

995,849



PATENT SPECIFICATION

NO DRAWINGS

995,849

Date of Application and filing Complete Specification: July 19, 1961.

No. 26117/61.

Application made in United States of America (No. 44544) on July 22, 1960.

Complete Specification Published: June 23, 1965.

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Index at acceptance:—C3 P(11D5, 11K11, 11T1B, 11T1X)

Int. Cl.:—C 08 g

COMPLETE SPECIFICATION

Oxymethylene Polymer Filamentary Material

We, CELANESE CORPORATION OF AMERICA, of 522 Fifth Avenue, New York 36, State of New York, United States of America, a company incorporated in accordance with the laws of the State of Delaware, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to oxymethylene polymer filamentary material.

Oxymethylene polymers, i.e. polymers having successively recurring $-\text{CH}_2\text{O}-$ units, may be prepared as resins of good stability, good toughness and high tensile strength. The properties of such polymers would be advantageous in filamentary material but there are difficulties which hinder the production of such filamentary material.

Filamentary materials are usually produced from polymers by spinning the polymers in molten or dissolved form into an environment in which the solid filaments form. However, since most solvents require high temperature for the solubilization of oxymethylene polymers, high temperatures are necessary for producing filaments from these polymers by either spinning method. Oxymethylene polymers tend to degrade when subjected to high temperatures and to produce gaseous degradation products. When properly stabilized, an oxymethylene polymer can be reduced in degradation level so that moulding thereof is practicable but spinning in a continuous system remains impracticable since relatively little gas formation is sufficient in a filament of small denier to reduce its strength drastically and cause breaks in the filament.

According to the present invention, filamentary material is prepared by extruding through a spinning orifice a liquid comprising an oxymethylene polymer containing from 25 to 0.5 mole percent of oxyalkylene units having adjacent carbon atoms and solidifying the

extruded polymer into filamentary material.

The preferred polymers are those made up of oxymethylene and oxyethylene groups, such as may be obtained by copolymerising trioxane and dioxolane or ethylene oxide. Such polymers are random copolymers in the sense that the higher oxyalkylene units are distributed among the oxymethylene units and are not concentrated in large blocks or segments. While the distribution of the higher oxyalkylene units is dependent upon the proportion thereof and the manner of contact and mixing, in general at least 80% of the higher oxyalkylene units are present in the polymer in segments of from one to three oxyalkylene units.

Oxymethylene polymers with higher oxyalkylene units are more stable against thermal degradation than oxymethylene homopolymers in that they may be subjected to identical degradation conditions with a lesser production of gaseous by-products. Oxymethylene polymers of the type described are also somewhat lower in melting point than oxymethylene homopolymers. Thus, in melt spinning, gas production is lessened both by the higher stability of the polymer and by the lower spinning temperature.

It has also been found in accordance with the present invention that the filamentary material produced is highly resistant to degradation by alkaline hydrolysis. Filamentary material used in textile applications is often subjected to hot alkaline solutions, as in scouring operations, certain dyeing operations, and in the mercerization of fabric blends containing cotton. Where the polymer has been subjected to stabilization by the treatment described in British Patent Specification No. 986,925, the filamentary material is virtually inert to alkali. It has been found that oxymethylene homopolymers, i.e. polymers containing only $-\text{OCH}_2-$ units in the chain, are especially susceptible to degradation by alkaline hydrolysis and are therefore unsuitable for many common textile applications.

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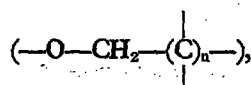
stability

The fibres were loaded at 3 grams per denier for 10 days without appreciable creep.

WHAT WE CLAIM IS:—

1. Process for the production of novel filamentary material, which comprises extruding through a spinning orifice a liquid comprising an oxymethylene polymer containing from 25 to 0.5 mole percent of oxyalkylene units having adjacent carbon atoms and solidifying the extruded polymer into filamentary material.

2. Process according to Claim 1, wherein the polymer has a structure comprising recurring units of the formula



- wherein n is an integer from zero to 4 and is zero in from 75 to 99.5 percent of the recurring units.

3. Process according to Claim 2, wherein the polymer is composed substantially of oxymethylene and oxyethylene units, the oxyethylene units forming between 10 and 1 percent of the total number of units.

4. Process according to any of the preceding claims, wherein the filamentary material is produced by extruding at 140° to 220°C. a melt containing a bisphenol anti-oxidant and a scission inhibitor which is a monomeric or polymeric compound containing trivalent nitrogen.

5. Process according to any of the preceding claims, wherein the filamentary material is stretched to between 3 and 20 times its original length while heated to between 60° and 155°C.

6. Process for the production of a novel filamentary material, substantially as hereinbefore described.

7. Process for the production of a novel filamentary material composed of an oxymethylene polymer containing oxyethylene units, substantially as described in the Example.

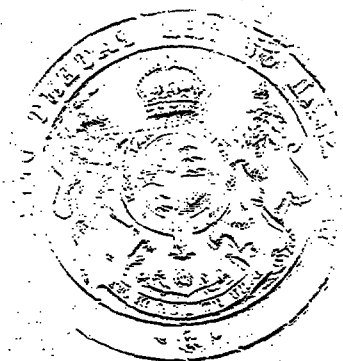
8. Novel filamentary material whenever produced by any of the processes claimed in the preceding claims.

A. J. BUTTERWORTH,

Chartered Patent Agent,

49 Old Bond Street, London, W.1.

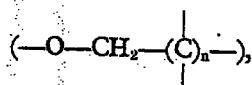
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A. J. Butterworth.

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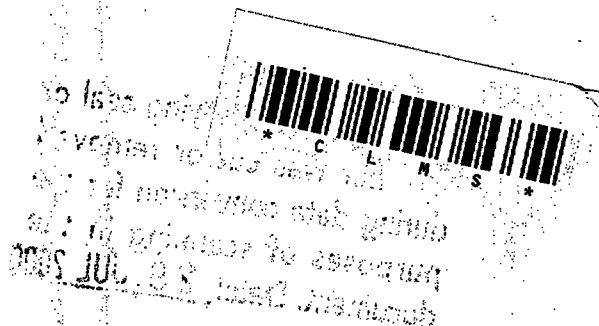
6. Process for the production of a novel filamentary material, substantially as hereinbefore described.

7. Process for the production of a novel filamentary material composed of an oxymethylene polymer containing oxyethylene units, substantially as described in the Example.

8. Novel filamentary material whenever produced by any of the processes claimed in the preceding claims.

E.B.
A. J. BUTTERWORTH,
Chartered Patent Agent,
49 Old Bond Street, London, W.1.

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A. J. Butterworth