(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 259 940**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87201796.7**

(51) Int. Cl.⁴: **A47G 27/02**

(22) Date of filing: **14.09.87**

(30) Priority: **12.09.86 NL 8602312**

(43) Date of publication of application:
16.03.88 Bulletin 88/11

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **Koninklijke Nijverdal-Ten Cate N.V.**
No. 3, E. Gorterstraat
NL-7607 GB Almelo(NL)

(72) Inventor: **Terhorst, Antonius Vincentius**
Waterhamskamp 20
NL-7576 EM Oldenzaal(NL)
Inventor: **van den Bosch, Harm**
Adastraat 33
NL-7607 HA Almelo(NL)

(74) Representative: **Schumann, Bernard Herman Johan et al**
OCTROOIBUREAU ARNOLD & SIEDSMA
Sweelinckplein 1
NL-2517 GK The Hague(NL)

(54) Method of manufacturing an artificial grass and an artificial grass obtained therewith.

(57) A method for manufacturing artificial grass consists of an underlayer and strip-like pile threads embedded therein, which threads protrude, as grass, on one side out of the underlayer, particularly for a sports field, for instance a football pitch.

The object of the current invention is to make available a method which enables the manufacture of an artificial grass such that it meets requirements with respect to coefficient of friction/roughness.

Use can be made of frizzing or crinkles to obtain the isotropic properties of the turf. An effective lowering of the coefficient of friction can be realized in this way. Use can be made for this purpose of a circle knit method or knitdeknit. The crinkles can be fixed by a heat treatment.

As an alternative substances may be added (mixed coated or coextruded) reducing the friction coefficient.

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METHOD OF MANUFACTURING AN ARTIFICIAL GRASS AND AN ARTIFICIAL GRASS OBTAINED THEREWITH

The invention relates to a method for manufacturing artificial grass, consisting of an underlayer and strip-like pile threads embedded therein, which threads protrude, as grass, on one side out of the underlayer, particularly for a sports field, for instance a football pitch.

Known is the use of a carrier having tufted pile threads in it, usually consisting of polypropene. Polypropene has the drawback that is has in common with human skin a comparatively high coefficient of friction, so that when someone playing a sport slides with his skin along the turf (sliding tackles) burns can result. The Nederlandse Sportfederatie NSF (Dutch Sport Federation) among others lays down particular requirements with respect to the characteristics of artificial grasses, including requirements related to the coefficient of friction. The NSF together with the Koninklijke Nederlandse Voetbalbond (Football Association) has adopted the norms 2.a, 4.b, 4.c and 4.d applicable to football. In such a "Leroux" test the coefficient of friction is expressed in terms of roughness. This roughness can be expressed in one characterising numeral and must be as low as possible. In principle a value of, at the highest 0.3 is required for a football pitch.

The object of the current invention is to make available a method which enables the manufacture of an artificial grass such that it meets the requirements laid down with respect to coefficient of friction/roughness.

Use can be made of frizzing or crinkles to obtain the isotropic properties of the turf. An effective lowering of the coefficient of friction can be realized in this way. Use can be made for this purpose of a circle knit method or knitdeknit. The crinkles can be fixed in a furnace, for example by means of hot air or steam. Use can be made for instance of at least one treatment at a temperature of approximately 130°C for a time interval in the order of 10 minutes. It can be useful, depending on the materials employed, to repeat such a thermal treatment several times.

A qualitatively high-grade artificial grass can be obtained with such a method. A further lowering of the coefficient of friction can be carried out by adding one or more substances to the base material, which is for example polypropene. Polyethylene terephthalate can for example be added in a ratio in the order of 50% : 50%. Other substances can also be used. Special mechanical techniques can also be employed in the manufacture of the threads, for instance a co-extrusion of a number, e.g. 3 or 4, of films onto one another, including for example at least one moisture absorbing layer. Even "super absorbers" can be applied in this context. The function of a moisture absorbing layer is to take up moisture and release it at the moment when the pitch has to be played on, which results in a lowered coefficient of friction being brought about owing to the released moisture, also in dry weather.

A strip-like thread, consisting of 100% linear low density polypropylene provides a soft artificial grass, of which the recovery capacity leaves something to be desired. The coefficient of friction is certainly lowered and the resistance to wear is good. A laminate type structure, for example 3 co-extruded films, can consist of a centre layer of the relatively rigid polypropene with a thickness of 60%, having on either side a layer with a thickness of 20% and consisting of another more flexible material, for example the linear low density polyethylene mentioned earlier. In addition use can be made of polyethylene terephthalate. This material possesses a low coefficient of friction and also has a (small) moisture absorption capacity.

An after treatment can be applied for addition of smoothing substances as coating layer on the pile threads, for example consisting of polytetrafluoroethylene and/or material on a silicon base. Strips can be treated in the factory. A water dispersion of smoothing substance can be manufactured and applied to the threads by spraying or another suitable process, and the water allowed to evaporate. The strip-like threads can thus for example be guided beforehand through a dispersion of the smoothing material, or a field with artificial grass can be rolled with a roller running through a liquid bath.

Example 1

Use was made of threads consisting of approximately 90% polypropene, approximately 8% linear low density polyethylene and approximately 2% $CaCO_3$, in addition to small quantities of the additions that are further usual to improve the mechanical, thermal and ultra violet stability and the like. Addition of $CaCO_3$ gives an increase in stiffness and lessens the tendency of the pile threads to splitting.

Use was made of a three-stand thread 3 x 2200 DTEX twine, 5 mm x 50 µ.

Thread frizzed.

Example 2

Threads as in example 1, frizzed. Frizzing length 20-30 mm. Frizzing fixed with steam, 130°C for 2 x 10 minutes.

Example 3

Thread as specified above, fibrillated with four needles per centimetre, incision length 8 - 12 mm.

Example 4

Application of coating layer. Thread as specified above. For smoothing the threads use is made of a surface treatment agent. Surface treatment means the applying of a liquid to give the thread the desired properties with respect to its processing and final characteristics. A surface treatment agent can if necessary permeate into the thread through diffusion. In this case the surface treatment agent consisted of a mixture of silicon oils and polytetrafluoroethylene. The surface treatment agent was dissolved in water. The dispersion was sprayed on. After evaporation of the water there remained 1-2% active substance or surface treatment agent per kg. of pile thread.

Example 5

A typical carpet construction for artificial football turf is manufactured on a tufting machine with 3/8 or 5/16 division, a stitch count of 14-16 per 10 cm and a pile height of 32-35 mm.

The norms referred to were satisfied in all cases.

Claims

1. Method for manufacturing artificial grass, consisting of an underlayer and strip-like pile threads embedded therein, which threads protrude, as grass, on one side out of the underlayer, characterized in that steps are taken to reduce the coefficient of friction.

2. Method as claimed in claim 1, characterized in that use is made of frizzed threads.

3. Method as claimed in claim 2, characterized in that the frizzing of the threads is fixed by a heat treatment.

4. Method as claimed in claim 3, characterized in that the pre-frizzed threads are exposed to at least one heating up to approximately 130°C for a time interval in the order of 10 minutes.

5. Method as claimed in claim 4, characterized in that use is made of steam.

6. Method as claimed in any of the foregoing claims, characterized in that use is made as raw material for the threads of a polymer, for example polypropene, to which is added at least one substance which reduces the coefficient of friction.

7. Method as claimed in claim 6, characterized in that polytetrafluoroethylene or polyethylene terephthalate is mixed with the polymer, for instance in the form of a masterbadge.

8. Method as claimed in claim 7, characterized in that the mixing ratio is selected in the order of magnitude of 50% : 50%.

9. Method as claimed in any of the claims 6-8, characterized in that the quantity of polytetrafluoroethylene is chosen such that the resulting quantity thereof amounts to approximately 2-7% of the total thread weight.

10. Method as claimed in any of the claims 6-8, characterized in that for manufacture of the threads both substances are extruded simultaneously.

11. Method as claimed in any of the foregoing claims, characterized in that threads are manufactured by co-extrusion of a number of films in order to obtain the required mechanical properties, such as coefficient of friction, pile stiffness, wear resistance and recovery capacity.

12. Method as claimed in claim 11, characterized in that at least one film is used with moisture absorbing properties.

13. Method as claimed in claim 12, characterized in that use is made of a "super absorber", for example a cross linkable sodium polyacrylate.

14. Method as claimed in claim 11, characterized in that 3 films are co-extruded, the middle one of which consists of polypropene while the outer films consist of a softer, more flexible and/or smoother material.

15. Method as claimed in claim 14, characterized in that the outer films contain linear low density polyethylene.

16. Method as claimed in claim 14, characterized in that the outer films contain polyethylene terephthalate.

17. Method as claimed in claim 14, characterized in that the outer films each have a relative thickness in the order of magnitude of 20% of the total thread thickness.

18. Method as claimed in any of the foregoing claims, characterized in that the threads are subjected to a fibrillation by piercing the strip-like threads with needles.

19. Method as claimed in any of the foregoing claims, characterized in that the threads or the completed artificial grass are subjected to an after treatment for applying to said threads a coating

layer containing a smoothing substance, which contains polytetrafluoroethylene or a material on a silicon base.

20. Method as claimed in claim 19, characterized in that a watery dispersion is made of the smoothing substance, which is applied to the threads by spraying or other suitable process, and the water is allowed to evaporate.

21. Artificial grass obtained by application of a method as claimed in any of the foregoing claims.