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(54) Method for producing yarn for fields of artificial grass and field of artificial grass produced with this yarn.

(57) Method for the production of yarn for fields of articicial grass by extruding polymer granulate to bands or to a film, cutting the film into bands and stretching the bands, in which the bands having a width of 1.5-4 mm are stretched at a stretching ratio of 1 to 2-3 to bands having a width of 0.75-3 mm whilst the thickness is 50-80% of the thickness of the extruded bandand then 5-10 bands are twisted into the yarn

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METHOD FOR PRODUCING YARN FOR FIELDS OF ARTIFICIAL GRASS AND FIELD OF ARTIFICIAL GRASS PRODUCED WITH THIS YARN.

The invention relates to a method for producing yarn for fields of artificial grass by extruding polymer granulate to bands or to a film, cutting the film to bands and stretching the bands. The invention also relates to the grass fields produced with this yarn.

From "De Tex" 27 (1968) number 12, pages 638-643 it is known from an article "Staplefibres and continuous yarns of fibrillated polypropylene film" of Dr. G. Schuur to produce fibred yarns from polypropylene by extruding the granulate to a film, stretching the film at a stretching ratio of 1:6 to 1:12 especially at 1:10, cutting the stretched film to bands and modifying these bands to fibres. It also is possible to cut the film to bands before stretching, after which the bands are stretched. Besides the general use of such fibres for cloths, carpets and technical backings, it also is mentioned that it can be used for "artificial lawn".

From "The Textile Manufacturer", July 1971, pages 263-268 "Fibrillated polypropylene fibre" W.H. Badrian and J.H.L. Choufoer it is known that it is difficult to directly extrude polypropylene fibres with additions from a spinneret, if this polypropylene comprises a relatively high amount of additives such as pigments and fillers. For this reason it is suggested to extrude the granulate to a film, to stretch this film and to cut bands from the stretched film. The value as such mentioned for the stretching ration is 1:8. The produced fibres have a low dtex-value of 6 and 42 denier, such as indicated in the table on page 266. The use of these fibres for articicial grass has not been mentioned in this article.

In practice one produces yarn for fields of artificial grass, as disclosed in European patent 0 263 566 by extruding polymer granulates such as polypropylene, to a film having a width of about 750 mm and a thickness of about 100 µm. This film is cut to bands of a width of about 30 mm, which bands are stretched to a stretch ratio of 1:4 or more, to a width of about 15 mm and a thickness of about 50 µm. In order to twist these bands, they are provided with cuts, so that a reticulated structure is produced, which structure facilitates twisting. When fields of artificial grass are made of said yarn, a disadvantage of a field of such artificial grass is that an after-fibrillation is caused, as a result of which the tufted yarn wears out. The inventor carried out an intensive research in order to improve the fields of artificial grass, during which research experiments have been directed to improve the resistence to wearing out. From these experiments it appeared that at a relatively high stretching ratio the strength of the fibers is high, but the resistence against wearing can be improved at a lower value for the stretching ratio. For this reason a new process has now been developed, in which one returned to a process that was no longer used in the production of yarns for fields or artificial grass. This process according to the invention as disclcsed in the preamble is characterized by the fact that the bands having a width of 1.5-4 mm are stretched at a stretching ratio of 1:2-3, to bands having a width of 0.75-3 mm while the thickness is 50-80% of the thickness of the extruded band, and then 5-10 bands are twisted to yarn. Preferably the bands have after extrusion a width of 2-3 mm and after stetching, during which the thickness of the band is 50-70% of the original thickness, a width of 1-2 mm. Besides this it is preferred that the bands have a yarn number of 900-1350 dtex and that beside polypropylene a blockcopolymer is used as sold by Solvay, Belgium. According to the process of the invention, the cutting of the bands from the film and the stretching can be reversed, so that it is possible to stretch bands as well as to stretch the film.

It might be true that it is known from US patent 4,253,299 to produce fibres from films by cutting the films and to stretch the fibres at a stretching ratio of about 3.0, but then much lighter fibres are produced of about 132 denier per fibre, which fibres are entangled in a jet. On basis of such fibres no useful fields of artificial grass can be produced.

On basis of the results of experiments as carried out, it is clear that the fields of artificial grass with a tufted yarn according to the invention is less subject to after fibrillation, which can be proved by a wheel experiment, with which a clearly improved result can be obtained after visual inspection. From the Taber test, of which the results have been indicated in the table given here below, it appears that the fibre loss has been strongly decreased of 70‰ , for fields of artificial grass on basis of yarns as used for fields as disclosed in European patent 0,263,566, to 20‰ for fields of artificial grass, produced on basis of yarns according to the invention.

TABLE

material for artificial grass	method as used	dtex	stretching ratio	wearing
polypropylene	bands of 15 mm with cuts *)	6600	1:4	70‰
polypropylene + silicon oil	bands of 15 mm with cuts *)	8000	1:4	50‰
polypropylene	according to the invention	6600/6 bands	1:2.5	40‰
polypropylene + silicon oil	according to the invention	8000/7 bands	1:2.5	20‰

*) 4 cuts per 10 mm width.

From this table it also appears that the application of a silicon derivative such as silicon oil on the field of artificial grass, to lower the coefficient of friction, decreases the wearing.

Instead of the production of a film that is cut into bands of 2-3 mm it also is possible to produce directly the bands with the indicated width from the spinneret. The melt then is pressed through a spinneret having openings which are dimensioned such that the bands can be obtained directly after which they are cooled, this contrary to the expectation as given in the article of W.A. Badrian as above mentioned, because now one produces according to the invention heavier fibres than aimed according to that article.

The invention is explained in more detail with reference to the following examples.

Example I

An extruder is fed with propylene having a melting index of 2. From this a film is produced having a width of 750 mm and a thickness of 100 μm. Said film is cut into bands being 2-3 mm width, while the thickness is maintained. Stretching takes place at a temperature of about 130 °C at a stretching ratio of 1:2.5. It also is possible to stretch at first the film and to cut bands from the stretched film. A hot-blast furnace is used for the stretching operation. After relaxation, cooling and shrinking, bands are obtained, having a width of 1.5 mm and a thickness of 60 μm. Eight of these bands are twisted in a yarn which can be processed into a carpet for a field of artificial grass by means of a tufting operation.

Example II

The method of example I was repeated whereby instead of polypropylene a blockcopolymer was used consisting of polypropylene and polyethylene marketed by Solvay, Belgium.

Claims

1. Method for the production of yarn for fields of artificial grass by extruding polymer granulate to bands or to a film, cutting the film into bands and stretching the bands, characterized in that the bands having a width of 1.5-4 mm are stretched at a stretching ratio of 1 to 2-3 to bands having a width of 0.75-3 mm whilst the thickness is 50-80% of the thickness of the extruded band and then 5-10 bands are twisted into the yarn.
2. Method according to claim 1, characterized in that after extrusion the bands have a width of 2-3 mm, and after stretching, during which the thickness of the band becomes 50-70% of the original thickness, the width of the bands is 1-2 mm.
3. Method according to claims 1-2, characterized in that as the polymer granulate a propylene comprising blockcopolymer is used.
4. Method according to claims 1-3, characterized in that the bands as used have a yarn number of 900-1350 dtex.
5. Field of artificial grass from yarn material, characterized in that the yarn material as used is produced according to a method as disclosed in claims 1-4.
6. Field of artificial grass according to claim 5 characterized in that on the yarn material a substance has been applied in order to decrease the coefficient of friction such as a silicon derivative.

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2335

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,Y	THE TEX, vol. 27, no. 12, December 1968, pages 638-643, Doetinchem, NL; G. SCHUUR: "Stapelvezels en continugarens van gefibrilleerde polypropyleen film" * Page 639, left-hand column, paragraph 1 *	1-4	D 01 D 5/42 D 01 F 6/06 E 01 C 13/00
D,Y	THE TEXTILE MANUFACTURER, vol. 97, no. 1159, July 1971, pages 263-268, Manchester, GB; W.H. BADRIAN et al.: "Fibrillated polypropylene fibre" * Page 264, column 2, "Stretching" *	1-4	
D,Y	US-A-4 253 299 (D.E. BORENSTEIN et al.) * Claims; column 3, lines 46-50; column 4, lines 37-39 *	1-4	
A	EP-A-0 259 940 (KONINKRIJKE NIJVERDAL TEN CATE N.V.)		
A	DE-A-1 941 950 (nINO)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
D 01 F D 01 D D 02 G E 01 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	17 December 90	VAN GOETHEM G.A.J.M.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document