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PRODUCTION OF STAPLE FIBERS FROM WASTE MATERIAL

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This invention relates to the manufacture of staple fibres made from waste fibres produced in the manufacture of commercially available synthetic linear polymer fibres.

Synthetic fibre waste material consists of drawn and undrawn lengths of melt-spun fibres and/or filaments which do not come up to specification and are therefore rejected during the manufacture of high quality drawn synthetic filament yarns and staple fibres. Hitherto, this waste material waste used in the manufacture of the polymer or its intermediates by chemical regeneration.

We have now found that such synthetic filament and staple fibre waste material, hereinafter called "fibre waste" can be used in textile applications, provided that it is suitably processed into a sufficiently uniform product, in the form of dressed, opened and crimped staple fibres.

According to our invention, we provide a process for the manufacture of staple fibres from fibre waste produced in the manufacture of commercially available synthetic linear polymer fibres, comprising the steps of

(I) Cutting fibre waste material to random length, e.g. greater than 2 inches, but less than 2 feet, if necessary.

(II) Feeding the random cut length material so obtained to a breaking and opening process, including e.g. a garnett machine for opening out the waste material, and, if desired, collecting a sliver so obtained by winding into an intermediate package e.g. in a ball.

(III) Submitting the sliver of randomly cut fibre waste after unwinding from the intermediate package to a parallelising process and preferably repeating the parallelising process on e.g. 4 to 5 ends, e.g. by gilling, until a substantially uniform thick sliver of parallelised cut fibre waste of preferably rectangular cross section about 2¼ inches wide and ⅜ inch thick is obtained, and which is, if desired, again wound up e.g. into a ball.

(IV) Crimping the sliver mechanically e.g. in a stuffer box crimper as disclosed in U.S.P. 2,311,174, heat setting the crimped fibre waste sliver and preferably coating with an anti-static dressing, lastly,

(V) Cutting the sliver to staple fibre length e.g. 1½ inches long, if desired.

The cut staple fibres so obtained are suitable for the manufacture of batts as insulating or filtration media or they can be used as fibre filling material in padding and upholstery or similar applications.

These staple fibres may also be converted to spun yarn on conventional textile spinning systems, if desired, blended with a proportion of natural fibres or with commercially available synthetic fibres.

The fibre waste material comprises substandard fibrous waste or fibres which may be unsuitable for further normal processing by the fibre manufacture, such as drawing, to at least e.g. 3 times its length as meltspun and

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which is made e.g. by meltspinning from fibre forming polymers such as polyethylene terephthalate, nylon and stereo-specific polypropylene.

The following examples illustrate, but do not limit our invention.

Example 1

Polyethylene terephthalate fibre waste in the form of filament yarn is cut from draw-twist bobbins resulting in a length of 4-15 inches. The cut filaments are fed into a garnetting machine which tears open and breaks up the lumps of filament bundles. The opened fibres are fed to a carding machine and the resulting web of fibres is wound into a ball. The ball of fibres is fed to a gill box which orientates and parallelises the fibres into a substantially uniformly thick sliver of rectangular cross section about 2¼ inches wide and ⅜ inch thick which is wound into cheeses weighing between 15 and 25 lb. The cheeses are unwound and the slivers are fed to a stuffer box crimper where it becomes crimped and the crimped slivers are collected in cans. The slivers in the cans are dried and heat set at 140° C. for 40 minutes in a Sanderson Steam Oven under super-atmospheric pressure. The crimped and heat set sliver is coated with an anti-static dressing by spraying and fed to a staple cutter. The cutter is adjusted to cut the sliver to staple fibres about 1½ inches long. Because of the low adhesion of the parallelised filaments in the sliver, precautions are required to prevent breaking of the sliver and low tensions and feed rollers are used for these purposes together with a trumpet guide each in front of and less than 2 inches from the stuffer box crimper and the staple cutter. The mean length of the cut fibres obtained is 1.9 inches, 2 denier filament, 17 crimps per inch, 14% crimp.

Example 2

Polyethylene terephthalate fibre waste in the form of drawn waste tow of 220,000 denier, 4 denier per filament is cut into lengths of 4-15 inches and the process steps described in Example 1 are repeated. The mean length of the cut fibres obtained is 1.9 inches, 4 denier per filament, 17 crimps per inch, 14% crimp.

The crimped staple fibres are suitable for filling material in upholstery and for heat and sound insulation material.

What we claim is:

1. A process for the manufacture of staple fibres from fibre waste produced in the manufacture of commercially available synthetic linear polymer fibres, comprising the steps of:

(I) cutting fibre waste material to random length;

(II) feeding the random cut length material so obtained to a breaking and opening process and collecting a sliver so obtained by winding into an intermediate package;

(III) submitting the sliver of randomly cut fibre waste after unwinding from the intermediate package to a parallelising process until a substantially uniform thick sliver of parallelised cut fibre waste is obtained;

(IV) crimping the sliver mechanically, heat setting the crimped fibre waste sliver; and

(V) cutting the sliver to staple fibre length.

2. The process of claim 1 wherein said staple fibres comprise polyethylene terephthalate.

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3. The process of claim 1 wherein said staple fibres comprise stereospecific polypropylene.

4. The process of claim 1 wherein the fiber waste material is cut to a random length greater than two inches but less than two feet; and the sliver is wound into a ball as the intermediate package.

5. The process of claim 4 wherein the sliver, after the parallelising process, is of rectangular cross section of about $2\frac{1}{4}$ inches wide and $\frac{3}{16}$ inch thick and this sliver is again wound up before the crimping step.

6. The process of claim 5 wherein after the heat

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setting and before cutting to fiber length, the sliver is coated with an anti-static dressing.

7. The process of claim 5 wherein the crimping step is carried out by stuffer box crimping.

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