



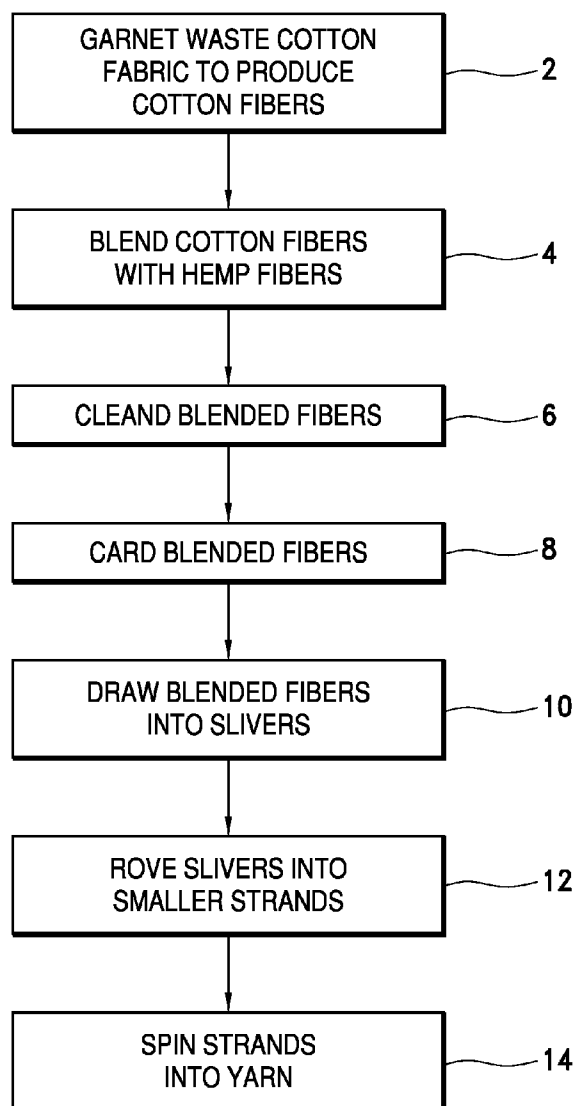
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(19) **United States**(12) **Patent Application Publication**  
**Silver**(10) **Pub. No.: US 2009/0173054 A1**(43) **Pub. Date: Jul. 9, 2009**(54) **COMPOSITE COTTON AND HEMP YARN  
AND METHOD FOR MAKING THE SAME**(52) **U.S. Cl. .... 57/238; 57/252**(76) **Inventor: Scott H. Silver, Annapolis, MD  
(US)**(57) **ABSTRACT**

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A composite hemp and cotton yarn is formed by blending hemp fibers with cotton fibers which have been regenerated from waste cotton material such as trimmings and cuttings from the apparel manufacturing industry. The fibers are cleaned and blended, then carded to align the fibers into strands. Depending on the size and texture of the desired yarn, the fibers are stretched and drawn into slivers prior to spinning to join the fibers together. The hemp fibers are up to three time longer than the regenerated cotton fibers, so that the hemp fibers overlap and braid onto the regenerated cotton fibers during spinning. The resultant yarn is stronger and more absorbent than yarns made solely out of regenerated cotton fibers or a blend of cotton and acrylic or cotton and polyester fibers.

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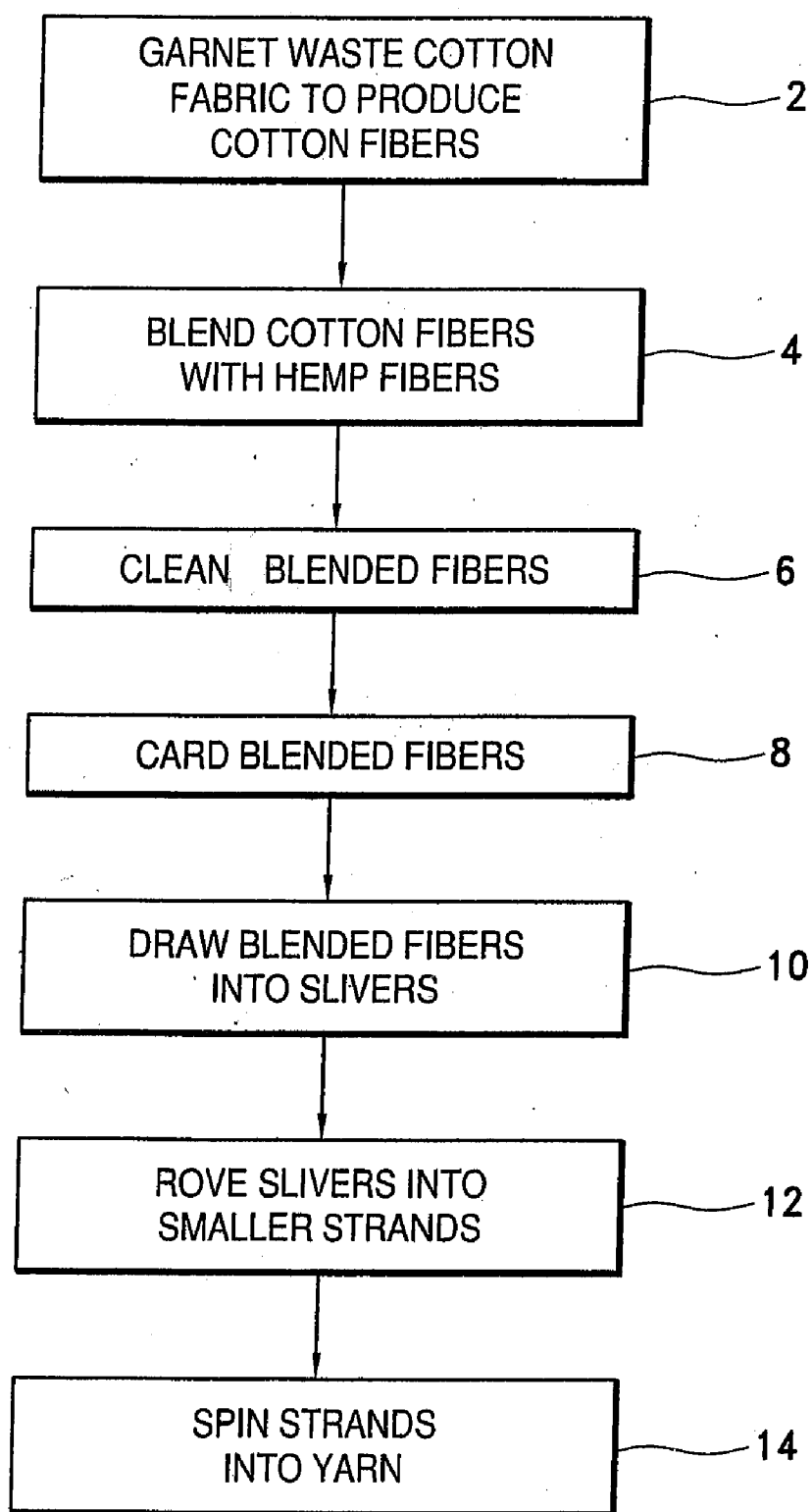


FIG. 1

## COMPOSITE COTTON AND HEMP YARN AND METHOD FOR MAKING THE SAME

**[0001]** Textile fabric treatment typically includes bleaching vast amounts of greige fabric and then dyeing the fabric to a desired color for use in manufacturing various fabric articles such as clothing, household linens, and canvas. Unfortunately, the effluents produced by the treatment processes can be harmful to the environment, thus increasing the costs of manufacture of such fabrics to safeguard the environment. In addition, waste fabric resulting from trimming and cutting the fabric during the formation of fabric articles must be discarded. The waste is typically dumped into landfills or incinerated, thereby releasing harmful pollutants into the environment and/or atmosphere.

**[0002]** Accordingly, there exists a need to recapture and reuse the waste fabric material, particularly bleached and dyed materials formed of cotton. The present invention relates to the production of yarn from a blend of regenerated cotton fibers from waste fabric material and of natural hemp fibers. No further bleaching or dyeing of the yarn is necessary. The yarn can be woven or knit into new fabric for production of colorful and functional clothing, household linen, canvas and the like.

### BRIEF DESCRIPTION OF THE PRIOR ART

**[0003]** It is known in the art to produce a composite yarn formed of vegetable and cotton fibers as disclosed in Haughey U.S. Pat. No. 1,986,970. Among the vegetable fibers disclosed in Haughey are hemp. It is also known in the art to recycle cotton waste material by breaking the material down into fibers and then blend the recycled fibers with virgin cotton fibers to manufacture yarn having a recycled content as disclosed in the Heifetz U.S. Pat. No. 5,331,801.

**[0004]** While the composite yarns of the prior art are satisfactory, they each suffer from certain inherent drawbacks. Neither yarn comprises a composite of hemp and recycled cotton fibers which can be blended into fine count yarns for manufacturing a variety of fabrics without further treatment of the yarn and with minimal damage to the environment. The present invention was developed to provide such a yarn.

### SUMMARY OF THE INVENTION

**[0005]** The invention relates to an eco-friendly yarn and a method for manufacturing the yarn. Waste cotton fabric is collected and sorted by color and the pieces of fabric of the same color are broken down into cotton fibers referred to as shoddy or fluff by a garnetting process. The cotton shoddy fibers are then blended with natural hemp fibers and spun into pre-dyed yarn. By recycling waste cotton fabric and combining the regenerated fibers derived therefrom with hemp fibers, a composite pre-dyed yarn is developed which is environmentally friendly and which does not require further bleaching, dyeing or treatment prior to weaving or knitting of the yarn into articles of clothing, household linens, or other fabric articles.

**[0006]** The finished yarn is between 30 and 45% recycled and regenerated cotton fibers which are generally shorter than the natural hemp fibers. Prior to spinning the fibers into yarn, they are blended and cleaned to remove any impurities from the mixture. Next, the blended fibers are carded to form aligned strands of fibers. The strands may be drawn roved into

smaller finer strands depending on the type of fabric that the yarn is to be used to form. Finally, once the desired strand size has been obtained, the fibers are spun to form the finished yarn.

### BRIEF DESCRIPTION OF THE FIGURES

**[0007]** Other objects and advantages of the invention will become apparent from a study of the following specification when viewed in light of the accompanying drawing in which,

**[0008]** FIG. 1 is a flow diagram illustrating the method steps used to form the eco-friendly yarn of the present invention.

### DETAILED DESCRIPTION

**[0009]** Textile waste in the form of cuttings, trimmings and clippings is collected from manufacturing facilities around the world before it is discarded for deposit in a landfill or incinerated. The waste cotton fabric has previously been bleached and dyed, so additional treatment or dyeing is not required and therefore no additional industrial effluents which could add to the further pollution of the environment are produced.

**[0010]** The waste materials are sorted by color range and cleaned to remove any foreign material such as paper or metal from labels, buttons, or the like. Referring to FIG. 1, the sorted waste materials are then subjected to garnetting 2 which is a process by which materials such as clippings and trimmings, threads, woven cloth scraps and the like are broken up and returned to a fluffy fibrous condition similar to the original state of the cotton. This is preferably accomplished by first cutting or chopping the waste materials into smaller pieces of approximately two to six inches in either direction. The pieces are then fed through a series of high speed cylinders having a jagged edged surface to break down the pieces into individual cotton fibers. While any fiber length greater than about 0.4 inches is useful, garnetting rarely produces fibers having a length greater than one and one-eighth inches. Lengths of 0.4-0.8 inches are typical, with a length of about 0.5 inches being average and the vast majority being over 0.4 inches.

**[0011]** After garnetting, the regenerated cotton shoddy fibers are lined up in a row or arranged in a circular configuration to be blended by a vacuum head and separated into large tufts. Long natural hemp fiber on the order of three inches is added so that the cotton and hemp fibers are blended together 4.

**[0012]** Hemp fiber is produced by processing the stalks of the hemp plant (*cannabis sativa* L.). Hemp is a member of the bast fiber genus which is grown and cultivated for the long sinuous bast fibers in the stalks which include herbaceous plants of dicotyledons such as flax, hemp, sunn, denaf, jute and ramie. Hemp fiber is naturally organic and do not require the use of herbicides or pesticides. One acre of hemp can produce as much useable fiber as two acres of cotton without the need for intensive watering or fertilization as is required for traditional cotton farming. Hemp stalks are cut and left in the field for thirty to forty-five days to ret, a natural process that begins to separate the fibers. Once retted, the stalks are processed by decortication to separate the fibers into long and short fibers. The cut stalks are soaked in water and mechanically pulverized to remove and separate the fibers. The fibers are washed to remove the natural glues and then dried.

[0013] The tufts of cotton and hemp fiber are air blown into hoppers to clean the blended fibers of any remaining dirt or trash 6 prior to delivery to carding machines 8. The carding machines use air to align the fibers into a picker lap of parallel fibers. Any remaining dirt or other particulates are separated from the picker lap by the air flow. The picker lap is in the form of a sheet approximately forty inches wide and one inch thick. The sheet is then processed into a thin mist-like sheet by the carding machines and then formed into loose rope-like strands referred to as card-sliver.

[0014] A number of card-slivers are brought together and drawn out 10 to form a single rope like strand known as drawn sliver. The fibers of the drawn sliver are further straightened to improve uniformity. The drawn sliver is further drawn or stretched into smaller strands of fiber by roving 12. Finally, the sliver or rope is still further drawn out into a tiny strand of fibers and twisted or spun into yarn 14 using conventional open end spinning frames. With the fibers aligned in parallel and spun, they twist together until they cling to each other. The finished yarn counts range between 6s Ne and 28s Ne. The physical difference between the relatively short recycled cotton fibers, typically less than one inch, and the relatively long hemp fibers, on the order of three inches, results in a very strong yarn as the fibers tend to overlap and braid onto each other. The pre-dyed spun yarn is now suitable for knitting or weaving into colorful and functional apparel and home fashion textiles, without the need for bleaching, dyeing, or other treatment.

[0015] Preferably, the amount of cotton fiber in the yarn is less than the amount of hemp fiber. For example, the yarn may comprise 30-45% regenerated cotton fibers, with the balance comprising natural hemp fibers. The natural hemp fibers are neutral in color, so the resulting yarn takes on the color of the original cotton waste materials, although the color is muted somewhat by the blending of the hemp fibers.

[0016] The benefits of the yarn produced according to the method are many. First, no man-made fibers such as acrylic or polyester are used, which allows for the production of truly sustainable and eco-friendly yarns and subsequent woven and knit textile products. Since polyester and acrylic products are petroleum based, there is a net saving in energy cost. Because the cotton fibers originate from waste products of previously bleached, dyed or treated fabric, no further treatment, bleach, or dye is used, nor are the waste products deposited into landfills or incinerated. By blending natural hemp fibers with the regenerated cotton fibers, the fibers may be spun into finer count yarns to manufacture better quality products than are currently available with conventional regenerated cotton products. In addition, the yarn is stronger and more absorbent than conventional cotton yarn.

[0017] While the preferred forms and embodiments of the invention have been illustrated and described, it will be appar-

ent to those of ordinary skill in the art that various changes and modifications may be made without deviating from the inventive concepts set forth above.

What is claimed is:

1. A method for making eco-friendly yarn, comprising the steps of

- (a) sorting waste cotton fabric comprising cuttings and trimmings of previously bleached, dyed and treated cotton fabric by color;
- (b) garnetting the sorted waste cotton fabric to produce cotton shoddy fibers of the same color therefrom;
- (c) blending cotton shoddy fibers of the same color with natural hemp fibers; and
- (d) spinning the blended cotton fibers and hemp fibers to form a yarn having a uniform color without bleaching or dyeing.

2. (canceled)

3. A method as defined in claim 1, wherein the amount of cotton shoddy fibers is less than the amount of natural hemp in the yarn.

4. A method as defined in claim 3, wherein the yarn comprises 30-45% cotton shoddy fibers.

5. A method as defined in claim 2, where in said natural hemp fibers are longer than said cotton fibers.

6. A method as defined in claim 2, and further comprising the step of cleaning said blended cotton and hemp fibers prior to said spinning step.

7. A method as defined in claim 2, wherein said fibers are carded to align said fibers into strands prior to said spinning step.

8. A method as defined in claim 7, and further comprising the step of forming said fibers into smaller strands.

9. A method as defined in claim 8, wherein said forming step comprises drawing said carded fibers into slivers and subsequently roving said slivers into smaller strands.

10. A yarn for making fabric, comprising

- (a) regenerated cotton fibers formed from waste cotton fabric that has previously been bleached, dyed and treated and sorted by color; and
- (b) natural hemp fibers spun with regenerated cotton fibers of the same color, whereby said yarn is colored without bleaching or dyeing.

11. A yarn as defined in claim 10, wherein the amount of cotton is less than the amount of hemp on the yarn.

12. A yarn as defined in claim 11, wherein the yarn comprises 30-45% regenerated cotton fibers.

13. A yarn as defined in claim 10, wherein said hemp fibers are longer than said cotton fibers.

14. A yarn as defined in claim 10 and having a fine count of up to 28 Ne.

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