-less shirt from linen fabrics is obtained.

After testing the non-iron performance of no-stitch shirt with cotton fabrics, the seam strength is up to 245 n, and the rest performance is the same as in the embodiment 1.

Embodiment 3 (single-face wearable suture-free shirt with 65% cotton fabric):

Use 65% cotton fabrics and cut pieces, using polyurethane adhesive materials, wherein according to different parts the width of polyurethane adhesive materials is respectively chosen from 6 mm and 8 mm, having a thickness of 0.03 mm and 0.05 mm, set a face breast pocket on the front piece of a garment, stick on fringes of shirt pieces and then fold two pieces of fringes, wherein the piece of adhesive seam allowance is folded into smooth cloth fringe, and then the smooth cloth fringe is connected by polyurethane adhesive materials, using arc-match stereo pressing to iron and mold all of the joints, wherein the press parameters are: temperature 168 °C, pressure 3.5kg, 8 seconds, and then cooling and molding, so that finally a single-side wearable suture-less shirt with 65% cotton fabrics is obtained.

[0029] The rest performance is the same as in the embodiment 1.

[0030] The manufacturing method of a suture-less shirt replaces sewing threads and sewing machine, wherein polyurethane adhesive materials are used to connect shirt pieces without a sewing thread, so that the production process is simple and saves a lot of resources and artificial. Polyurethane adhesive materials jointing seams of pieces having a melting point between 150 °C ~ 180 °C belong to the high temperature glue. Therefore, the suture-less shirt is more suitable for high temperature washing and high temperature ironing, wherein the seam is smooth, in order to truly achieve better effects of washing and wearing and non-wrinkling.

Reference signs:

[0031]

1 collar
2 front piece
3 back piece
4 shoulder
5 sleeve
6 cuff
7 hem
8 placket
9 breast pocket
10 button

Claims

1. Natural fiber-containing suture-free shirt being **characterized in that** a collar piece (1), a front piece (2), a back piece (3), a shoulder piece (4), a sleeve piece (5), a cuff piece (6) and a hem piece (7), a placket piece (8) and a pocket piece (9) are jointed, pasted and cover-seamed together via hot melt adhesive technology, and the fabric is a natural fiber.

2. Natural fiber-containing suture-free shirt according to claim 1, **characterized in that** a face breast pocket is set on the front piece of garment and an inner pocket is set on the opposite fabric.

3. Natural fiber-containing suture-free shirt according to claim 1 or 2, **characterized in that** the fabric content of natural fiber is 65% ~ 100%.

4. Natural fiber-containing suture-free shirt according to claim 3, **characterized in that** the natural fiber is made of cotton, linen, wool, silk of one or more of the afore-mentioned.

5. Manufacturing method for a natural fiber-containing suture-free shirt according to one of the claims 1 to 4, wherein said manufacturing method is **characterized in that** it includes the following steps:

   (1) Cutting process: cutting natural fiber fabrics into garment pieces, wherein the garment pieces comprise a collar piece, a front piece, a back piece, a shoulder piece, a sleeve piece, a cuff piece, a hem piece, a placket piece and a breast pocket piece, wherein all or part of the pieces are cut using conjoined cutting,
   (2) Connection bonding process: joint adhesion of adjacent pieces, wherein half cover-seam, parallel or stuck outside are used to connect, wherein various or all of the joints of garment pieces are performed by using the hot melt adhesive technology, wherein polyurethane adhesive materials connect all the pieces into a whole,
   (3) Three-dimensional ironing process: select the arc-match stereo ironing machine to iron and mold all of the joints, and
   (4) Cooling process: using the gas suction device for quickly cooling down the products to room temperature.

6. Manufacturing method according to claim 5 **characterized in that**, when cutting pieces, polyurethane adhesive materials are adopted to stick on fringes of a shirt piece.

7. Manufacturing method according to claim 5, **characterized in that** after cutting pieces, also all shirt fringes or part fringes are folded into smooth cloth fringes, and then the shirt fringes or smooth cloth fringes are stuck by polyurethane adhesive materials.

8. Manufacturing method according to claim 5, **characterized in that** in step (1) the cutting pieces of fabric are resin finished.

9. Manufacturing method according to claim 5, **characterized in that** in all of the stereo pressing processes, the press parameters are set as follows: temperature 150 ~ 180°C, pressure of 2 ~ 8 kg/cm^2, 4 ~ 15 seconds.

10. Manufacturing method according to claim 5, **characterized in that** the polyurethane adhesive materials can be solid polyurethane adhesive materials or can be liquid polyurethane adhesive materials.

11. Manufacturing method according to claim 5, **characterized in that** the models of Polyurethane adhesive materials are 3410, 3206 d, 3410 c, 3412, 3415, 3412, 3106, 3302, 3914, 3916 or 3918.

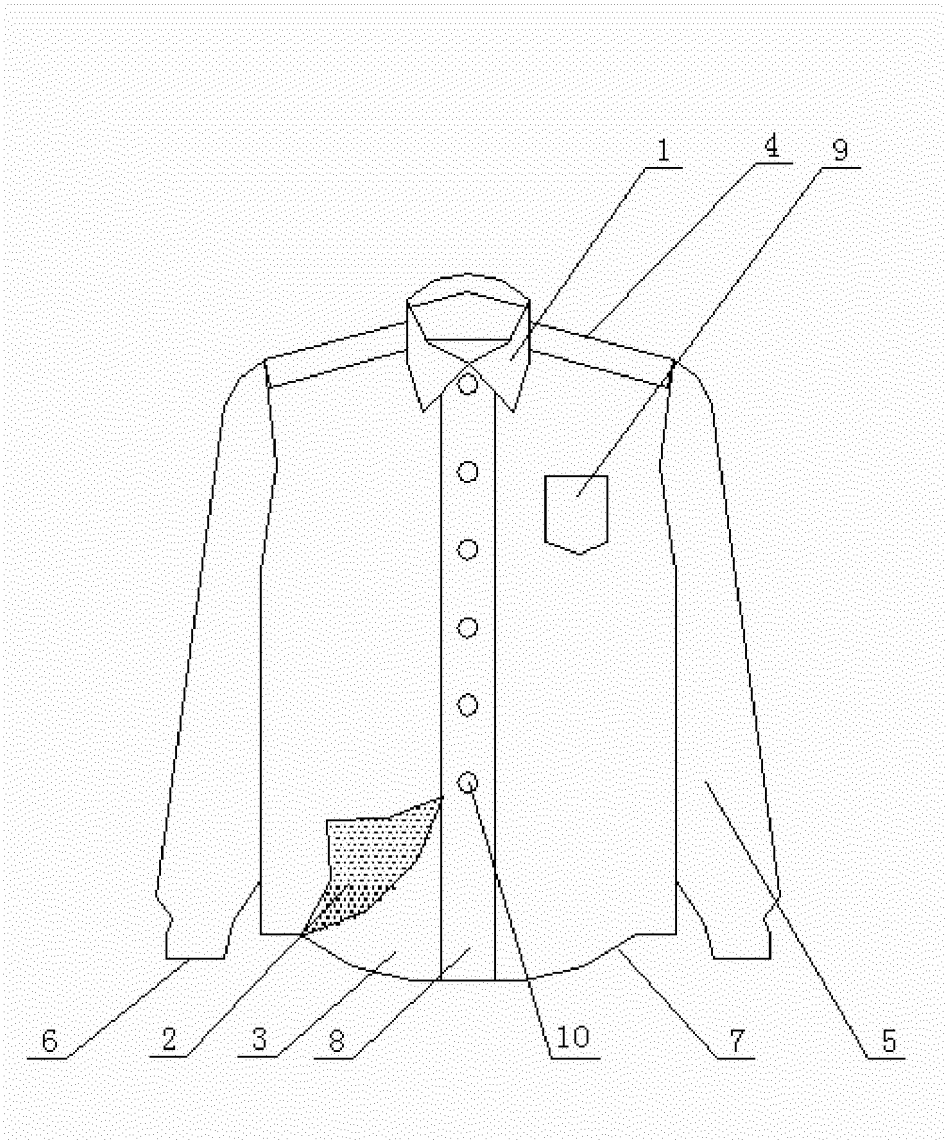

Fig. 1

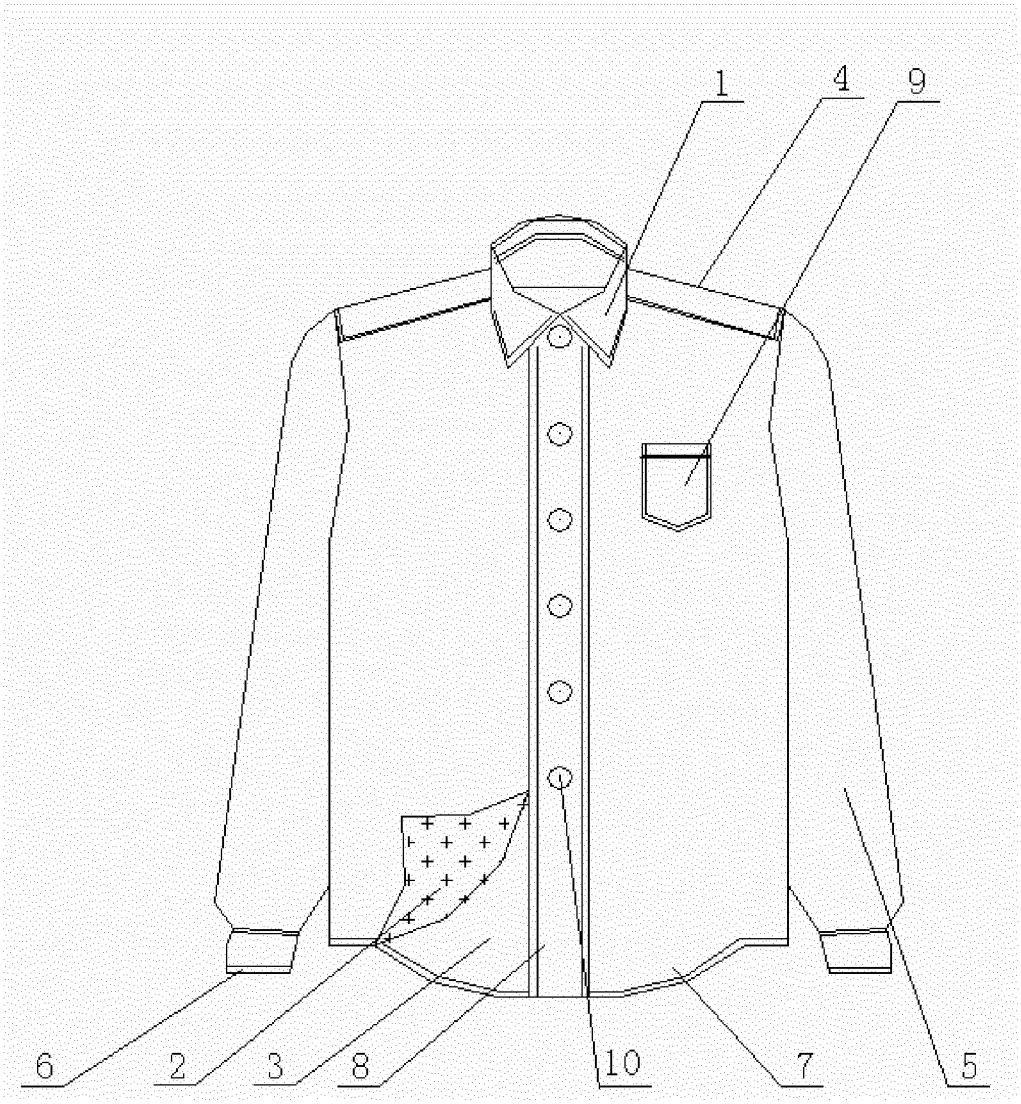

Fig. 2

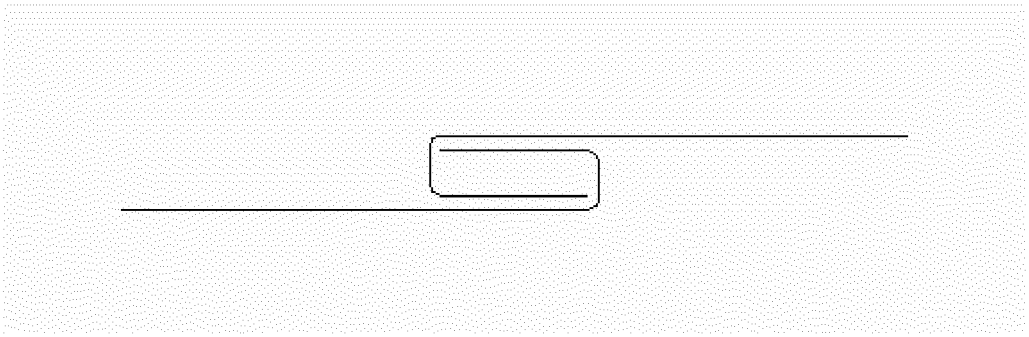

Fig. 3

Fig. 4

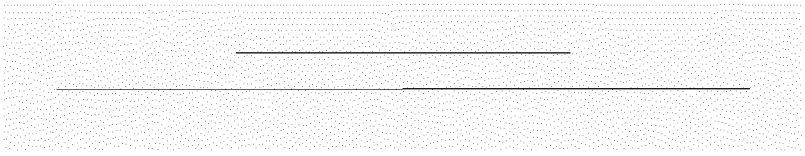

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/001507

A. CLASSIFICATION OF SUBJECT MATTER

A41B 1/00 (2006.01) i; A41H 43/00 (2006.01) i

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)

A41H 43, A41D 27, A41B 1, A41B 3

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)

CNPAT, WPI, EPODOC, CNKI: seamless, stitchless, non-suture, iron+, glu+, weld+, adhe+, darn+, invisible mend+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/044714 A1 (LUTHAI TEXTILE CO., LTD.), 21 April 2011 (21.04.2011), claims 1-11, description, page 1 to page 6, and figures 1-6	1-11
X	CN 201238611 Y (LUTHAI TEXTILE CO., LTD.), 20 May 2009 (20.05.2009), claims 1-4, description, page 1, line 10 to bottom line, and figure 1	1-11
X	CN 1988817 A (MOUNTAIN HARDWEAR, INC.), 27 June 2007 (27.06.2007), description, paragraphs [0020]-[0038], and figures 1-10B	1-11
X	CN 101129230 A (ZHAO, Junyi), 27 February 2008 (27.02.2008), description, page 2, line 1 to page 4, bottom line, and figures 1-3	1-11
A	CN 1172620 A (WU, Yantian), 11 February 1998 (11.02.1998), the whole document	1-11

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

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Date of the actual completion of the international search	Date of mailing of the international search report
02 September 2014 (02.09.2014)	**11 September 2014 (11.09.2014)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **WANG, Xiuli** Telephone No.: (86-10) **62085662**

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/001507

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

REFERENCES CITED IN THE DESCRIPTION

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