Material from cotton fibers is contained from 10% to 90% in the fabric. The essence of this invention is that in its special design it combines two types of materials, hydrophobic synthetic material (2) and a hydrophilic cotton fibers (1), where synthetic material covers the back surface of the fabric and the staple yam of hydrophilic cotton fibers creates the inner structure and loop fabric surface, i.e., a front of the end product. The outer loop surface and internal structure of the fabrics, that consist of staple yam from hydrophic cotton fibers, mediate the transport of water from the back layer and thus away from the body and it gradually evaporates into the surrounding environment. Material from cotton fibers is contained from 10% to 90% in the fabric.
Declarations under Rule 4.17:  

— of inventorship (Rule 4.17(iv))

Published:  

— with international search report (Art. 21(3))
Functional loop fabric

Technology area

Technical solution relates to the technological design of fabric that combines cotton-loop side and synthetic side so that the resulting structure provides a new special function - the moisture away from skin while maintaining comfort and good thermal-insulation properties.

Present condition of technology

Loop fabrics, also known as Terry cloth, are three-dimensional fabrics. The third dimension consists of fabric loops of warp threads above or below the surface of the fabric. Loop fabrics are usually manufactured in two versions:

- Loop fabrics three-weft

- Loop fabrics four-weft

For production the weaving machines for weaving of terry are used. Loop and the basic warp is given from the individual weaver's beam, loops are formed on the warp are created by "non-reaching" of ray during the weaving. Height of the loop is determined by the size of the "non-reaching".

The loop warp has 200 to 800 % gathering. The full stop/reaching is only after the third or fourth brought weft, which takes a loop warp. Loop fabrics with cut loops are similar to velvet and can be called "velor".
The standard loop fabrics are often used in hotel textiles, which includes the following categories: textiles bathroom (dressing gowns - bathrobes), bathroom clothing (sauna towels - kilts, loincloth, slippers), towels, massage pads, etc. and then also for the production of sports textiles (clothing, equipment).

This type of fabric is usually used at home, in hotels, wellness, spa, health services, for sports, fitness, on the beach. According to the methods of use the properties of fabric of this type must fulfill various requirements. Fulfillment of these requirements is ensured by the type of fiber used, fabrics construction, or cut clothing.

The most common requirements (which are sometimes mutually exclusive) are moisture absorption, quick drying, heat insulation - warmth, light weight, drape, minimal pilling, nice touch, non-stick surface, antimicrobial properties, dimensional stability, low wear, contemporary look, easy maintenance.

The standard loop fabrics used most often for towels and bathrobes are made of hydrophilic cotton fibers and provide excellent absorbency and in dry state provide also the warmth. The disadvantage of these traditional materials is the fact that in the wet state the above properties, especially the warmth, decrease rapidly and thereby the user's comfort decreases as well. This results in less outlet of moisture from the skin and worse keeping it dry.

**Principle of technical solution**

During the construction of material in accordance with this technical solution it is an attempt to achieve these requirements for fabrics:

- moisture from the skin, absorbency
- maintaining the skin's surface in dry
- thermal insulation, warmth
- comfortable feel
- easy maintenance, fast drying, stability maintenance
- low bulkiness
- Modern look
The above deficiencies largely solves by the construction of functional loop fabric according to his technical solution.

Its essence is that in its special design it combines two types of materials, hydrophobic synthetic material and a hydrophilic cotton fibers, where synthetic material covers the back surface of the fabric and the staple yarn of hydrophilic cotton fibers creates the inner structure and loop fabric surface, i.e. a front of the end product.

The surface of the backside of the cloth is made up of synthetic length textile. This layer provides output of moisture from the skin, but due to its hydrophobic properties it provides also minimal water absorption. This layer is in direct contact with the skin, it does not absorb water, but it can detract the water from the body (by capillary phenomenon) to the next layer of fabric. At the same time it improves the thermal insulation. It also provides the following functions: it prevents odor, has a nice touch, does not irritate skin mechanically, allows rapid drying of the skin. Synthetic material is contained in the fabric from 10 to 90%.

The outer loop surface and internal structure of the fabrics, that consist of staple yarn from hydrophilic cotton fibers, mediate the transport of water from the back layer and thus away from the body and it gradually evaporates into the surrounding environment. Material from cotton fibers is contained from 10% to 90% in the fabric.

Functional fabric loop consists of the basic warp of the nominal fineness of yarn tex 20 to 150, then the loop warp of the nominal fineness of yarn tex from 20 to 150, weft cotton yarn of the nominal fineness of yarn tex 20-150 and weft synthetic length fabric of a nominal fineness tex 30 - 700. The warp thread count is in the range 180 to 450 threads / 10 cm and weft thread count is in the range 100 to 350 threads / 10 cm. Gathering of loop warp loop is in the range 150 - 1000 % and the fabric surface weight is between 300 to 900 g/m2.

Based on the above composition these advantageous properties of the loop fabric according to the invention are achieved:
- in the wet state the thermal conductivity is on the synthetic inner side lower i.e. this surface takes away from the body less heat, i.e. it cools less in the wet state than the outer side of cotton
- the process of soaking of small drops into the fabric from the inner side of the synthetic material is performed in the way that the moisture spreads faster through body of synthetic material and it is transmitted to the cotton outer side of textile
List of pictures on the drawings

Technical solutions will be further illustrated by a drawing in which Figure 1 shows a longitudinal section of functional loop fabric from which the structural composition of the fabric according to the invention is evident.

Example of technical solution conduct

Construction of functional loop fabric in accordance with this technical solution is in more details described below on the specific implementation example using the enclosed picture, where the longitudinal section of this type of fabric construction is schematically shown.

The structural parameters of fabrics include: surface weight, fineness and type of linear length textiles - yarns, thread count (number of threads per unit length) of warp and weft, clotting, gatherings of warp and weft and mutual interconnection.

Basic warp, loop warp and weft loop for the certain type of loop fabric is from cotton yarn 1. One woven loop is formed from at least 3 wefts forming the front side and is made of cotton yarn 1.

The inserted weft forming the reverse side is made of polyester chenille yarn 2.

Example 1

Exemplary functional fabric loop is formed by lower loop and larger chenille, where the exemplary composition is as follows:

Finessess (linear density) and type of yarn:
- basic warp 25 * 2 tex carded classic AI
- loop warp 38 * 1 tex carded classic AI
- basic weft 38 * 1 tex carded classic AI
- weft effective 555 * 1 tex polyester Chenille

Thread count (number of threads per unit length)
- warp 27,2 cm - 1
- weft 12,0 cm - 1
Warp gatherings 150%
Basis weight 400g/m2

Note: 3 loops per 1 cm, one loop consists of three basic wefts and one effective weft

The first example of functional design is functional loop fabric, which is characterized by the laying of three loops of cotton yarn 1 in the front side and three chenille polyester yarns 2 in the back per one centimeter. This arrangement ensures during the wetting of back chenille side the rapid transport of moisture into the front cotton side while maintaining adequate thermal-insulation properties of the whole. The overall design gives a nice touch and optimum bulkiness.

**Example 2**
Exemplary functional fabric loop is formed by higher loop and larger chenille, where the exemplary composition is as follows:

Fineness (linear density) and type of yarn:
- basic warp 25 * 2 tex carded classic AI
- loop warp 38 * 1 tex carded classic AI
- basic weft 38 * 1 tex carded classic AI
- weft effective 555 * 1 tex polyester Chenille

Thread count (number of threads per unit length)
- warp 27,2 cm - 1
- weft 14,0 cm - 1

Warp gatherings 250%
Basis weight 400g/m2

Note: 4 loops per 1 cm, one loop consists of three basic wefts and one effective weft and following loop only from three basic wefts

Other example of functional design is functional loop fabric, which is characterized by the laying of four loops of cotton yarn 1 in the front side and two chenille polyester yarns 2 in the back per one centimeter. This arrangement ensures during the wetting of back chenille side
the rapid transport of moisture into the front cotton side while maintaining adequate thermal-insulation properties of the whole. The overall design gives the full touch of front side and emptier touch of the back side.

**Example 3**
Exemplary functional fabric loop is formed by higher loop and softer chenille, where the exemplary composition is as follows:

**Fineness (linear density) and type of yarn:**
- basic warp: 25 * 2 tex carded classic AI
- loop warp: 38 * 1 tex carded classic AI
- basic weft: 38 * 1 tex carded classic AI
- weft effective: 260 * 1 tex polyester Chenille

**Thread count (number of threads per unit length):**
- warp: 27,2 cm - 1
- weft: 15,0 cm - 1

**Warp gatherings:** 170%

**Basis weight:** 400g/m2

Note: 3 loops per 1 cm, one loop consists of three basic wefts and two effective wefts

Other example of functional design is functional loop fabric made of softer chenille yarn. The whole is characterized by the laying of three loops of cotton yarn in the front side and six chenille polyester yarns in the back per one centimeter. This arrangement ensures during the wetting of back chenille side the rapid transport of moisture into the front cotton side while maintaining adequate thermal-insulation properties of the whole. The overall design gives the full touch of front and back side, good overall bulkiness while maintaining high thermal insulation and rapid moisture transport.

**Example 4**
Exemplary functional fabric loop is formed by lower loop and softer chenille, where the exemplary composition is as follows:
Fineness (linear density) and type of yarn:
- basic warp 25 * 2 tex carded classic Al
- loop warp 38 * 1 tex carded classic Al
- basic weft 38 * 1 tex carded classic Al
- weft effective 260 * 1 tex polyester Chenille

Thread count (number of threads per unit length)
- warp 27,2 cm - 1
- weft 20,0 cm - 1
- Warp gatherings 250%
- Basis weight 400g/m2

Note: 5 loops per 1 cm, one loop consists of three basic wefts and one effective wefts

Other example of functional design is functional loop fabric made of softer chenille yarn. The whole is characterized by the laying of five loops of cotton yarn in the front side and five chenille polyester yarns in the back per one centimeter. This arrangement ensures during the wetting of back chenille side the rapid transport of moisture into the front cotton side while maintaining adequate thermal-insulation properties of the whole. The overall design gives the full touch of front side and back side, low overall bulkiness while maintaining high thermal insulation and rapid moisture transport.

Industrial efficiency

Functional loop fabric in accordance with this technical solution can be used in all areas of hotel textiles, home textiles, in the wellness & spa, health services as clothing or technical textiles.
Claims for protection

1. The functional loop fabric with improved moisture output and thermal insulation properties in the wet state, characterized in that it is made of two materials of different properties - particular in absorbency, output of moisture and thermal conductivity in wet state when one side is made up of loops of cotton yarn (1) with high hydrophilic capability - absorbency, compact surface of second side of the fabric is made of hydrophobic synthetic length fabric (2) when the fabric contains a combination of cloth and cotton yarn (1) and synthetic length fabric (2) in any proportion, where each used combination of these components is represented in the mixture up to 95%.

2. The functional loop fabric according to the claim 1, characterized in that it consists of the basic warp of the nominal fineness of yarn tex 20 to 150, then the loop warp (1) of the nominal fineness of yarn tex from 20 to 150, weft cotton yarn of the nominal fineness of yarn tex 20-150 and weft synthetic length fabric (2) of a nominal fineness tex 30 - 700.

3. The functional loop fabric according to the claim 1, characterized in that the warp thread count is in the range 180 to 450 threads / 10 cm and weft thread count is in the range 100 to 350 threads / 10cm.

4. The functional loop fabric according to the claim 1, characterized in that gathering of loop warp loop is in the range 150 - 1000 %.

5. The functional loop fabric according to the claim 1, characterized in that the fabric surface weight is between 300 to 900 g/m2.
**INTERNATIONAL SEARCH REPORT**

**PCT/CZ2012/000072**

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**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A41B17/00 A41D31/02 D03D27/08

**ADD.**

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

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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

D03D A41B A41D A47K

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

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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**Further documents are listed in the continuation of Box C.**

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**See patent family annex.**

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**Date of the actual completion of the international search**

20 November 2012

**Date of mailing of the international search report**

28/11/2012

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