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(71) Applicant: **Wegenbouwmaatschappij J. Heijmans B.V.**
Graafsebaan 13
NL.5248 JR Rosmalen(NL)

(72) Inventor: **Heerkens, Josephus Cornelis**
Baroniehoeve 32
NL-5244 HZ Rosmalen(NL)

(74) Representative: **Noz, Franciscus Xaverius, Ir. et al,**
Boschdijk 155 P.O. Box 645
NL-5600 AP Eindhoven(NL)

(54) **Method of providing a substructure for an artificial grass field and artificial grass field applied to such a substructure.**

(57) A method of constructing a substructure for an artificial grass field by depositing a foundation on an available layer of sand or a layer of sand applied in which the foundation is composed of a mixing of material containing unbroken sand with at least 1% by weight of fibrous material.

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Method of providing a substructure for an artificial grass field and artificial grass field applied to such a substructure.

The invention relates to a method of providing a substructure of an artificial grass field by arranging a foundation on an available layer of sand or a layer of sand deposited. The invention furthermore relates to an artificial grass field applied to such a substructure.

An artificial grass field and an associated substructure are described in British Patent 1,528,264, which artificial grass field is developed for outdoor games, in particular tennis and hockey. From this British Patent it appears that the substructure is built up from a layer of stones or gravel on which a layer of sand and a layer of clay are deposited. Such an artificial grass field is also described in Dutch Patent Application 8100174, wherein it is, however, stated on page 3, last paragraph that the preliminary treatment of the base of the field does not form part of the Patent Application and that it is only schematically designated by 21.

In the further developments of such artificial grass fields the substructure is further improved by applying a layer of lava to the layer of sand to a height of about 15 cms, the surface of the coarse lava layer being strewn with lava sand, on which a water-pervious, pressure-distributing thin cloth is deposited. In this substructure, if desired, a draining system may be arranged. The lava is a stony material originating from Germany or France and formed by solidification of vulcanic material.

For given sports, particularly for football it has appeared to be important that on such an artificial grass field high damping should be ensured in order to discharge the sportsman

as much as possible and in order to render the game on the artificial grass field as much as possible similar to that on a natural grass field. Solutions in this respect have hitherto been sought in modifications of the grass surface, for example, by bringing sand between the fibres as indicated in the aforesaid British Patent 1,528,264 (or the corresponding U.S. Patent 4,044,179) and Dutch Patent Application 8100174. It has now been found that a higher damping for such an artificial grass field can also be obtained by replacing the lava of the foundation by a different material and the method embodying the invention is characterized in that in the method mentioned in the preamble the foundation is composed of a mixture of material containing unbroken sand with at least 1 % by weight of fibrous material.

The higher damping is obtained by using the unbroken sand, a kind of sand consisting of round grains, in which preferably at least 95 % by weight has a granular size distribution of 0.2 to 0.6 mm. If in the foundation only this unbroken sand were used, a high damping would be obtained, it is true, but the cohesion of this sand is so poor that permanent deformations would occur in the foundation layer where the foundation is loaded. In order to minimize such deformations it appeared to be necessary to mix the unbroken sand with at least 1 % by weight of fibrous material. Preferably 3 to 7 % by weight of fibrous material was used. An example of fibrous material is organic fibres and artificial fibres such as polypropylene fibres or Nylon fibres or inorganic fibres such as glass fibres. These fibres preferably have a length of 6 to 10 mms and a thickness of about 10 µm. By using this fibre material in the unbroken sand a foundation is obtained, which on the one hand has a high damping and on the other hand minimum deformation since the fibres have a levelling and stress-distributing effect on the sand grains.

In providing such a foundation layer there will be a tendency to minimize the content of fibre material because it is very expensive as compared with the sand to be used. The fibrous material will be about 50 times more expensive per kilogram than the sand to be used. In constructing hockey fields a less high damping will suffise than in the construction of football fields. In such a foundation layer unbroken sand may be replaced partly by broken sand in conjunction with less fibrous material. The

layer of broken sand has a considerably lower damping than unbroken sand, but the deformation of the layer of broken sand is less than that of a layer of unbroken sand. The lower sensitivity of broken sand to deformation enables the use of less fibrous material. The replacement of 40 % of unbroken sand by broken sand brings about a potential reduction of the use of fibres.
If in pure unbroken sand for a hockey field 5 % of fibres is used, the amount of fibre can be reduced to 3 % by replacing 40 % of unbroken sand by broken sand. The resultant damping is lower, it is true, but the sensitivity to deformation remains substantially the same.

The unbroken sand is a round, natural sand, for example, from river sand, whereas broken sand is obtained by a mechanical grinding treatment of, for example, stones; this broken sand has an angular grain surface.

By the addition of the fibres the resistance to deformation of the stability of the layer is increased. By adding the fibrous material less deep indents and bulging of the foundation are ensured at the places of load than without fibrous material in the unbroken sand.

Apart from the construction of artificial grass field for football, hockey or tennis such artificial grass fields may also be used for other sports, in particular in riding schools.

The figures used in the claims are only meant to explain more clearly the intention of the invention and are not supposed to be any restriction concerning the interpretation of the invention.

CLAIMS.

1. A method of constructing a substructure for an artificial grass field by depositing a foundation on an available layer of sand or a layer of sand applied characterized in that the foundation is composed of a mixing of material containing unbroken sand with at least 1 % by weight of fibrous material.

2. A method as claimed in Claim 1 characterized in that at least 95 % by weight of the sand has a grain size distribution of 0.2 to 0.6 mm.

3. A method as claimed in Claims 1 to 2 characterized in that the foundation contains 3 to 7 % by weight of fibrous material.

4. A method as claimed in Claims 1 to 3 characterized in that the fibrous material is chosen among organic fibres such as polypropylene fibres or Nylon fibres or inorganic fibres such as glass fibres.

5. A method as claimed in Claim 4 characterized in that the fibres have a length of 6 to 10 mms and a thickness of 5 to 15 /ums.

6. A method as claimed in Claims 1 to 5 characterized in that apart from the fibrous material an amount of broken sand is provided in the foundation.

7. An artificial grass field comprising an upper layer of artificial grass fibres arranged in a mat deposited on a substructure, in which as the case may be a layer of sand is applied between the artificial grass fibres characterized in that the substructure is composed as described in Claims 1 to 6.

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EUROPEAN SEARCH REPORT

Application number

EP 84 20 1229

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.4)
A	US-A-3 934 421 (DAIMLER) * Whole document *	1,4,5	E 01 C 13/00
A	FR-A-2 008 646 (A.K.U.) * Whole document *	1,4	
D,A	US-A-4 044 179 (HAAS) * Whole document *	1	
D,A	GB-A-2 087 959 (TOMARIN) * Page 1, line 48 - page 3, line 83; figures 2,3 *	1,4,5	
A	STRASSE UND VERKEHR, vol. 69, no. 1, January 1983, pages 15,16, Zürich, CH; "Le renforcement des matériaux granulaires avec des fils continus" * Page 16 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.4) E 01 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-11-1984	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

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