

[54] **FIBERS FOR PILLOW STUFFING**

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28/75 WT; 260/28.5 A, 37 SI; 117/4, 138.8
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[56] **References Cited**

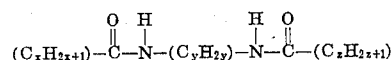
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[57] **ABSTRACT**

Synthetic staple fibers having improved resilience, softness and non-scroopiness and which are suitable for use as bed pillow stuffing, are produced by melt spinning filaments from a blend of fiber-forming polymer of propylene and at least one wax compound having the formula



wherein x and z are integers in the range of 10 to 25 and y is an integer in the range of 2 to 10, drawing, heating and crimping the resulting filaments and cutting the crimped filaments into staple fibers, the filaments being coated with an ethoxylated polysiloxane.

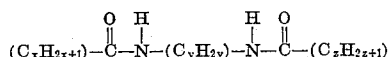
12 Claims, No Drawings

FIBERS FOR PILLOW STUFFING

In recent years the material utilized for pillow stuffing has changed from predominantly natural materials to predominantly synthetic fibers. The synthetic fibers have the advantages of being more uniform, substantially free of odor, substantially nonallergenic, and readily washable. However, difficulty has been encountered in the utilization of these synthetic fibers for pillow stuffing due to the low resilience of the fibers after a long period of use, the relative harsh hand of the fibers, and the noise generated by the movement of fibers against fibers or against the pillow casing.

Accordingly it is an object of the present invention to provide a new and improved synthetic fiber suitable for utilization as pillow stuffing. Another object of the invention is to provide a synthetic fiber having improved resilience, softness and non-scroopiness. Yet another object of the invention is to provide a new and improved pillow. Other objects, aspects and advantages of the invention will be apparent from a study of the disclosure and the appended claims to the invention.

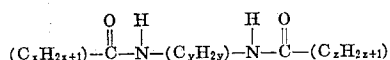
In accordance with the present invention it has been discovered that synthetic staple fibers having improved resilience, softness and non-scroopiness, suitable for use for a bed pillow stuffing, can be prepared by melt spinning filaments from a blend of fiber-forming polymer of propylene and at least one wax compound having the formula



wherein x and z are integers in the range of 10 to 25 and y is an integer in the range of 2 to 10, drawing the thus spun filaments, heating the thus drawn filaments to cause a portion of the wax compound to migrate to the surface of the filaments, crimping the thus heated filaments, and cutting the thus crimped filaments into staple fibers, and at some stage in this processing, coating the filaments with a finish composition comprising an ethoxylated polysiloxane.

The polypropylenes suitable for use in the present invention are the crystalline homopolymers of propylene and the crystalline copolymers of propylene and at least one other monoolefin having up to 8 carbon atoms. Generally the other monoolefins are used in the production of the copolymers in an amount less than about 10 mol percent, preferably in the range of about 0.1 to about 5 mol percent, and more preferably in the range of about 0.1 to about 3 mol percent. Specific examples include fiber-forming homopolymers of propylene, the fiber-forming copolymers of propylene and ethylene, the fiber-forming copolymers of propylene and butene-1, the fiber-forming copolymers of propylene and hexene-1, the fiber-forming copolymers of propylene and octene-1, and admixtures thereof.

The wax compounds which can be employed in the present invention include the N,N' -alkylenebis(alkanamides) having the structural formula

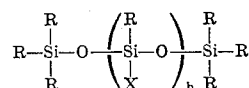


wherein x and z are integers in the range of 10 to 25, preferably in the range of 15 to 20, and y is an integer in the range of 2 to 10, preferably in the range of 2 to 6. Exemplary compounds include N,N' -ethylenebis(undecanamide), N,N' -propylenebis(undecanamide), N,N' -tetramethylenebis(hexacosanamide), N,N' -tetramethylenebis(undecanamide), N,N' -pentamethylenebis(hexadecanamide), N,N' -hexamethylenebis(heneicosanamide), N,N' -octamethylenebis(undecanamide), N,N' -decamethylenebis(hexacosanamide), N,N' -ethylenebis(hexadecanamide), N,N' -ethylenebis(heptadecanamide), N,N' -ethylenebis(octadecanamide), N,N' -ethylenebis(nonadecanamide), N,N' -ethylenebis(eicosanamide), N,N' -ethylenebis(heneicosanamide), N,N' -ethylenebis(hexacosanamide), N,N' -trimethylenebis(hexadecanamide), N,N' -propylenebis(nonadecanamide), N,N' -trimethylenebis(2-methyleicosanamide), N,N' -propylenebis(hexacosanamide), N,N' -tetramethylenebis(hexadecanamide), N,N' -tetramethylenebis(octadecanamide), N,N' -tetramethylenebis(heneicosanamide), N,N' -pentamethylenebis(nonadecanamide), N,N' -pentamethylenebis(heneicosanamide), N,N' -hexamethylenebis(undecanamide), N,N' -(3-methylpentamethylene)bis(hexadecanamide), N,N' -hexamethylenebis(nonadecanamide), N,N' -hexamethylenebis(hexacosanamide), N,N' -octamethylenebis(nonadecanamide), N,N' -octamethylenebis(hexacosanamide), N,N' -decamethylenebis(undecanamide), N,N' -decamethylenebis(heptadecanamide), N -[3-(4-ethylpentadecanamido)butyl]-2-methyloctadecanamide, and admixtures thereof.

The wax compound can be added to the propylene polymer in any suitable manner known to the art. For example, the addition of the wax compound can be accomplished by dry blending, followed by melting and extrusion of the admixture. The wax compound can also be added to a hot melt of the polymer of propylene. The wax compound can be employed in any desired amount, but will generally be utilized in an amount in the range of about 0.1 to about 3 weight percent of the filament, and preferably will be in the range of about 0.5 to about 2 weight percent of the filament.

In addition to the wax compound, other compatible additives can be included in the propylene polymer composition. For example, various oxidation stabilizers, ultraviolet stabilizers, fillers, pigments, and dyes can be included in the formulation to be melt spun.

The ethoxylated polysiloxanes which can be utilized in the present invention include those having the structural formula



wherein each R is individually selected from the group consisting of alkyls having from 1 to 6 carbon atoms, each X is individually selected from the group consisting of R and $+CH_2CH_2O+$, H with from 10 to 90 percent of the X 's being R , b being an integer having a

value of at least 10 and *c* is an integer having a value of at least 20. In a presently preferred embodiment, each *R* is methyl, *b* is in the range of 10 to 22, *c* is in the range of 20 to 40, and the percent of the *X*'s being methyl is in the range of about 60 percent to about 80 percent. The silicon content of the ethoxylated polysiloxane will generally be in the range of about 10 to about 60 weight percent, and preferably will be about 20 weight percent of the total polymer. The ethoxylated polysiloxane is water dispersible and has a viscosity in the range of about 100 to about 400, preferably in the range of about 150 to about 250, centistokes at 77°F.

The blend of fiber-forming polymer of propylene and the wax compound can be melt spun into filaments by any known technique. After solidification the spun filaments are drawn to the desired extent, generally within the range of about 1.2 to about 7, preferably in the range of about 1.4 to about 5, times the original length. The drawn fibers are heated under suitable conditions to cause a portion of the wax compound to migrate to the surface of the drawn filaments. The heat treated filaments are crimped by any manner known in the art, for example by stuffer box crimping, gear crimping, jet crimping, thermally induced self-crimping, and the like. The heat treatment can be carried out prior to and/or simultaneously with the crimping operation. The heating can be accomplished by any suitable means known in the art, for example radiant heat, intimate contact with hot air, saturated or superheated steam, and the like. In a presently preferred embodiment, the heating operation and crimping operation are accomplished simultaneously by the introduction of a heated fluid, preferably superheated steam, in a stuffer box crimping chamber. In the heat treatment operation the filaments are heated to a temperature in the range of about 220°F to about 350°F, preferably in the range of about 230°F to about 260°F, for a period of time in the range of about 1 to about 20 seconds, preferably in the range of about 2 to about 10 seconds.

The crimped and heat treated filaments are then cut into staple fibers of the desired length in accordance

coating comprising an ethoxylated polysiloxane. Although a different processing finish can be applied to the filaments before drawing and then subsequently removed by scouring before the ethoxylated polysiloxane finish is added, it is presently preferred that the ethoxylated polysiloxane be applied to the filaments after solidification and before drawing. The ethoxylated polysiloxane will generally be employed in an aqueous dispersion, and will be applied to the filaments to provide from about 0.02 to about 1 weight percent, preferably in the range of about 0.05 to about 0.5 weight percent, of the ethoxylated polysiloxane, based on the weight of the filaments. If desired, the finished coating can also contain other known components, for example wetting agents, corrosion inhibitors, and/or antistatic agents. A suitable wetting agent is a polyethoxylated straight chain alcohol, while a suitable corrosion inhibitor is sodium nitrite, with borax added as a buffering agent. A suitable antistatic agent is a quaternary ammonium salt. The finish coating can be applied to the spun filament in any suitable manner known in the art in one or more coating operations.

The following example is presented in further illustration of the invention and should not be construed in undue limitation thereof.

EXAMPLE

Several runs were made for the production of fibers from polypropylene having a melt flow of about 12 and containing 1 weight percent N,N'-ethylenebis(stearamide). A control run was conducted without the additive. The undrawn fibers had a denier per filament of about 10. In each run filaments were combined to form a tow of about 50,000 denier. After drawing, the filaments had a denier per filament of about 6. The tow was crimped in a stuffer box forming a crimped tow having about 6 to 8 crimps per inch. The crimped tow was cut into staple 4 inches long and made into bed pillows. Additional details of the treatment each sample received is listed in Table I below, along with the characteristics of the resulting product.

TABLE I

Sample	Amount Wax, Wt. % ^a	Heat Treatment Steam in Stuffer Box Crimper Tow Temp. About 230°F, 5 Sec.	External ^b Finish	Resiliency ^c	Softness ^d	Scroopiness ^e
1	None	None	None	No	No	Very noisy
2	1	Yes	A	No	Yes	Slightly noisy
3	1	None	A	No	No	Very slightly noisy
4	1	Yes	B	Yes	Yes	No significant noise
5	None	None	B	No	Yes	Very noisy
6	1	None	B	No	Yes	Very slightly noisy
7	None	Yes	B	Yes	Yes	Very noisy

^aN,N'-ethylenebis(stearamide)

^bIn Run 1 the external finish was scoured from the filaments before testing. In Runs 2-7 the external finish was applied as an aqueous dispersion in an amount sufficient to provide approximately 0.5 weight percent of the finish solids based on the weight of the filaments. External finish A is an ethoxylated tallow amine quaternized with diethyl sulfate. External finish B is an ethoxylated polysiloxane wherein *R* is methyl, and having a silicon content of about 50 weight percent and a viscosity of about 200 centistokes at 77°F.

^cResiliency was determined by placing the test pillow on a horizontal surface and dropping a 16-lb. bowling ball on the top of the pillow for 1600 times from a point at the original height of the pillow. The initial pillow height and final pillow height are measured. A ratio of final pillow height to initial pillow height of at least 0.65 is considered satisfactory while a ratio less than this amount is considered unsatisfactory.

^dSoftness was determined by manually feeling the fibers.

^eScroopiness was determined by a technician laying his head on the pillow and moving his head in natural motions while listening for the noise level generated.

with any technique known in the art. In general the staple fibers will have a length in the range of about 1 to about 6, preferably in the range of about 2 to about 5 inches.

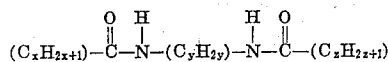
At at least one stage during this processing of the filaments, each individual filament is coated with a finish

Reasonable variations and modifications are possible within the scope of the foregoing disclosure and the appended claims to the invention.

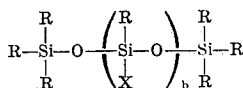
That which is claimed is:

1. A method for producing synthetic staple fibers having improved resiliency, softness, and non-

scroopiness, suitable for use as bed pillow stuffing, which comprises melt spinning filaments from a blend of fiber-forming polymer of propylene and at least one wax compound having the formula



wherein x and z are integers in the range of 10 to 25 and y is an integer in the range of 2 to 10; drawing the thus spun filaments; heating the thus drawn filaments to cause a portion of said wax compound to migrate to the surface of the filaments; crimping the thus heated filaments; cutting the thus crimped filaments into staple fibers; and coating the filaments at at least one stage in the processing thereof with a finish coating comprising an ethoxylated polysiloxane having the formula



wherein each R is individually selected from the group consisting of alkyls having from 1 to 6 carbon atoms, each X is individually selected from the group consisting of R and $-\text{CH}_2\text{CH}_2\text{O}-$, c is an integer having a value of at least 10, and b is an integer having a value of at least 20.

2. A method in accordance with claim 1 wherein said wax compound is present in said blend in an amount to provide from about 0.1 to about 3 weight percent of the filaments, wherein said ethoxylated polysiloxane is present on said filaments in an amount in the range of about 0.02 to about 1 weight percent of the filament.

3. A method in accordance with claim 2 wherein said ethoxylated polysiloxane is applied to the filaments after solidification and before drawing.

4. A method in accordance with claim 3 wherein the step of heating the filaments to cause a portion of the wax component to migrate to the surface of the filaments is accomplished during the crimping of the filaments.

5. A method in accordance with claim 4 wherein the step of heating the filaments comprises heating the filaments to a temperature in the range of about 220°F to about 350°F for a period of time in the range of about 1 to about 20 seconds.

6. A method in accordance with claim 5 wherein each R is methyl.

7. A method in accordance with claim 6 wherein said ethoxylated polysiloxane has a viscosity in the range of about 150 to about 250 centistokes at 77°F.

8. A method in accordance with claim 7 wherein said wax compound is present in said blend in an amount to provide from about 0.5 to about 2 weight percent of the filaments, wherein said ethoxylated polysiloxane is present on said filaments in an amount in the range of about 0.05 to about 0.5 weight percent of the filament.

9. A method in accordance with claim 8 wherein said wax compound is N,N' -ethylenebis(stearamide).

10. A method in accordance with claim 1 wherein said wax compound is N,N' -ethylenebis(stearamide), and wherein each R is methyl.

11. A pillow comprising a casing stuffed with staple fibers prepared by the method of claim 1.

12. A synthetic staple fiber having improved resilience, softness, and non-scroopiness, suitable for use as bed pillow stuffing, prepared by the method of claim 1.

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