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(54) **INVENTION OF THE HOLLOW STRETCH YARN**

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ABSTRACT

Publication Classification

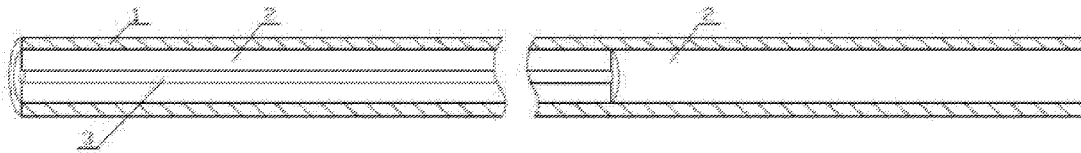
A substantially hollow structured elastic core-spun yarn has a dissolvable core and main stretch core covered with single or multiple slivers. The dissolvable core would be partially or totally removed in yarn processing, or fabric finishing, or garment finishing, and removed with combination of different stages' processing.

(51) **Int. Cl.**

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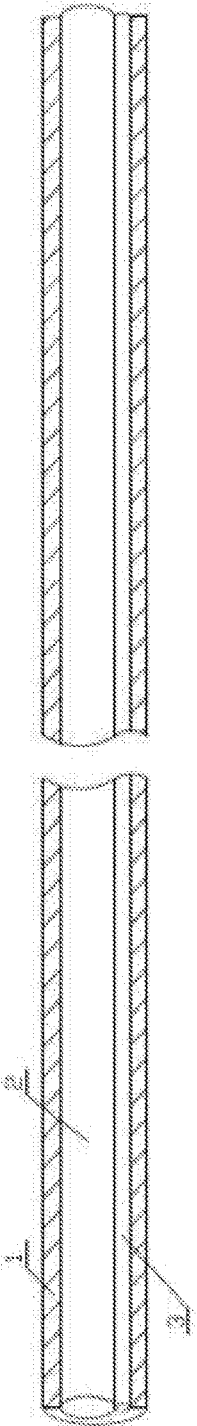


FIG. A

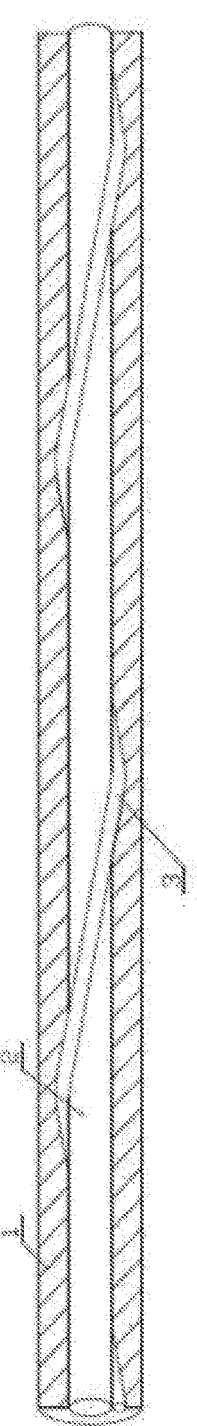


FIG. B

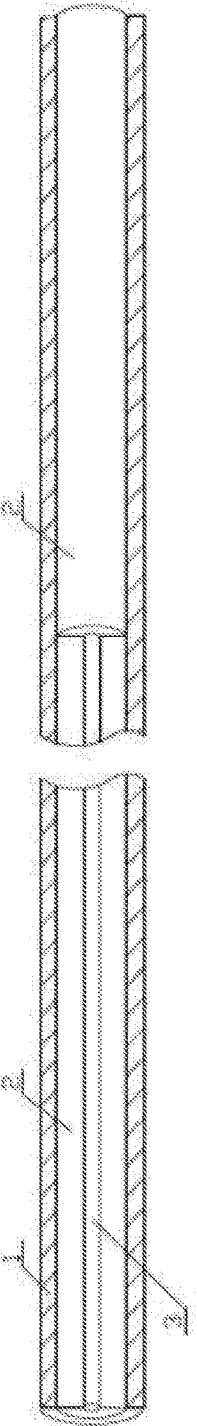


FIG. C

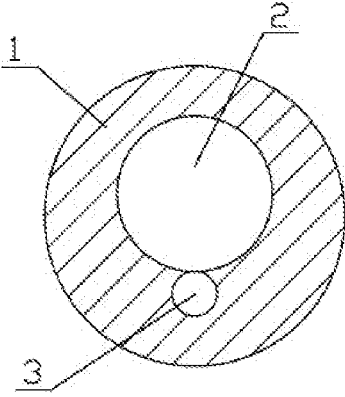


FIG. A1

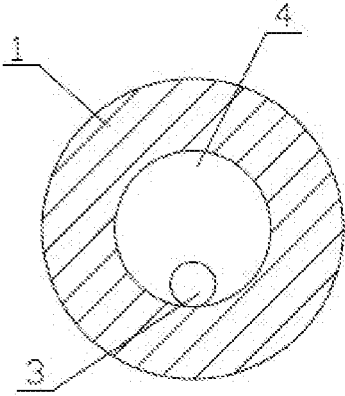


FIG. B1

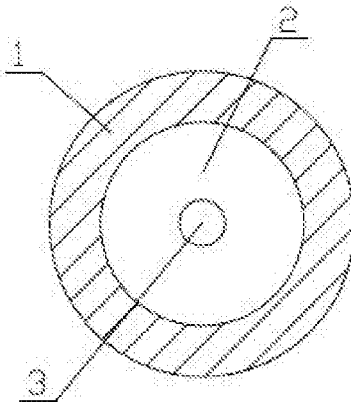


FIG. C1

INVENTION OF THE HOLLOW STRETCH YARN

CROSS REFERENCE OF RELATED APPLICATION

[0001] This application claims priority under 35 U.S.C. 119(a-d) to CN 201811097773.0, filed Sep. 20, 2018.

BACKGROUND OF THE INVENTION

Field of Invention

[0002] This invention relates to an elastic yarn structure with substantial hollow structure. The core is composed of dissolvable part (dissolvable core) and elastic part (main elastic core) covered with single or multiple slivers, as well as fabrics containing such yarns and garments made use of such fabric.

Description of Related Arts

[0003] The invention is particularly concerned with improvements of core-spun elastic yarns performance, recovery of stretch fabric and easier recycle of such woven fabrics, and comfortableness of stretch garments.

[0004] Recovery of stretch woven fabric is always a challenging topic for fabric designers, as well as garment designers. Elastic yarn with synthetic fibers sheath could achieve better recovery, but it carried glittery look as well as a hot synthetic hand those are undesirable. Current best solution is dual core type spun yarns but those frequently have obvious segments of filaments exposures in splices of yarn and sometimes on yarn body as well which is due to spun process fluctuations. Such exposures of segments of filament core are undesirable in apparel applications because light reflection usually differed from sheath of yarn adopted and result in non-uniformities. Core spun yarns with good recovery and without filament core exposure are still sought. Fabric comprising such yarns and garments made from such fabric, which have lower risk of filament core exposure and have good stretch recovery, good appearance and hand, are also sought.

[0005] Due to pulling force of elastane, stretch woven fabric construction is more compact compared with rigid (without stretch) woven fabric and lead to low breathability. Wearing bad ventilation of garments made with stretch woven fabric is not good to health as bacteria growth faster because of humidity and warmness, those feeling is not good wearing experience either. Therefore, stretch woven fabric with good ventilation and less see through is still sought.

[0006] Stretch woven fabric made with hollow stretch yarns, because of the loose yarn construction carried, has higher breathability and softer hand those provided consumers more comfort wearing experience as well as less see through under same final yarn size and construction. Hollow stretch yarn provides a tunnel space so the drafted elastane inside could almost freely rebound and achieve prompt recovery (shown as FIG. B1) in garments after stretching

[0007] The stretch fabrics are required to spring back after stretching. Artificial yarns (polyester etc.) are commonly adopted to reduce frictions to obtain rapid spring back. The cloth produced keeps good shape while stretching. But the touch of the artificial yarn is not as skin friendly as the

natural yarn or the cellulose yarn. The dyeing and reflectivity of the artificial yarn is not able to compete with the natural yarn.

[0008] The air permeability of the fabric is also important besides the resilience, which is far from satisfactory. The gap of the dual core spun yarn or other elastic fabric is small which lead to low air permeability and cause uncomfortable especially in places such as underarm because of the accumulated humidity.

[0009] In order to reduce the weight of the clothes, the superfine yarns are adopted or the density of the yarns is reduced, either of which cause the possible transparent due to the reduced cover factor.

[0010] An elastic, air permeable, light weight, not see through yarn are required to meet the needs.

SUMMARY OF THE PRESENT INVENTION

[0011] The present application is a substantial hollow stretch yarn construction with covering fibers (shown as FIG. A1), substantial hollow structure in central and at least one core, fabric comprising such yarn and the garment made from such fabric.

[0012] The final yarn construction is achieved by removing dissolvable core of composite core and substantially hollow space formed in central of yarn (shown as FIG. C1).

[0013] The invention also covers a woven fabric from the hollow yarn, as well as garment made from such fabric.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] 1 is covering sheath;

[0015] 2 is dissolvable core;

[0016] 3 is main stretch core;

[0017] 4 is hollow space after dissolvable core removed.

[0018] In the accompanying drawings given by the way of example:

[0019] FIG. A is vertical section of the way composite core fed in parallel form with FIG. A1 showing the cross section;

[0020] FIG. B is vertical section of the way composite core fed in ply yarn form with FIG. A1 showing the cross section;

[0021] FIG. C is vertical section of the way composite core fed in core spun form with FIG. C1 showing the cross section;

[0022] FIG. B1 is cross section of final hollow stretch yarn formed regardless using any feeding method above.

DETAILED DESCRIPTION OF THE INVENTION

[0023] The Hollow Stretch Yarn

[0024] According to the invention, main stretch core and dissolvable core is fed in the central of yarn during spinning. The drafting ratio of main stretch core is ranged 230% to 350% according to technical needs; regardless it is parallel (shown as FIG. A) placement way or ply yarn way (shown as FIG. B) or spun yarn core. The dissolvable core is under certain tension and drafting is below 5% as normally dissolvable fibers elasticity is low.

[0025] This invention relates to main stretch core with hollow structure that comprise dissolvable core with water-soluble vinylon or rayon and polyurethane filament(s). The invention also relates to stretch woven fabrics comprising such core spun (shown as FIG. C) yarn and the garments made from such fabric. The fabrics are substantially almost

free from core exposure, as the portion of dissolvable core would be removed by hot water or hot alkaline bath in consequential fabric or garment processes. The final hollow structure of yarn provided free space (shown as FIG. B1) for main stretch core moving and shrinking in core of yarn, thus stretch fabric's recovery is improved. Because of interfering of the thick core in yarn spinning stage and the high shrinking of stretch yarn of hollow stretch yarn, the final sheath of yarn is an imperfect tube shape and result tinny path in fabric. Those tinny paths improved fabric breathability. The final tube like construction improved yarn-covering factor and more efficient in light reflection compared with stretch yarn with same final weight, less see-through is achieved. Also, the final tube like structure provided fabric with thicker body while without shoulder additional garment weight.

[0026] <Advance> a dissolvable core comprising water-soluble vinylon fibers yarn or filament and/or viscose rayon fibers and/or filament and filament(s) of polyurethane.

[0027] <Advance> The dissolvable core would be totally or partially removed by hot water bath for dissolvable vinylon or hot alkaline for viscose rayon during fabric finishing or garment washing process, wherein a hollow yarn structure to be formed.

[0028] <Advance> there are multiple ways for placing of dissolvable core and main stretch core. The application could be in (a) parallel form; (b) twisted form; (c) covered yarn form (shown as FIGS. A, B and C).

[0029] <Advance> The total core occupied total yarn linear weight in the rage from about 10% to 40%. The total yarn size can be ranged from about 4 to about 60 English cotton count.

[0030] <Advance> The hollow stretch yarn may be used in either warp or weft direction or both to produce warp stretch or weft stretch or bi-stretch woven fabrics.

[0031] There are no particular restrictions on the fibers or filament to be mixed with dissolvable core to achieve other purpose.

[0032] The woven fabric of the invention can be any type construction, included but not limited to plain weave, different types of twills, ribs, satins, dobby weaving, and jacquards.

What is claimed is:

1. A process for producing a composite main stretch core with substantially formed with hollow structure after removed the dissolvable core. The process comprising feeding of composite core and covered with sliver or slivers (shown as FIG. A1).

2. The process of claim 1, wherein the main stretch core is chosen from the group consisting multiple filaments, spun yarn and composite thereof.

3. The process of claim 1, wherein the fiber covering is made of materials chosen from the group of natural fibers, artificial fibers and synthetic fibers.

4. The process of claim 1, wherein the composite core is made of main stretch core and dissolvable core chosen from the group of natural fibers, artificial fibers and/or filaments, synthetic fibers and/or filaments and composite thereof.

5. The process of claim 1, wherein the composite core is fed in the way chosen from parallel feeding, ply yarn form, or core spun and composite thereof (shown as FIGS. A & B).

6. The process of removing the dissolvable core of composite core in chosen from yarn stage, fabric stage, garment stage and composite thereof (shown as FIG. C).

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