

POLYMERIC PLASTICS MATERIAL AND MANUFACTURE THEREOF

BACKGROUND TO THE INVENTION

Field of the Invention

5 This invention relates to a polymeric plastics material as well as the manufacture thereof. The material is applicable as a filament, fibre and fabric for general commercial and industrial uses, including covers, curtains, blinds, signage and tarpaulins exposed to environmental elements including moisture, and it will be convenient to hereinafter disclose the invention in relation to those
10 exemplary applications. However, it is to be appreciated that the invention is not limited to those applications.

Description of the Prior Art

 The following discussion of the background to the invention is intended to
15 facilitate an understanding of the invention. However, it should be appreciated that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or part of the common general knowledge as at the priority date of the application.

 One previous general purpose covering fabric has a material base woven
20 from polypropylene fibres, with a polypropylene coating applied to each side of the base in order to provide the fabric with various characteristics including a liquid barrier and surfaces for printing. The fibres for the fabric are composed of a multiple of extruded and twisted filaments.

 One problem with this fabric is a propensity for the material base to rapidly
25 absorb moisture, such as water, through capillary action. That action is enhanced by a coating of a polyglycerolfattyester surfactant applied to the filaments following their extrusion in order to facilitate subsequent processing into fibres. The surfactant has the effect of lowering the surface tension of the filaments and thereby assisting moisture absorption.

30 Moisture absorption typically occurs at cut edges of the fabric, and at any flaws or disruptions in the integrity of the surface coating, and moisture access to even very small portions of the material base can lead to rapid and significant penetration of moisture through the material base. That moisture absorption

sometimes entrains particles of dirt and other impurities, leading to staining of the base as well as initiating bacterial growth within the material base. As a result, the fabric is rendered unsightly and eventually leads to deterioration of the fabric.

5 In addition, the moisture absorption adds considerably to the weight of the fabric. As a consequence, when used in a hung or suspended application, more robust fittings are required to ensure proper support of the fabric. In any event, the wet fabric can be heavier and more difficult to handle.

10 **SUMMARY OF THE INVENTION**

It is an object of the present invention to provide a polymeric plastics material which has a reduced propensity to absorb moisture such as water.

It is a further object of the present invention to provide a method of manufacturing an improved polymeric plastics material.

15 With those objects in mind, the present invention in one broad aspect provides a polymeric plastics material having a composition which includes a wax, wherein the material has a reduced propensity to absorb moisture.

In one specific aspect of the present invention the above polymeric plastics material is in filamentary form.

20 In another specific aspect, the present invention provides a fibre manufactured from a multitude of filaments.

In a further broad aspect, the present invention provide a method of manufacturing a polymeric plastics material, including preparing a polymeric plastics composition including a wax; and, forming the composition into a material; wherein the material has a reduced propensity to absorb moisture.

25 In another specific aspect, the present invention provides a method of manufacturing a polymeric plastics material including: preparing a polymeric plastics composition including a wax; forming the composition into a material; and, lubricating the formed material, wherein the material has a reduced propensity to absorb moisture.

30 In still other aspects, the present invention provides a filament and fibre when manufactured according to the above methods.

Preferably, the wax is at a surface of the material. That is preferably achieved by allowing the wax to migrate to the surface as the composition is formed into the material. In at least one preferred form, the wax is intermittently distributed over the material surface.

5 Preferably, the wax is present in an amount which at least substantially prevents the material from absorbing moisture by capillary action. In at least one preferred form the amount of wax is between 0.5 and 5% by weight of the material, and more preferably about 1% by weight.

10 Preferably, the wax is a hydrocarbon compound or mixture. In at least one preferred form, the compound or mixture is selected from one or more of the Fischer-Tropsch range of hydrocarbons.

Preferably, the plastics material includes a lubricant on the surface of the material. The lubricant is preferably applied to the material surface following material formation.

15 Preferably, the lubricant is present in an amount of between 0.5 and 5% by volume of the material, and more preferably about 2% by volume.

The lubricant is preferably an oil present as a film on the surface of the material.

20 Preferably, the composition includes a polymer or copolymer of propylene. Preparing the composition preferably includes preparing a polypropylene master batch and adding a hydrocarbon compound or mixture max to the master batch. The prepared composition is preferably extruded to form the material. That extrusion preferably forms filamentary material.

25 **DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION**

30 In at least one preferred embodiment, the polymeric plastics material of the present invention has a composition which includes a polymer or co-polymer of propylene. However, it should be appreciated that, depending on the intended application of the material other polymers and co-polymers may be suitable, for example polyamides including nylon, and polyesters.

In this embodiment, the wax in the composition is a hydrocarbon compound or mixture selected from the Fischer-Tropsch range of hydrocarbons.

Those hydrocarbons particularly suitable for use with polypropylene in the manufacture of the material and filament are sold by Sasol under the product name of AdSpense. One preferred product is known as AdSpense 868. That product was specifically developed for use as a dispersing aid in the
5 manufacture of polyolefin masterbatches and colour concentrates.

The polymeric plastics composition is prepared as a master batch prior to formation into the material. The wax is then added to the polypropylene master batch. The wax is included in an amount of about 2% by volume of the composition.

10 In the preferred embodiment, formation of the polymeric plastics composition into the material causes the wax to migrate to the surface of the material, where it may be intermittently distributed over the material surface. The wax is preferably distributed in globules over the material surface in an amount of about 1% by weight of the material.

15 In this embodiment, the polymeric plastics material is formed by extrusion of the master batch into filaments. That extrusion occurs in any manner well known to those skilled in the relevant art. Typically, the composition is extruded through a multifilament die to simultaneously produce between about 120 and 130 filaments for subsequent formation into fibres.

20 In the preferred embodiment, the polymeric plastics material is lubricated immediately after formation. Thus, in this embodiment, the filaments are lubricated immediately after extrusion through the multifilament die. Lubrication is achieved by passing the extruded filaments through a lubricant so that the lubricant is applied to the surfaces thereof.

25 The lubricant is in a liquid state, and is presented to the extruded filaments in drop form. Thus, the extruded filaments pass through the lubricant drops so as to coat the surfaces thereof with a thin film of lubricant.

In the preferred embodiment, the lubricant is applied to the material in an amount of about 2% by volume of filament.

30 The lubricant may be of any suitable composition having regard to the intended application of the material. In the exemplary application of the polymeric plastics filaments, the lubricant has characteristics which include transparency so as to not impact on the appearance of the filaments. In

addition, the lubricant should not interfere with subsequent processing of the filaments, including twisting into fibres and weaving into fabric, and any subsequent treatment of the fabric such as coating. Preferably, the lubricant facilitates formation of the filaments into fibres by holding the filaments together, and acting as an anti-static agent during subsequent heating, stretching and twisting into fibres.

In this embodiment, the lubricant is a high viscosity hydrocarbon white oil. One such suitable oil is sold by Exxon-Mobil Corporation under the product identifier N172.

In this preferred embodiment, the lubricant may include an antistatic agent added to the oil in order to reduce static electricity between the extruded filaments during subsequent processing.

The polymeric plastics material, particularly in the form of filaments and fibres, may be manufactured using any suitable equipment including conventional equipment used to manufacture current polypropylene filaments and fibres. That equipment can be operated using the same parameters as in the known manufacturing techniques. Fabric manufactured from filaments and fibres composed of the polymeric plastics material of the present invention, can be coated in a similar manner to the previously coated woven polypropylene material base.

The polymeric plastics material of the present invention has a reduced propensity to absorb moisture, such as water, through capillary action. The reason for that resistance to absorb moisture is not entirely understood. However, it is believed that in part, the wax globules distributed over the surface of the material act as barriers to the capillary flow of water there along. The inhibited water flow tends to accumulate at the globules into water droplets which eventually overcome surface tension between the droplets and material, and fall away under their own weight.

Example

In order to further understand the present invention, an Example material will now be described.

A master batch was prepared having the following approximate composition:

10% UV stabiliser
40% AdSperser wax
50% Polypropylene carrier

5 The master batch was added to polypropylene at the rate of about 4.5% and the composition thoroughly mixed. In particular, the mixing distributed the wax throughout the composition.

The mixed composition was then extruded through a multi-filament die to simultaneously produce about 120 filaments.

10 Downstream of the dye the filaments were passed through a hydrocarbon white oil N172 of Exxon-Mobil Corporation so as to film coat the filaments with the oil.

The filaments were then twisted into a multi filament fibre which is wound into a skein or roll for subsequent use.

15 In one test, polypropylene fibres manufactured according to the above Example were compared with known polypropylene fibres to quantify their resistance to moisture absorption, particularly atmospheric moisture absorption by capillary action. That test involved suspending lengths of both polypropylene fibres types above a container of tap water, with the ends of the fibres dipping into the water. The fibres were of the same nominal sizes, and the test was
20 conducted in ambient conditions. It was observed that the water was absorbed by capillary action or wicked along the known fibres at a rate of about 1cm per minute. That absorption continued along the entire length of the fibres. In contrast, the water wicked along the fibres according to the present invention for about 1cm above the surface of the water over a longer period of time, and then
25 stopped. That is, the water did not continue to wick along the fibres.

In a further test, a 1.5 metre square piece of fabric woven from fibres manufacture according to the above Example was supported horizontally. A hole approximately 50mm was cut in the centre of the fabric piece, and water was applied through a tube at a rate of about 5 litres/minute to the edge of the
30 fabric defining the hole. The water was supplied to the tube from a small tank. Again, the test was conducted in ambient conditions.

Initially, water with a zero pressure head was applied to the fabric for a period of 24 hours. No absorption into the fabric surrounding the hole was observed. The fabric displayed a distinct hydrophobic nature.

5 The water tank was then raised above the fabric piece so as to apply the water at a pressure head of 1 foot. At that pressure head it was observed that the water was absorbed by capillary action into the fabric piece at a rate of about 0.01 litres/minute.

10 By way of comparison, the same test was conducted with a 1.5 metre square piece of fabric woven from known polypropylene fibres. With a zero pressure head, water was absorbed by the fabric at a rate of about 0.05 litres/minute, whilst at a 1 foot pressure head the absorption rate increased to about 0.1 litres/minute.

15 The oil lubricant produces a material surface tension which is higher than exhibited by the unlubricated material, and thus reduces the capillary action between the material and water.

20 The material of the present invention is suitable for a wide range of uses and applications. Because of the reduced moisture absorption capabilities, fibres composed of the material, and woven or knitted into a fabric, will be more suitable for external and exposed environments. In particular, the fabric will be less prone to staining and bacterial attack, and will also be easier to handle in such environments.

25 Finally, it is to be understood that various alterations, modifications and/or additions may be made to the material and its manufacture, without departing from the ambit of the present invention as defined in the claims appended hereto.

CLAIMS

1. A polymeric plastics material having a composition which includes a wax, wherein the material has a reduced propensity to absorb moisture.
- 5 2. A material as claimed in claim 1, wherein the wax is at a surface of the material.
3. A material as claimed in claim 1 or 2, wherein the wax is intermittently distributed over a surface of the material.
- 10 4. A material as claimed in any preceding claim, wherein the wax is distributed in globules over a surface of the material.
- 15 5. A material as claimed in any preceding claim, wherein the wax is present in an amount which at least substantially prevents the material from absorbing moisture by capillary action.
- 20 6. A material as claimed in any preceding claim, wherein the wax is present in an amount of between 0.5 and 5% by weight of the material.
7. A material as claimed in any preceding claim, wherein the wax is present in an amount of about 1% by weight of the material.
- 25 8. A material as claimed in any preceding claim, wherein the wax is a hydrocarbon compound or mixture.
9. A material as claimed in claim 8, wherein the compound or mixture is selected from one or more of the Fischer-Tropsch range of hydrocarbons.
- 30 10. A material as claimed in any preceding claim, wherein the wax is Ad Spere 868.

11. A material as claimed in any preceding claim, and including a lubricant on a surface of the material.
12. A material as claimed in claim 11, wherein the lubricant is present in an amount of between 0.5 and 5% by volume of the material.
13. A material as claimed in claim 12, wherein the lubricant is present in an amount of about 2% by volume of the material.
14. A material as claimed in any one of claims 11 to 13, wherein the lubricant is an oil present as a film on the surface of the material.
15. A material as claimed in claim 14, wherein the oil is a hydrocarbon white oil.
16. A material as claimed in any preceding claim, wherein the composition includes a polymer or copolymer of propylene.
17. A material as claimed in any preceding claim, wherein the material is in the form of an extruded filament.
18. A polymeric plastics material substantially as hereinbefore described with reference to the Example.
19. An extruded filament of material as claimed in any one of claims 1 to 16 or 18.
20. A fibre manufactured from a multitude of filaments as claimed in claim 19.
21. A method of manufacturing a polymeric plastics material, including: preparing a polymeric plastics composition including wax; and forming the composition into a material; and

wherein the material has a reduced propensity to absorb moisture.

22. A method as claimed in claim 21, wherein forming the composition into a material includes allowing the wax to migrate to a surface of the material.

5 23. A method as claimed in claim 22, wherein the wax is intermittently distributed over the surface of the material.

24. A method as claimed in claim 22 or 23, wherein the wax is distributed in globules over the surface of the material.

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25. A method as claimed in any one of claims 21 to 24, wherein the wax is included in the composition in an amount which at least substantially prevents the material from absorbing moisture by capillary action.

15 26. A method as claimed in any one of claims 21 to 25, wherein the wax is included in the composition in an amount of between 0.5 and 5% by volume of the composition.

20 27. A method as claimed in any one of claims 21 to 26, wherein the wax is included in the composition in an amount of about 2% by volume of the composition.

25 28. A method as claimed in any one of claims 21 to 27, wherein preparing the polymeric plastics composition includes preparing a polypropylene master batch and adding a hydrocarbon compound or mixture wax to the master batch.

29. A method as claimed in any one of claims 21 to 28, wherein the material is formed by extrusion of the composition.

30 30. A method as claimed in claim 29, wherein the composition is extruded into material filaments.

31. A method as claimed in any one of claims 21 to 30, and including lubricating the formed material.

32. A method as claimed in claim 31, wherein lubricating the formed material includes applying a lubricant to a surface of the material in an amount of
5 between 0.5 and 5% by volume of the material.

33. A method as claimed in claim 32, wherein the lubricant is applied in an amount of about 2% by volume of the material.

10 34. A method as claimed in any one of claims 31 to 33, wherein lubricating the formed material includes applying an oil to a surface of the material.

35. A method as claimed in any one of claims 31 to 34, wherein lubricating the formed material includes applying a hydrocarbon white oil to a surface of the
15 material.

36. A method as claimed in any one of claims 31 to 35, when appended to claim 28, wherein the lubricant is applied by passing the filaments through lubricant drops so as to form a film of lubricant on surfaces of the filaments.
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37. A method of manufacturing a polymeric plastics material substantially as hereinbefore described with reference to the Example.

38. A polymeric plastics material when manufactured according to the
25 method as claimed in any one of claims 21 to 37.