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(19) **United States**(12) **Patent Application Publication**
He(10) **Pub. No.: US 2011/0151155 A1**(43) **Pub. Date: Jun. 23, 2011**(54) **FABRIC STRAP WITH MULTI-LAYER
STRUCTURE FOR AIR-CUSHION EFFECT
AND USES THEREOF IN UNDERWEAR**(76) Inventor: **Mike He**, Dongguan (CN)(21) Appl. No.: **12/876,092**(22) Filed: **Sep. 3, 2010****Related U.S. Application Data**

(60) Provisional application No. 61/239,463, filed on Sep. 3, 2009.

Publication Classification(51) **Int. Cl.****D03D 11/02** (2006.01)**D03D 17/00** (2006.01)(52) **U.S. Cl. 428/34.1; 442/205; 442/182; 428/85**(57) **ABSTRACT**

The present utility model relates to the technical field of fabric straps, more particularly, it relates to a fabric strap with a multi-layer structure. Said fabric strap itself is integrally interwoven by the fabric with at least a double-layer structure. It is characterized in that: there are at least two layers fabric connecting up-and-down with one or more groups of yarn according to a certain weave structure. Said one or more groups of yarn not only can form an air cushion with erect fine hairs, but also can increase anti-bursting strength of the fabric. When the present utility model is applied to the shoulder straps of underwear, it can effectively relieve the stress on the skin generated by the fabric straps and increase comfort of underwear; when applied to the underwear wire casing, it can not only greatly increase anti-bursting strength, but also relieve the stress on female breasts generated by wire with formed cushion, thus preventing uncomfortable stress on the points of contact on skin after wearing said underwear. Impressions on the skin can be avoided and the comfort and safety of underwear can be improved.

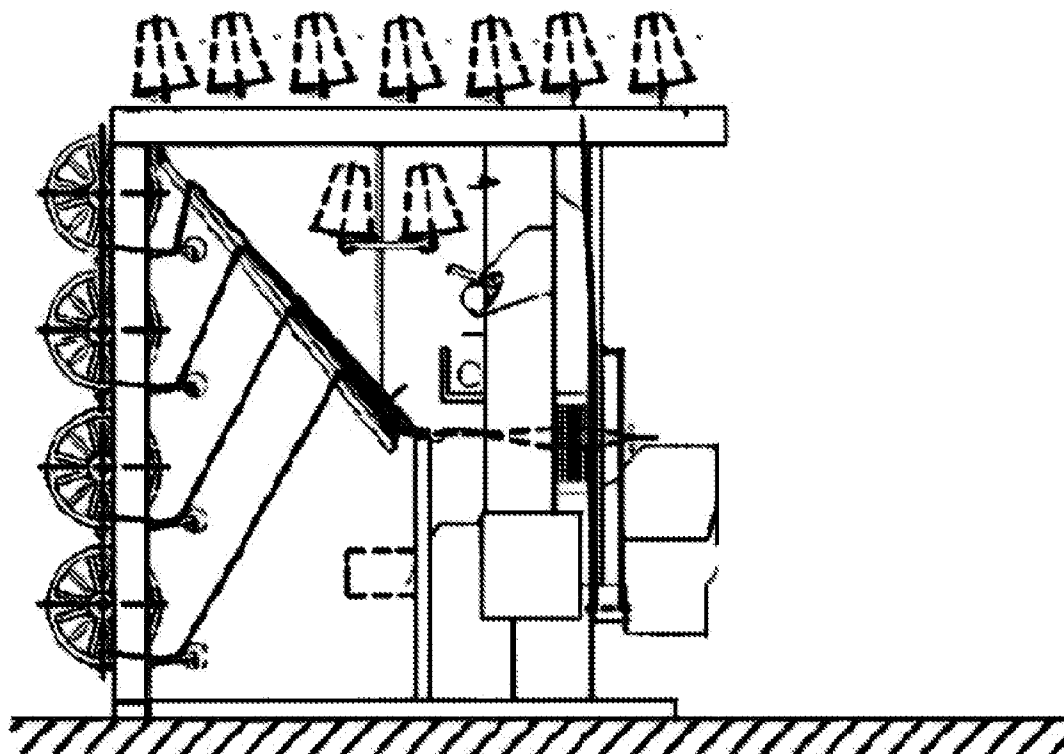


FIG. 1

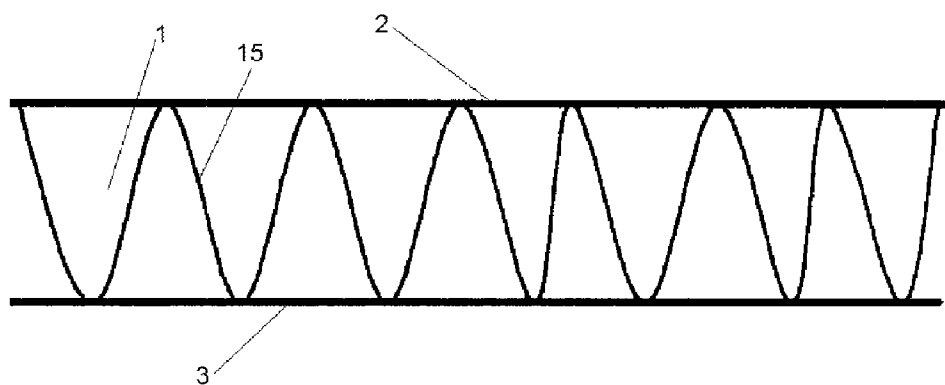


FIG. 2

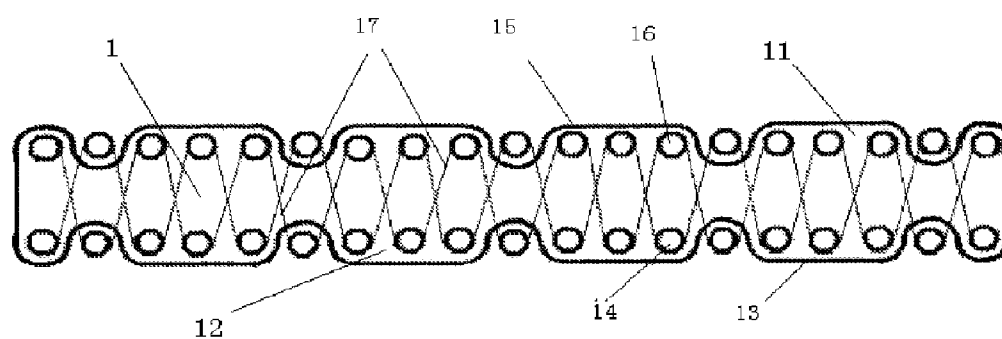


FIG. 3

×	×	×	×	×
×	△	×	△	×
×	×	×	×	○
△	×	△	×	○
×	×	×	×	×
×	△	×	△	×
×	×	×	×	○
△	×	△	×	○

FIG. 4

○	△	○	○	×
△	○	○	○	×
△	○	○	○	○
○	△	△	○	○
○	△	○	○	×
△	○	○	○	×
△	○	○	○	○
○	△	○	△	○

FIG. 5

△	△	×	○
×	○	△	△
△	△	○	×
○	×	△	△
△	△	×	○
×	○	△	△
△	△	○	×
○	×	△	△

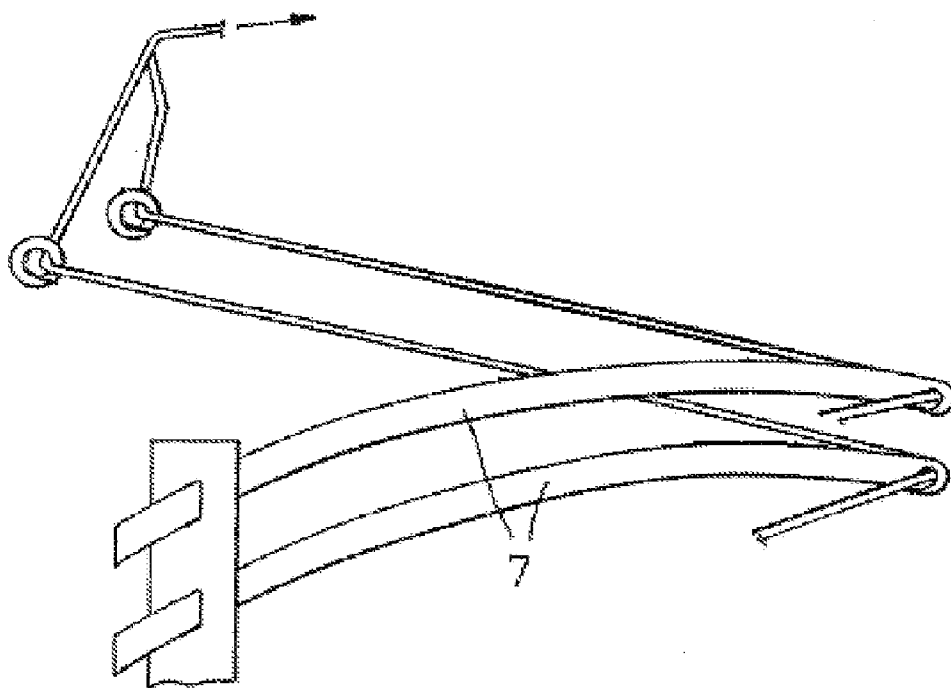


FIG. 7

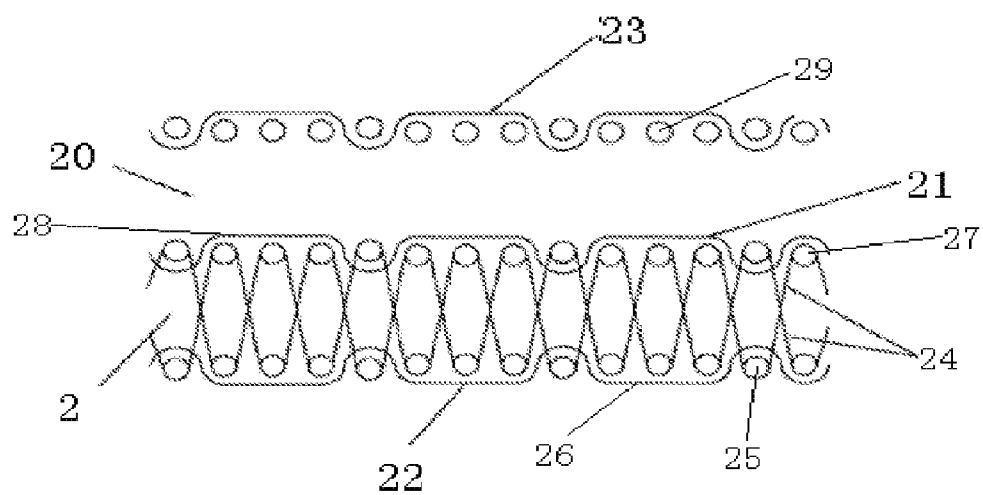


FIG. 8

×	▲	×	▲	×	×	×
▲	×	▲	▲	▲	×	×
×	▲	▲	▲	×	×	△
▲	×	▲	▲	×	×	△
×	▲	▲	×	×	×	×
▲	×	▲	▲	×	▲	×
×	▲	▲	▲	×	×	△
▲	×	▲	▲	×	×	△

FIG. 9

▲	△	▲	▲	×
△	▲	▲	▲	×
▲	△	▲	▲	△
△	▲	▲	△	△
▲	△	▲	▲	×
△	▲	▲	▲	×
▲	△	▲	▲	△
△	▲	△	▲	△

FIG. 10

○	△	○	△	×
△	○	△	○	×
○	△	○	△	△
△	○	△	○	△
○	△	○	△	▲
△	○	△	○	▲
○	△	○	△	○
△	○	△	○	○

FIG. 11

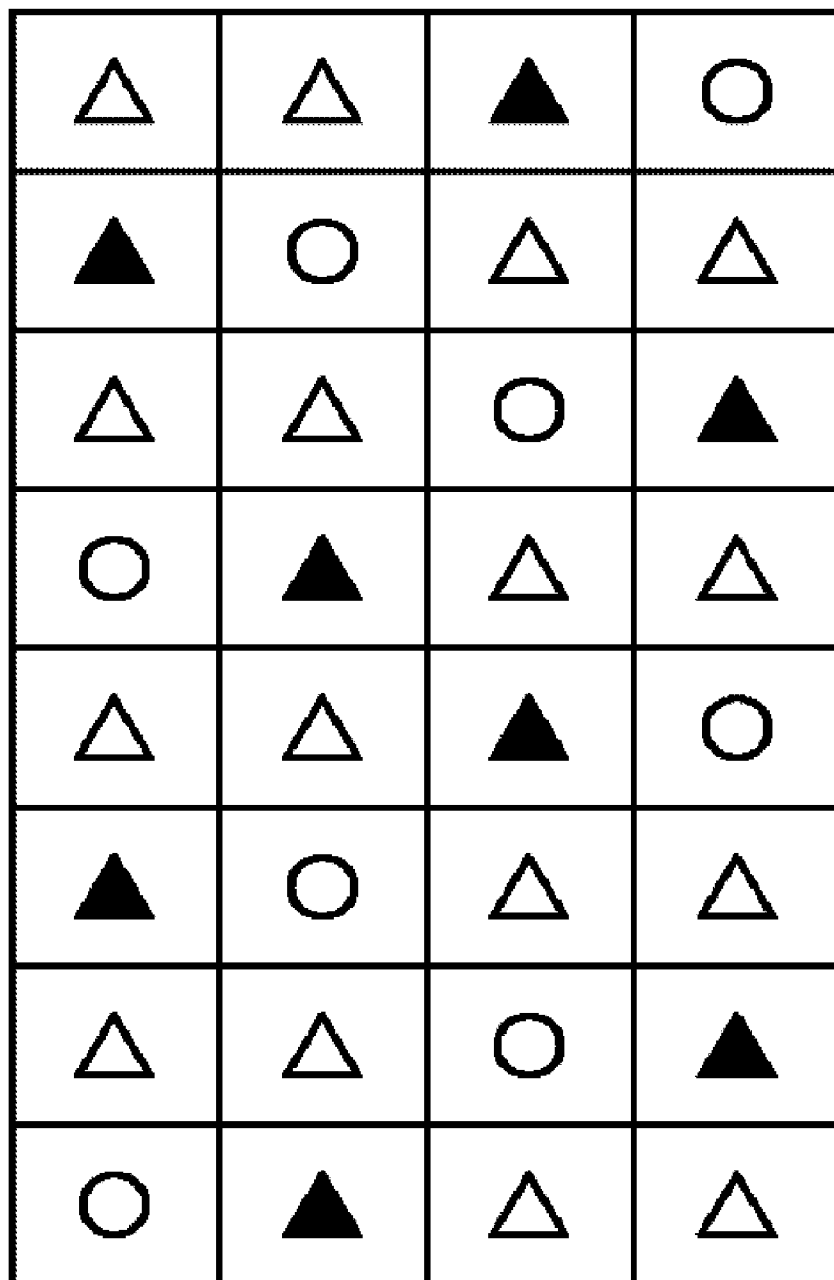


FIG. 12

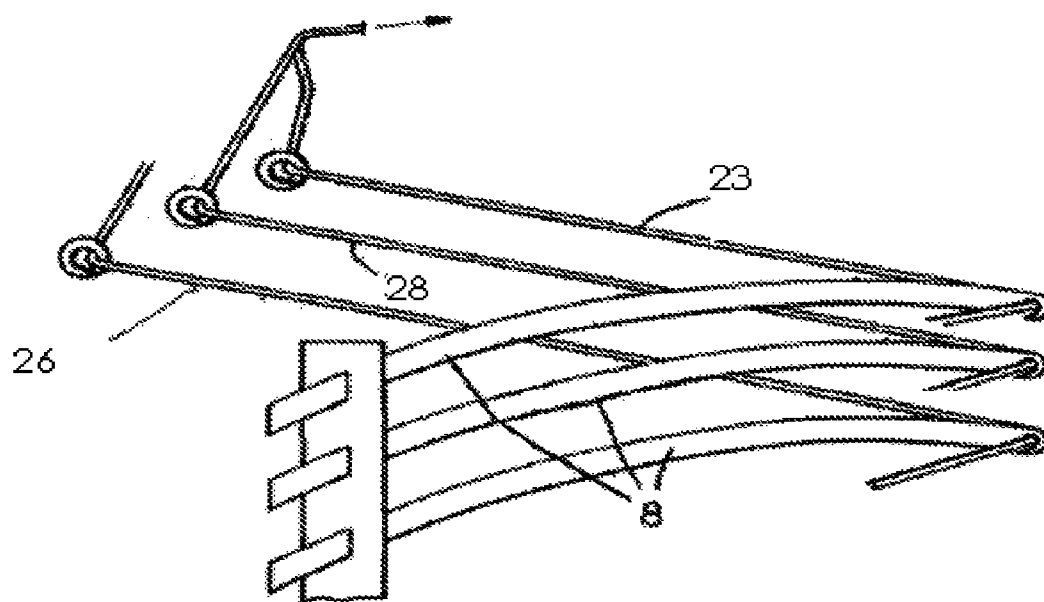


FIG. 13

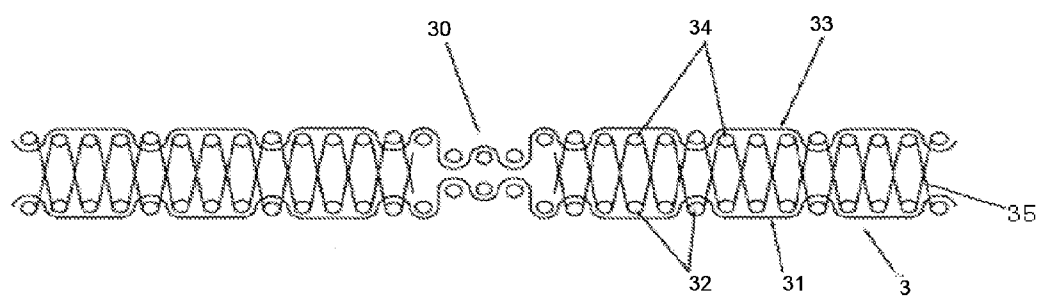


FIG. 14

×	△	×	×	×
△	×	×	×	×
×	△	×	×	○
△	×	×	△	○
×	△	×	×	×
△	×	×	×	×
×	△	×	×	○
△	×	△	×	○

FIG. 15

○	△	○	△	×
△	○	△	○	×
○	△	○	△	○
△	○	△	○	○
○	△	○	△	×
△	○	△	○	×
○	△	○	△	○
△	○	△	○	○

FIG. 16

△	△	×	○
×	○	△	△
△	△	○	×
○	×	△	△
△	△	×	○
×	○	△	△
△	△	○	×
○	×	△	△

FIG. 17

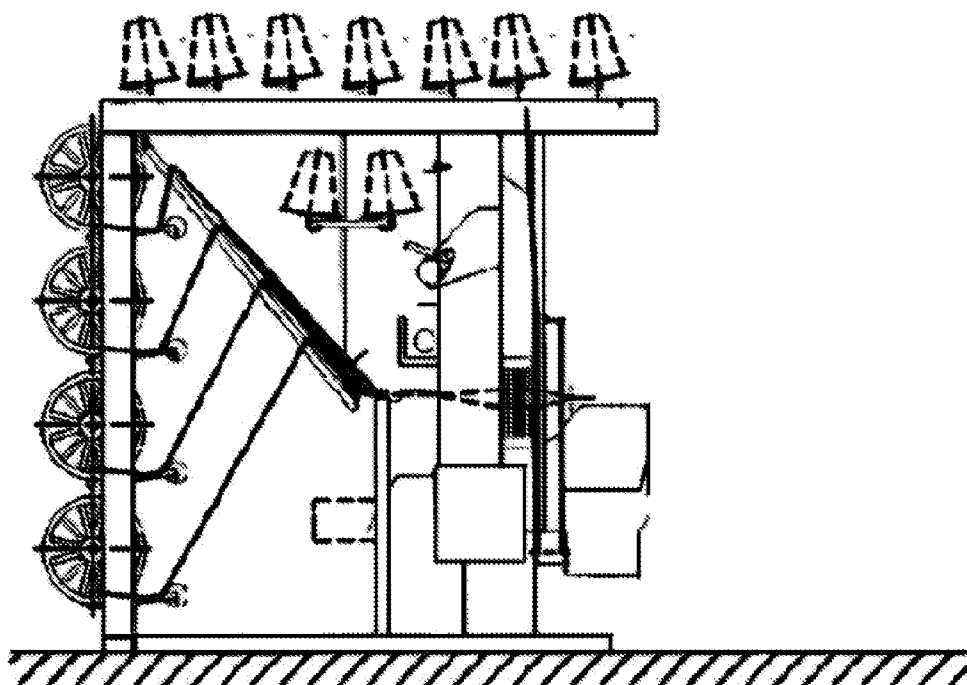


FIG. 18

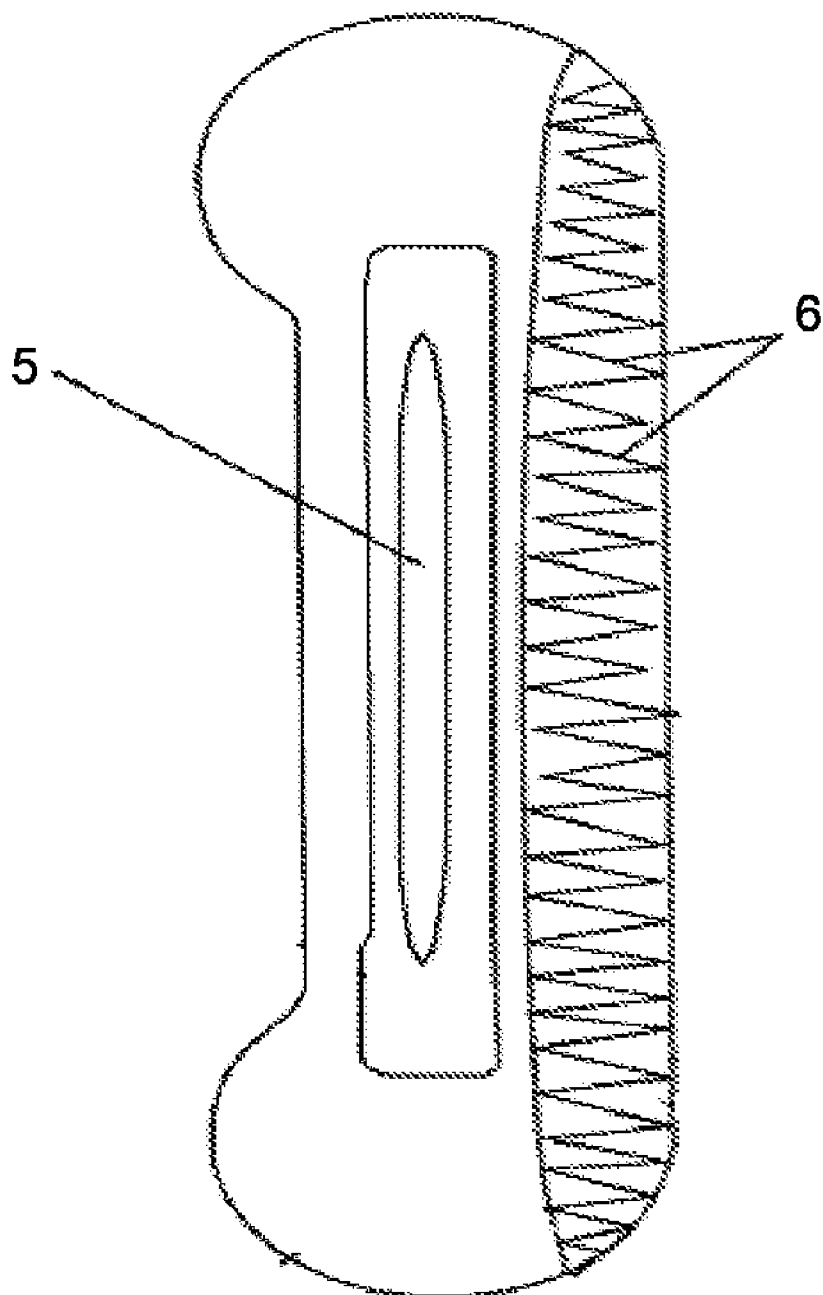
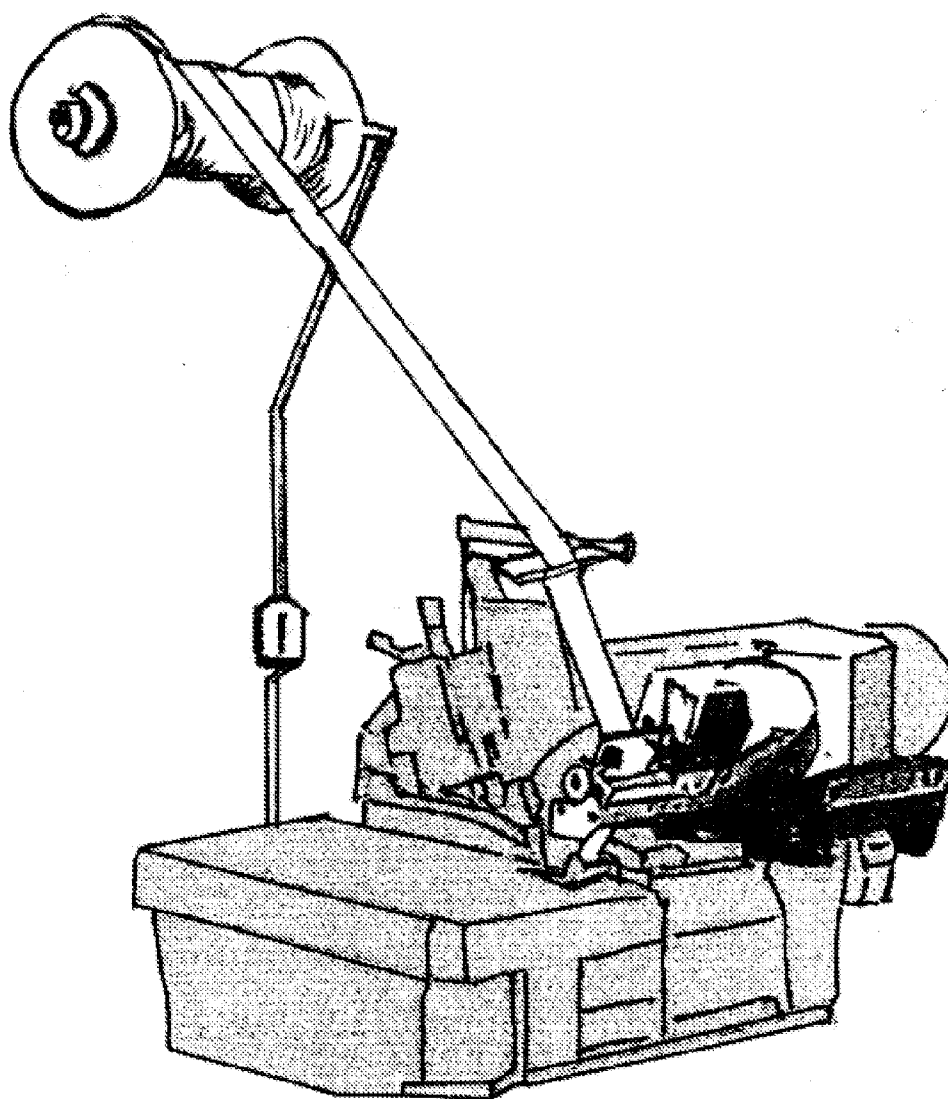


FIG. 19



FABRIC STRAP WITH MULTI-LAYER STRUCTURE FOR AIR-CUSHION EFFECT AND USES THEREOF IN UNDERWEAR

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims benefit from U.S. Provisional Application No. 61/239,463, filed Sep. 3, 2009.

FIELD OF THE INVENTION

[0002] The present utility model relates to the technical field of fabric straps. Particularly to a new fabric strap with a multi-layer structure.

BACKGROUND OF THE INVENTION

[0003] Presently, fabric straps are widely used in the textile industry and daily life, specifically in the garment industry. For example, fabric straps are essential accessories for underwear. In recent years, dramatic improvements have been made in the design and appearance of fabric straps. In order to make fabric straps more beautiful, patterns, decorations and color designs are changing with each passing day, yet less improvement has been made in the structure and function of fabric straps. Taking underwear straps as an example, one sees that most regular-sized underwear adopt narrow fabric straps as their shoulder straps to make the appearance look more exquisite. But for developed females, in order to keep the figure, the underwear straps need to bear large amounts of tension. Narrow straps will press hardly against the shoulders, thus causing discomfort for the wearer. In addition, it is easy for the narrow straps to generate impressions on the skin. Due to these problems, the present method is to connect a length of softer, thicker and wider fabric strap at the shoulder position of the shoulder strap through sewing, so as to satisfy the function required. However, it has complicated working procedures and leads to low work efficiency, which hinders automated production. Moreover, due to the present stitching position, the fabric strap affects the integral aesthetics and can cause skin allergies, red impressions or uncomfortable feelings, etc. due to friction. Another example is underwear wire casing. At present, two types of steel casing straps for underwear are available in the market: those that contain hot-melt yarn and those that do not contain any hot-melt yarn. The steel casing straps without the hot-melt element are structurally loose and prone to perforation. The steel casing straps with hot-melt yarn in the weft, which during the drying process are hot-melt and adhered to the cross-points of other yarn within the fabric, have an enhanced strength to effectively prevent the steel wire from perforating. For example, U.S. Pat. No. 6,071,578 discloses a tubular fabric with a hot-melt yarn, which is hot-melt to form a barrier on the inner wall of the tubular fabric to prevent perforation by steel wire, yet has complicated working procedures and high costs. In addition, the steel casing strap for underwear has a double-layer tubular structure with uniform thickness and would form a layer of hard film after the hot-melt yarn is heated. After the underwear wire is embedded, it will form a hard embossment, create uncomfortable stress and generate impressions when

the embossment touches the wearer's skin, which provides a poor level of wearing comfort.

SUMMARY OF THE INVENTION

[0004] The utility model aims to provide a new fabric strap with a multi-layer structure, to improve upon the limitations of present technology. The multi-layer structure of the present utility model can form a cushion with erect fine hairs, which can relieve the pressure on the skin caused by the fabric strap and steel casing, making the underwear more comfortable. Meanwhile, proneness to penetration from steel wired casing can be reduced. The steel casing with the present structure, not only contains no hot-melt yarn, but also has incredible anti-bursting strength far more than the steel casing fabric containing hot-melt yarn, which can reduce the cost and simplify production process.

[0005] In order to achieve the above purpose, the utility model adopts the following technical scheme: a new fabric strap with multi-layer structure contains fabric with at least two-layer structure. Said fabric strap itself is the fabric with at least a two-layer structure interwoven and connected by a group or multiple groups of yarn according to a certain weave structure.

[0006] Said fabric strap is formed by integral weaving.

[0007] Said fabric strap is divided into several groups according to the yarn connected with every layer.

[0008] Said fabric strap contains at least two groups of the above connected at every layer of yarn.

[0009] Said yarn connecting fabric of every layer form the air cushion with a structure of erect fine hairs.

[0010] The upper-layer fabric of said fabric strap is interwoven by upper-layer wefts and upper-layer warps, the middle-layer fabric is interwoven by middle-layer wefts and middle-layer warps while the lower-layer fabric is interwoven by lower-layer wefts and lower-layer warps.

[0011] Said upper-layer fabric, middle-layer fabric and lower-layer fabric are woven integrally, forming the fabric strap itself with a tubular structure.

[0012] Said fabric strap body has a folding part in the middle position and the body of fabric strap folds and sews along the above folding part, forming a tubular structure. The middle of said tubular structure will form a wire channel used as the outer package of the wire.

[0013] Every layer of fabric of said fabric strap is a plain structure or patterned structure.

[0014] The peripheral surface of said fabric strap itself is a napped or unnapped surface.

[0015] Said fabric strap itself can be an elastic fabric or a non-elastic fabric strap.

[0016] Below are the advantages of the present utility model:

[0017] 1. The new fabric strap with multi-layer structure of said utility model can be interwoven to the fabric strap with air cushion by velvet loom. Said air cushion (1) is the layer with erect fine hairs formed by one or more groups of nap warps (17) interwoven and connected with the upper- and lower-layers of fabric according to a certain weave structure. Since the air cushion composed of erect fine hairs are thicker and softer and also has the effect of relieving pressure, so when said fabric strap with air cushion of the present utility model is used as an underwear strap, the pressure on the skin caused by the fabric strap can be effectively relieved, thus increasing comfort of wear. In addition, since said fabric strap with air cushion for protection of the present utility model is

integrally woven, having a smooth and even surface without connection points and comfortable hand feel, it can not only reduce processing operations, therefore improving production efficiency, but also ensure beautiful appearance of the clothing.

[0018] 2. Said new fabric strap with a multi-layer structure of the present utility model woven by velvet loom, which can form a cushion (2) by interweaving by connecting two layers or more of fabric with a group or more of yarn (24) in the body of the fabric strap. A wire channel (20) will be interwoven above or below the cushion. If the wire casing fabric strap with said structure is adopted in the female underwear, no uncomfortable stress will be generated in the touching point of skin after wearing underwear. In addition, it can avoid leaving impressions on the skin, improve comfort of underwear wear and greatly increase the anti-bursting strength of wire casing.

[0019] 3. Said new fabric strap with multi-layer structure of the present utility model can be woven into high-strength and anti-bursting fabric strap by loom. The body of fabric strap is connected by every layer of fabric with one or more groups of yarn (35) according to a certain weave structure. By folding and sewing said new fabric straps, a tubular structure will form. It will form a wire channel used as the outer package in the middle of the tubular structure, which greatly increases the anti-bursting strength and reduces the probability of suffering bodily harm due to wire. In addition, it can provide a better hand feel of the wire fabric strap and improve the comfort of underwear.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 shows the structural schematic diagram of the present utility model.

[0021] FIG. 2 shows the interweaving structural schematic diagram of the present utility model.

[0022] FIG. 3 shows the upper-layer fabric weave structural schematic diagram of the present utility model.

[0023] FIG. 4 shows the lower-layer fabric weave structural schematic diagram of the present utility model.

[0024] FIG. 5 shows the napped warps interweaving structural schematic diagram of the present utility model.

[0025] FIG. 6 shows the schematic diagram of the double-weft hook yarn used in the present utility model.

[0026] FIG. 7 shows the interweaving structural schematic diagram of the present utility model.

[0027] FIG. 8 shows the upper-layer fabric weave structural schematic diagram of the present utility model.

[0028] FIG. 9 shows the middle-layer fabric weave structural schematic diagram of the present utility model.

[0029] FIG. 10 shows the lower-layer fabric weave structural schematic diagram of the present utility model.

[0030] FIG. 11 shows the napped warps interweaving structural schematic diagram of the present utility model.

[0031] FIG. 12 shows the schematic diagram of the three-weft hook yarn used in the present utility model.

[0032] FIG. 18 shows the anatomical schematic diagram of the present utility model.

[0033] FIG. 13 shows the interweaving structural schematic diagram of the present utility model.

[0034] FIG. 14 shows the upper-layer fabric weave structural schematic diagram of the present utility model.

[0035] FIG. 15 shows the lower-layer fabric weave structural schematic diagram of the present utility model.

[0036] FIG. 16 shows the interweaving structural schematic diagram for interweaving with the middle yarn from the upper and lower layer of the present utility model.

[0037] FIG. 17 shows the loom schematic diagram used in the present utility model.

[0038] FIG. 19 shows the sew machine PEGASUS schematic diagram used for sewing the present utility model.

DETAILED DESCRIPTION OF PARTICULAR EMBODIMENTS OF THE INVENTION

[0039] The following is the detailed description of an embodiment of the present utility model with reference to the attached figures.

First Detailed Description of the Preferred Embodiments

[0040] Shown in FIG. 1 and FIG. 2 is a fabric strap with air cushion protection containing the fabric strap itself. Said fabric strap itself has a double layer structure by integral weaving. Said double layer structure contains upper-layer fabric (11) and lower-layer fabric (12). Said upper-layer fabric (11) and lower-layer fabric (12) form the air cushion (1) with a structure of erect fine hairs by interweaving with the napped warps of upper- and lower-layers (17). Since the air cushion (1) composed of erect fine hairs are thicker and softer and also has the effect of relieving pressure, so that when said fabric strap with air cushion of the present utility model is used as an underwear strap, the pressure on the skin caused by the fabric strap can be effectively relieved, thus increasing comfort of wear. In addition, since said fabric strap with air cushion for protection of the present utility model is integrally woven, having a smooth and even surface without connection points and comfortable hand feel, it can not only reduce processing operations, improving production efficiency, but also ensure beautiful appearance of the clothing.

[0041] In the present embodiment, said upper-layer fabric (11) is interwoven with upper-layer wefts (15) and upper-layer warps (16) while lower-layer fabric (12) is interwoven with lower-layer wefts (13) and lower-layer warps (14).

[0042] Shown in FIG. 3 and FIG. 4 are the schematic diagrams for the better weave structures of said upper-layer fabric and the lower-layer fabric with air cushion protection of the present utility model. Shown in FIG. 5 is the schematic diagram for the better weave structure of napped warps (17). Of course, their weave structures are not limited to the weave structures shown in FIG. 2, FIG. 3, FIG. 4 and FIG. 5. The symbols in figures are as follow: x indicates that the warps keep in the highest position, Δ indicates that the warps keep in the middle position and ○ indicates that the warps keep in the lowest position. In the present embodiment, said upper-layer fabric (11) is interwoven by upper-layer wefts (15) and upper-layer warps (16). The detailed weave structure can be: one-above with one middle, or two-above with two middle, or three-above with one middle, or three-middle with one above, or similar structure. As shown in FIG. 2, the structure is three-above with one middle; the lower-layer fabric (12) is interwoven by lower-layer wefts (13) and lower-layer warps (14). The detailed weave structure can be: one-below with one middle, or two-below with two middle, or three-middle with one above, or three-below with one middle, or of similar structure. As shown in FIG. 4, the structure is two-below with two middle; the upper-layer fabric (11) and lower-layer fabric (12) are interwoven by upper- and lower-napped warps (17),

forming an air cushion (1). The weave structure of the napped warps (17) interwoven is one-above and one below, or two-above and two below, or one-above-and-one-middle with one below, or one-above-and-three-middle with one below, or similar structure. As shown in FIG. 5, the structure is one-above-and-one-middle with one below. In the present embodiment, the nap height of air cushion 6 can be controlled within a range of 0.5 mm-3 mm.

[0043] In the present embodiment, said upper-layer fabric (11) and lower-layer fabric (12) are plain structures or patterned structures. The peripheral surface of said fabric strap itself can be a napped or unnapped surface. Said fabric straps with air cushion protection of present utility model can adopt polyamide, spandex, polyester and other raw materials. The material of napped warps (17) can adopt polyamide, which will have a better effect, such as adopting polyamide 6 or polyamide 66. Said fabric strap itself can be elastic fabric strap or a non-elastic fabric strap. In the case that raw materials with a high elasticity coefficient are adopted as the raw materials of the fabric strap, an elastic fabric strap can be woven; in the case that raw materials with an elastic coefficient close to zero are adopted as the raw materials of the fabric strap, a non-elastic fabric strap can be woven.

[0044] The shuttleless loom, which is the main manufacturing equipment of the present utility model, is the NF53/66S velvet loom Swiss MULLER. The manufacturing process is as follows:

[0045] I. Wind the required warps (spandex yarn, nylon yarn and other yarn) on the pan head using warping appliances;

[0046] II. Wind and convey warps though the warp pan head and make thread in the warp pass through the heddle of shuttleless loom according to required warp arrangement; Wherein nap warps 4 shall pass through the warp conveying device;

[0047] III. The heald frame of shuttleless loom moves up and down in accordance with the required weaving mode, thus driving the up-and-down motion of heddles and dividing warps into three layers to form an opening;

[0048] IV. As shown in FIG. 6, the double-weft hook of the shuttleless loom drives wefts to traverse the opening and the latch needle winds up the wefts or edges;

[0049] V. The loom reed swings to make wefts passing through the opening firm and form the greige strap of said fabric strap with air cushion protection of the present utility model and there is no need to cut the naps.

[0050] VI. Dip-dye and set the above greige strap in the dye vat to make it to the product.

[0051] In conclusion, said fabric strap with air cushion protection of present utility model has a simple structure, which can be used as a underwear strap, can be manufactured with high production efficiency, and is easy to achieve production automation. Since the fabric strap itself is provided with an air cushion 6 composed of erect naps, it is relatively soft on the skin and can relieve stress generated by fabric strap itself. Red impressions or discomfort, etc. of skin will not be caused after wear. In addition, for underwear with a large cup size, narrower and more exquisite fabric straps can also be adopted to make the appearance of the underwear more beautiful. Therefore, by adopting said fabric strap with air cushion protection of the present utility model, the underwear enjoys a closer fit, is smoother, more comfortable, and meets require-

ments on beautiful appearance. Whether participating in sports or keeping stationary, it provides perfect wearing effect and comfort.

Second Detailed Description of the Preferred Embodiments

[0052] Shown in FIG. 7 is a high-strength wire fabric strap, consisting of the fabric strap itself. Said fabric strap itself has a three-layer weave structure. Said three-layer weave structure consists of upper-layer fabric (23), middle-layer fabric (21) and lower-layer structure (22). Said upper-layer fabric (23), middle-layer fabric (21) and lower-layer fabric (22) are interwoven integrally to the fabric strap itself with a tubular structure: both sides of the upper-layer fabric (23) and middle-layer fabric (21) are connected vertically to form a hollow wire channel (20) for embedding the wire while the middle-layer fabric (21) and the lower-layer fabric (22) are interwoven napped warps (24) to form a reinforcing layer (2) with erect fine hairs structure; there are vertically connected weave structures on both sides of the middle-layer fabric (21) and lower-layer fabric (22), forming a reinforcing layer (2) after interweaving with napped warps (24), then the strength of wire channel (20) inner wall is improved to prevent wire penetration. In addition, the vertically interwoven structure forms erect fine hairs, providing a certain cushioning effect in the reinforcing layer (2), adding soft feel to the touch, relieving stress generated by the wire in the wire channel (20). No wire impressions will be left under the breasts after wear and when the wire is embedded, it reduces embossment and makes the appearance of the underwear more beautiful.

[0053] Said high-strength wire fabric strap of the present utility model does not adopt any hot-melt yarn or yarn similar to hot-melt yarn as its raw material. However, its strength can be much higher than that of the wire fabric strap with hot-melt yarn after process structure reformation, effectively solving the problem of wire penetration. The following has the comparison of the detailed experiment test.

[0054] Shown in FIG. 8, FIG. 9 and FIG. 10 are the better weave structure schematic diagrams of upper-layer fabric (23), middle-layer fabric (21) and lower-layer fabric (22) for said high-strength wire fabric strap of the present utility model. The better weave structure of the connecting napped warps (20) is shown in FIG. 11. The symbols in figures are as follows: x indicates that the warps keep in the highest position, ▲ indicates that the warps keep in the sub-high position, Δ indicates that the warps keep in the sub-low position and ○ indicates that the warps keep in the lowest position.

[0055] In the present embodiment, when the three-layer fabric is woven, the warps need to be divided into four layers of yarn, arranged from top to bottom, these warps keep in the highest position, sub-high position, sub-low position and lowest position, respectively. Wherein: said upper-layer fabric (23) is interwoven by upper-layer wefts and upper-layer warps (29) and the detailed weave structure can be one-above with one middle, or two-above with two middle, or three-above with one middle, or three-middle with one above, or a similar structure. As shown in FIG. 8, the structure is a combination of one-above with one middle and seven-above with one middle; the middle-layer fabric (21) is interwoven by middle-layer wefts (28) and middle-layer warps (27) and the detailed weave structure is one-above with one middle, or two-above with two middle, or three-above with one middle, or three-middle with one above, or a similar structure. As shown in FIG. 9, the structure is one-above with one middle;

the lower-layer fabric (22) is interwoven by lower-layer wefts (26) and lower-layer warps (25) and the detailed weave structure is one-below with one middle, or two-below with two middle, or three-middle with one below, or three-below with one middle, or similar structure. As shown in FIG. 10, the structure is one-below with one middle. The middle-layer fabric (21) and the lower-layer fabric (22) are interwoven by napped warps (24) to form a reinforcing layer (2). The weave structure of connecting napped warps is one-above with one below, or two-above with two below, or one-above-and-one-middle with one below, or one-above-and-three-middle with one below, or similar structure. As shown in FIG. 11, the structure is one-above-and-one-middle with one below.

[0056] The peripheral surface of said fabric strap itself can be a napped or unnapped surface. Said high-strength wire fabric of the present utility model adopts polyamide, spandex, polyester or other raw materials. It is better to adopt polyamide for the material of napped warps. For example, it adopts polyamide 6 or polyamide 66.

[0057] The fabric strap of the present utility model itself can be an elastic fabric strap or a non-elastic fabric strap. In the case that raw materials with a high elasticity coefficient are adopted as the raw materials of fabric strap, an elastic fabric strap can be woven. In the case that raw materials with an elasticity coefficient close to zero are adopted as the raw materials of the fabric strap, a non-elastic fabric strap can be woven.

[0058] The shuttleless loom, which is the main manufacturing equipment of the present utility model, is a shuttleless loom by Swiss MULLER.

[0059] The main manufacturing equipment of said high-strength wire fabric strap of the present utility model is shuttleless loom. The manufacturing process is as follows:

[0060] I. Wind the required warps (spandex yarn, nylon yarn and other yarn) on the pan head using warping appliances;

[0061] II. Wind and convey warps though the warp pan head and make thread in the warp pass through the heddle of shuttleless loom according to required warp arrangement mode;

[0062] III. The heald frame of shuttleless loom moves up and down in accordance with the required weaving mode, thus driving the up-and-down motion of heddles and dividing warps into three layers to form an opening;

[0063] IV. As shown in FIG. 12, the three-weft hook of the shuttleless loom drives wefts to traverse the opening and the latch needle winds up the wefts or edges;

[0064] V. The loom reed swings to make wefts passing through the opening firm and form the greige strap of said fabric strap with air cushion protection of the present utility model.

[0065] VI. Dip-dye and set the above greige strap in the dye vat to make it to the product by using union dyeing appliance or vat dyeing appliance for fabric strap.

[0066] In conclusion, the present utility model can effectively prevent wire penetration, relieve stress on skin generated by wire and avoid leaving impressions on the skin, thus improving the comfort of underwear. After wearing the underwear adopting said high-strength wire casing of the present utility model, the wire will not penetrate the wire casing and there will be no wire impressions left under the breasts. It meets the requirement for beautiful appearance while making the underwear more close-fitting and smooth

without wire traces. Whether participating in sports or keeping stationary, it provides perfect wearing effect and comfort.

Third Detailed Description of the Preferred Embodiments

[0067] Shown in FIG. 13 is an anti-bursting wire fabric strap, consisting of the fabric strap itself. Said fabric strap body is integrally woven with upper-layer fabric and lower-layer fabric by weaving up-and-down middle yarn (35). Said fabric strap body has a folding part (30) in the middle position and the body of fabric strap folds and is sewn along the above folding part (30), forming a tubular structure. The middle of said tubular structure will form a wire channel used as the outer package of the wire. A cushion is formed by connecting the upper-layer fabric, lower-layer fabric and middle yarn, which can not only improve the anti-bursting strength of fabric strap, effectively preventing wire penetration, but also provide a better hand feel for the fabric strap, improving the comfort of the underwear.

[0068] Said anti-bursting wire fabric strap of the present utility model does not contain any hot-melt yarn or raw material similar to hot-melt yarn in its raw material composition. However, after process structure reformation, its anti-bursting strength is much higher than that of the wire fabric strap with hot-melt yarn and it can effectively resolve the problem of wire penetration.

[0069] As shown in FIG. 14 and FIG. 15, they are the better weave structures of the upper-layer fabric and lower-layer fabric of said anti-bursting wire fabric strap of the present utility model. As shown in FIG. 16, it is the better weave structure of interwoven warps. Of course, their weave structures are not limited to the weave structures shown in FIG. 14, FIG. 15, FIG. 16. The symbols in figures are as follows: x indicates that the warps stays in the highest position, Δ indicates that the warps stay in the middle position and ○ indicates that the warps stay in the lowest position.

[0070] In the present embodiment, the fabric strap itself is an integrally woven tubular fabric formed by folding and sewing from the middle, used as the outer package of the underwear wire. The fabric strap itself has a two-layer strap structure with upper-layer fabric and lower-layer fabric. Wherein, the upper layer is interwoven by the upper-layer wefts (33) and upper-layer warps (34) and its detailed structure can be one-above with one middle, or two-above with two middle, or three-above with one middle, or three-middle with one above, or similar structures. Shown in FIG. 14 is a combination structure of one-above with one middle and seven-above with one middle; the lower-layer fabric is interwoven by lower-layer wefts (31) and lower-layer warps (32) and its detailed weave structure is one-below with one middle, or two-below with two middle, or three-middle with one below, or three-below with one middle, or similar structures. As shown in FIG. 15, the structure is one-below with one middle; the upper-layer fabric 2 and lower-layer fabric 3 are interwoven up and down with middle yarn (35) to form a reinforcing layer. The weave structure of the interwoven middle yarn is one-above with one below, or two-above with two below, or one-above-and-one-middle with one below, or one-above-and-three-middle with one below, or similar structures. As shown in FIG. 16, the structure is one-above-and-one-middle with one below.

[0071] The peripheral surface of said fabric strap itself can be a napped or unnapped surface. Said anti-bursting wire fabric of the present utility model adopts polyamide, spandex,

polyester or other raw materials. It is better to adopt polyamide for the material of napped warps. For example, it adopts polyamide 6 or polyamide 66.

[0072] The fabric strap of the present utility model itself can be an elastic fabric strap or a non-elastic fabric strap. In the case that raw materials with a high elasticity coefficient are adopted as the raw materials of fabric strap, elastic fabric strap can be woven. In the case that raw materials with an elasticity coefficient close to zero are adopted as the raw materials of the fabric strap, a non-elastic fabric strap can be woven.

[0073] The shuttleless loom, which is the main manufacturing equipment of the present utility model, is a narrow-width loom by Swiss MULLER, as shown in FIG. 17. The manufacturing process is as follows:

[0074] I. Wind the required warps (spandex yarn, nylon yarn and other yarn) on the pan head using warping appliances;

[0075] II. Wind and convey warps through the warp pan head and make thread in the warp pass through the heddle of shuttleless loom according to required warp arrangement mode;

[0076] III. The heald frame of shuttleless loom moves up and down in accordance with the required weaving mode, thus driving the up-and-down motion of heddles and dividing warps into three layers to form an opening;

[0077] IV. As shown in FIG. 12, the double-weft hook 7 of the shuttleless loom drives wefts to traverse the opening and the latch needle winds up the wefts or edges;

[0078] V. The loom reed swings to make wefts passing through the opening firm and form the greige strap of said anti-bursting fabric strap of the present utility model.

[0079] VI. Fold and sew its greige strap by applying Japanese sewing machine PEGASUS to tubular semi-finished products. Wherein, bottom yarn adopts 70D baogen yarn while sewing thread adopts elastic nylon;

[0080] VII. Dip-dye and set the above sewed tubular semi-finished products in the dye vat to make it to the product.

[0081] In conclusion, the present utility model can bring the functions of wire into better play and make the appearance of lady's underwear such as underwear and corselets more beautiful. After wearing the underwear adopting said anti-bursting wire casing of the utility model, there will be no wire impressions left under the breasts and it meets requirements for beautiful appearance while making the underwear more close-fitting and smooth without wire traces. Whether one participates in sports or keeps stationary, it will provide a perfect wearing effect and comfort.

[0082] The following table is the comparison table of wire fabric strap bursting strength tests between existing technology and preferred embodiment 2 and 3 of the present utility model:

Sample	Containing hot-melt yarn or Not?	Bursting Strength Value	Meets Martha Requirement (25.0 KG)	Meets VS Requirement (50 LB)
A	YES	≥20 KG	NO	NO
B	NO	≥30 KG	YES	YES
C	NO	≥30 KG	YES	YES

[0083] Wherein, Sample A is a common wire fabric strap with hot-melt yarn; Sample B is the high-strength wire fabric

strap in the preferred embodiment 2 of the present utility model; Sample C is the anti-bursting wire fabric strap in the preferred embodiment 3 of the present utility model.

[0084] It is shown from the above table that strength of said anti-bursting wire fabric strap of the present utility model is much stronger than the wire casing fabric strap with hot-melt yarn. In addition, it far surpasses Martha and VS requirements for the bursting strength of wire casing.

[0085] The above mentioned is just a better embodiment of the utility model, therefore, all equivalent changes or modifications made in accordance with structure, characteristics and principles stated in the utility model patent claim shall be included in the utility model patent claim.

[0086] While the preferred embodiment of the present invention has been described in conjunction with the drawings, the present invention is not limited to the above embodiment. The above embodiment is only illustrative and not limitative. Without departing from the spirit of the present invention and the scope sought for protection by the claims, a person skilled in the art can further make a lot of forms, all of which belong to the protection scope of the present invention.

What is claimed is:

1. A new fabric strap with multi-layer structure, containing the fabric with at least a two-layer structure, characterized in that: the body of said fabric strap is interwoven integrally by the fabric with at least double-layer structure through connecting one group or more than one group yarn according to a certain weave structure.

2. Said fabric strap with multi-layer structure of claim 1, characterized in that: said fabric strap is formed by integral weaving.

3. Said fabric strap with multi-layer structure of claim 1, characterized in that: said fabric strap is divided into several groups according to the yarn connected with every layer.

4. Said fabric strap with multi-layer structure of claim 1, characterized in that: said fabric strap contains at least two groups of the above connected at every layer of yarn.

5. Said fabric strap with multi-layer structure of claim 3, characterized in that: said yarn connecting fabric of every layer form the air cushion with a structure of erect fine hairs.

6. Said fabric strap with multi-layer structure of claim 1, characterized in that: the upper-layer fabric of said fabric strap is interwoven by upper-layer wefts and upper-layer warps, the middle-layer fabric is interwoven by middle-layer wefts and middle-layer warps while the lower-layer fabric is interwoven by lower-layer wefts and lower-layer warps.

7. Said fabric strap with multi-layer structure of claim 1, characterized in that: said upper-layer fabric, middle-layer fabric and lower-layer fabric are woven integrally, forming the fabric strap itself with a tubular structure.

8. Said fabric strap with multi-layer structure of claim 1, characterized in that: said fabric strap body has a folding part in the middle position and the body of fabric strap folds and sews along the above folding part, forming a tubular structure. The middle of said tubular structure will form a wire channel used as the outer package of the wire.

9. Said fabric strap with multi-layer structure of claim 1, characterized in that: every layer of fabric of said fabric strap is plan structure or patterned structure.

10. Said fabric strap with multi-layer structure of claim 1, characterized in that: the peripheral surface of said fabric strap itself is a napped or unnapped surface.

11. Said fabric strap with multi-layer structure of claim 1, characterized in that: said fabric strap itself can be an elastic fabric or a non-elastic fabric strap.

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