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⑤④ **Sports field with natural grass and artificial grass and a method for laying same.**

⑤⑦ A sports field comprises a foundation which bears an artificial grass surface and which is rooted with roots of grass plants passing through the artificial grass surface.

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SPORTS FIELD WITH NATURAL GRASS AND ARTIFICIAL GRASS AND A METHOD FOR LAYING SAME

The present invention relates to a sports field whereof the top layer consists only partially of artificial grass and consists partially of natural grass. This sports field is suitable for all kinds of field sports such as football, hockey, tennis and the like.

The use of sports fields with a top layer of artificial grass is becoming increasingly common because of the reduced maintenance and the more intensive use compared to a sports field of natural grass.

A drawback of the use of artificial grass is that when there is frictional contact of the skin with the artificial grass, for instance in the case of a sliding tackle or unintended fall, the frictional resistance is so high that this contact is experienced as unpleasant and can cause wounds and injuries. Efforts have been made to lower the frictional resistance by changing the fibre structure of the artificial grass (frizzed fibres) or by applying a lubricant to the fibres.

The present invention has for its object to avoid as far as possible the above mentioned drawbacks of an artificial grass field, wherein the advantages of the artificial grass field remain preserved and in addition the properties of the sports field according to the invention correspond more closely to those of a sports field with a grass surface.

This is achieved according to the invention in that the sports field comprises a foundation which bears an artificial grass and which is rooted with roots of grass plants passing through the artificial grass surface. The sports field according to the invention therefore consists of a grass surface of artificial grass and natural grass, wherein the latter is preferably slightly longer by setting a specific mowing height, whereby the natural grass lies partially over the artificial grass, wherein however the artificial grass provides the natural grass with firmness and protection. This means that compared to a purely artificial grass the foundation usually has a simpler construction and requires a smaller investment. It is also once again possible to suffice with the usual chalk markings.

The artificial grass for use according to the invention is provided over its surface with openings through which the grass plants grow from the foundation.

Such an artificial grass can be manufactured in simple manner if the artificial grass is provided with a tuft cloth or canvas and the openings are either formed from yarn threads and/or weft threads missing in the tuft cloth or canvas or are punched in. Because of the openings now present in the tuft

cloth no latex layer can be formed on the underside of the artificial turf at the location of these openings, so that it is scarcely or not necessary to adapt the normal manufacturing process of the artificial grass. In order to avoid the tuft cloth and ultimately the turf losing strength at the position of the openings through the omission of yarn threads and/or weft threads, it is recommended that yarn threads and/or weft threads adjoining the openings have a greater diameter than other tuft cloth threads. An optimal artificial grass according to the invention is provided on 30-60% of its surface with openings for grass plants.

Specific requirements are set down for the foundation of the sports field because the foundation must on the one hand provide the artificial grass with stability and must on the other hand provide the grass plants with a biological environment favourable to growth. It has been found however that as a consequence of the rooting of the grass plants in the foundation, the foundation can possess in its simplest embodiment an individual stability that is smaller than that for a foundation whereon only artificial grass is laid. The foundation preferably comprises a mixture of sand and particle-form material with hooking resistance, which mixture contains 2-8% by weight of humus material. The particle-form, hooking material forms a skeleton providing the stability over the height of the foundation, wherein the sand and the humus material fill the hollow spaces and form there an environment for the grass plant roots. An optimum foundation mixture comprises sand and particle-form material in a weight ratio of 60-30 to 40-70. As particle-form material can be used lava and steagran™.

For specific applications, such as football, it may be desired to provide the sports field with a greater damping power. For this purpose damping, particle-form material can be added to the mixture in a quantity of 15-60% by weight. This damping material preferably consists of rubber particles such as rubber fibres and rubber nuggets.

In a particular embodiment the sand consists of low-grade earth with a humus content of 2-8% by weight.

In order to allow development of the grass plants grass seed has to be caused to germinate in one way or another. According to a first embodiment the foundation can be sown with grass seed which only germinates and eventually grows at the location of the openings in the grass covering. Another embodiment comprises the sowing of the artificial grass, wherein only the grass plants in the immediate vicinity of the openings in the grass

surface can grow therethrough and penetrate into the foundation. Finally, it is possible that grass plants can find their way through the back layer of the artificial turf to the foundation at places where in principle no openings are present.

If the foundation per se cannot be sown with grass seed, it is recommended to arrange the grass seed in a preferably biologically degradable germinating layer, for instance a layer of cellulose.

Finally, the invention relates to methods for laying the above described sports field. In a first embodiment the method comprises the steps of:

- i) arranging the foundation on a ground;
- ii) arranging a layer containing grass seed on the foundation;
- iii) laying out the artificial grass over the grass seed layer;
- iv) allowing the grass seed to germinate;
- v) strewing sand into the artificial grass; and
- vi) mowing the grass plants to a length that is greater than the length of the artificial grass fibres.

In a second embodiment the method comprises the steps of:

- i) arranging the foundation on an underlayer;
- ii) laying out the artificial grass onto the foundation;
- iii) sowing grass seed into the artificial grass;
- iv) strewing sand at least partially into the artificial grass; and
- v) mowing the grass plants to a length that is greater than the length of the artificial grass fibres.

The notable feature is that the grass is preferably strewn with sand that contains 1-2% of humus material.

In its simplest embodiment the foundation may consist only of sand having added thereto 2-8% by weight of humus material. Low-grade earth may optionally be used consisting of sand with 2-8% by weight of humus material. If the stability must be further increased it is recommended that in addition to sand the foundation contains particle-form material having hooking resistance. These materials are known and comprise steagranTM with a particle diameter of 0-8 mm and lava 03 with a particle diameter of 0-3 mm.

Depending on the sport to be played and the sand used the ratio of sand to material with hooking resistance is 60-30 to 40-70 on weight basis.

For an improved stability it may be desired to add damping, i.e. resilient material, to the sand or to the mixture of sand and material with hooking resistance. This material can be a synthetic elastomer material (polyurethane plastics), or rubber in the form of rubber fibres or particles. Materials known for this purpose are described for instance in the European patent applications 204.381 and 260.769.

The foundation is brought in the usual ways to the desired density and initial stability.

At choice, grass seed can be sown in the foundation or a layer containing grass seed can be arranged, for instance a germinating bed layer of cellulose, wherein the grass seed is arranged. This material is biologically degradable and disappears after a time leaving behind humus material. According to another embodiment, seed can be sown in the artificial grass, whereafter the germinated grass plants find a way to the foundation with their roots.

The artificial grass that is used according to the invention must have a relatively open character, which means that 30 to 60% of the artificial grass surface must be provided with holes having a diameter in the order of magnitude of approximately 1-3 mm. These holes can be arranged afterwards, but an elegant manner of production results if the holes or openings are already left free in the tuft cloth. This can take place through interweaving the mutual yarn or weft threads or by omitting yarn-and/or weft threads. At the point of these openings no artificial grass fibres can be arranged on the tuft cloth. Moreover, when the latex underlayer is arranged, the latex will not form a film at the position of the openings and will leave the holes open. The artificial grass according to the invention can thus be manufactured with existing apparatus. It is noted that a conventional artificial grass already possesses a good water permeability so that no additional steps are required for sufficient adding of water to the grass plants.

If the artificial grass is arranged on a foundation already provided with a layer of grass seed, it is recommended not to strew sand in the artificial grass or to do so only partially and to strew sand to the required height after the grass seed has germinated and the grass shoots have grown out above the artificial grass. Further, it is advantageous to strew sand with a diameter of 0-310 μ m containing 1-2% of humus material. This contributes to a good growth of the grass plants.

After germinating of the grass plants the natural grass has to be mown during maintenance to a length that is slightly longer than the length of the fibres of the artificial grass. In general the artificial grass fibres have a length of 15-35 mm. This means that with straight artificial grass fibres with a length of 15-25 mm or with frizzed artificial grass fibres with a length of 15-35 mm the grass must be mown to a grass length of 30-35 mm.

In contrast to the usual artificial grass fields the sports field according to the invention has to watered regularly in dry periods and provided with nutrients.

An additional advantage is that for the line-marking of the sports field use can in principle be

made of chalk lines which adhere to the natural grass shoots. Line-marking using inset line tracks remains possible, which inset tracks can optionally have grass plants growing therethrough.

Claims

1. Sports field comprising a foundation which bears an artificial grass surface and which is rooted with roots of grass plants passing through the artificial grass surface.

2. Sports field as claimed in claim 1, wherein openings for the grass plants are present in the artificial grass.

3. Sports field as claimed in claim 2, wherein the artificial grass is provided with a tuft cloth and the openings are formed from yarn threads and/or weft threads missing in the tuft cloth.

4. Sports field as claimed in claim 3, wherein yarn threads and/or weft threads adjoining the openings have a greater diameter than other tuft cloth threads.

5. Sports field as claimed in claims 1-4, wherein 30-60% of the surface of the artificial grass consists of openings for the grass plants.

6. Sports field as claimed in claims 1-5, wherein the artificial grass consists of straight and/or frizzed fibres with a fibre length of 15-35 mm.

7. Sports field as claimed in claims 1-6, wherein the foundation comprises sand with a humus content of 2-8% by weight.

8. Sports field as claimed in claim 7, wherein the foundation comprises a mixture of sand and particle-form material with hooking resistance, which mixture contains 2-8% by weight of humus material.

9. Sports field as claimed in claim 8, wherein the foundation mixture contains sand and particle-form material in a weight ratio of 60-30 to 40-70.

10. Sports field as claimed in claim 9, wherein the particle-form material comprises lava and steagranTM.

11. Sports field as claimed in claims 8-10, wherein damping, particle-form material is added to the mixture in a quantity of 15-60% by weight.

12. Sports field as claimed in claim 11, wherein the damping material consists of rubber particles.

13. Sports field as claimed in claims 9-12, wherein the sand consists of low-grade earth with a humus content of 2-8% by weight.

14. Sports field as claimed in claims 1-13, wherein between the artificial grass and the foundation is arranged a germinating bed layer for grass seed.

15. Method for laying a sports field as claimed in claims 1-13, comprising the steps of:

i) arranging the foundation on a ground;
ii) arranging a layer containing grass seed on the foundation;

5 iii) laying out the artificial grass over the grass seed layer;

iv) allowing the grass seed to germinate;

v) strewing sand into the artificial grass; and

10 vi) mowing the grass plants to a length that is greater than the length of the artificial grass fibres.

16. Method as claimed in claim 15, wherein in step ii) grass seed is sown on the foundation in a quantity of 100-600 kg per hectare.

15 17. Method as claimed in claim 15, wherein in step ii) a germinating layer containing grass seed is laid out on the foundation.

18. Method for laying a sports field as claimed in claims 1-14, comprising the steps of:

i) arranging the foundation on an underlayer;

20 ii) laying out the artificial grass on the foundation;

iii) sowing grass seed in the artificial grass;

25 iv) strewing sand at least partially into the artificial grass; and

v) mowing the grass plants to a length that is greater than the length of the artificial grass fibres.

30 19. Method as claimed in claims 15-18 wherein the artificial grass is strewn with sand that contains 1-2% of humus material.

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 1493

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)
X	EP-A-0 174 755 (NOTT-COUNTY COUNCIL) * The whole document *	1	E 01 C 13/00
Y		2,6,7,9 11,12	
A		18	
Y	FR-A-2 333 534 (DUNLOP) * Claims 1,14-17,23 *	2	
A		1,6	
Y	EP-A-0 263 566 (DESSAUX) * Column 3, lines 14-20; column 4, lines 36-40 *	6	
A		1	
Y	FR-A-2 556 381 (MASQUELLER) * Page 3, lines 17-26 *	7	
A		8	
Y,D	EP-A-0 204 381 (HBG) * Claim 1 *	9	
A		1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
Y,D	EP-A-0 260 769 (HEYMANS) * Abstract *	11,12	E 01 C
A			
X	DE-A-2 522 864 (BERLEBURGER) * The whole document *	1,2	
A		5	
	--- -/-		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16-08-1990	Examiner DIJKSTRA G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category 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			



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)												
A	NL-A-8 500 946 (HEIDEMY) * Claims * ---	1,10,13													
A	DE-A-3 723 364 (REPPERT) * Claims 1,2 * ---	7													
A	DE-A-2 160 576 (HA. EFF. KUNSTSTOFFE) * The whole document * ---	15,16													
A	US-A-3 703 786 (SWAN) -----														
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)												
The present search report has been drawn up for all claims															
Place of search THE HAGUE		Date of completion of the search 16-08-1990	Examiner DIJKSTRA G.												
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS</td><td>T : theory or principle underlying the invention</td></tr><tr><td>X : particularly relevant if taken alone</td><td>E : earlier patent document, but published on, or</td></tr><tr><td>Y : particularly relevant if combined with another document of the same category</td><td>after the filing date</td></tr><tr><td>A : technological background</td><td>D : document cited in the application</td></tr><tr><td>O : non-written disclosure</td><td>L : document cited for other reasons</td></tr><tr><td>P : intermediate document</td><td>& : member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS	T : theory or principle underlying the invention	X : particularly relevant if taken alone	E : earlier patent document, but published on, or	Y : particularly relevant if combined with another document of the same category	after the filing date	A : technological background	D : document cited in the application	O : non-written disclosure	L : document cited for other reasons	P : intermediate document	& : member of the same patent family, corresponding document
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