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(54) Device and method for the consolidation of grass sward

(57) A device is described for the consolidation of the grass sward of ground used for sporting activities or otherwise subject to intense trampling and wear, including a net of non-degradable plastics material disposed parallel to the surface of the ground at a depth of 5-8cm (5). The method can include another two nets disposed parallel to the surface of the ground at respective depths of 1-2cm (7) and 11-18cm (3).

In addition a method is described for the consolidation of the aforesaid sward comprising the introduction into the said ground of at least one net (5) of non-degradable plastics material, disposed parallel to the surface of the ground.

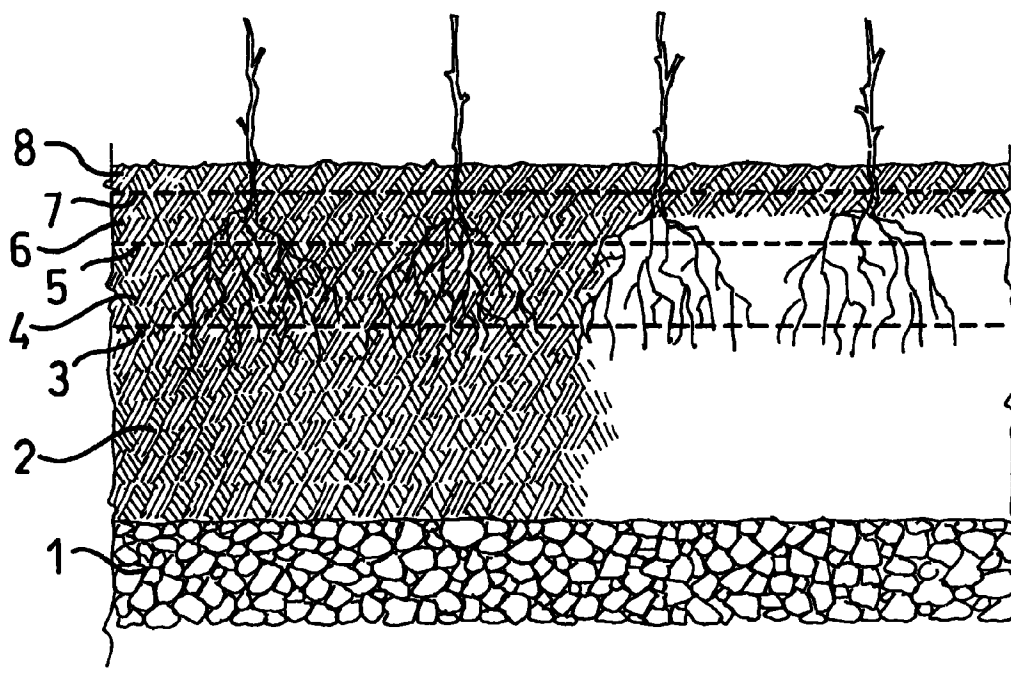


FIG.1

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Description

The present invention relates generally to the provision of grass sward for surfaces used for sporting activities, such as, for example, golf, football, rugby, horseriding, horse-racing, polo etc or for public parks and gardens or for grassed parking places for motor cars.

In particular the invention relates to a device and a method for consolidating the surface layer of grass swards of the above type, in which layer the seed is sown and the grass plants take root, and which is commonly known as the "nutritive layer" or "substratum".

It is known that sports fields comprise a deep drainage layer, in general consisting of stones, gravel, broken bricks and coarse sand, having a system of perforated tubes for collecting and carrying away excess water.

Over the drainage layer is a nutritive layer having a thickness of approximately 20-40cm, consisting principally of a mixture of peat and sand. The grass plants are sown and form roots within the aforesaid nutritive layer, and fertilisation of this nutritive layer through the surface and operations of rolling, watering etc are performed at appropriate times (for example, see Mario Vietti, "Il prato ornamentale", De Agostini, 1991).

Likewise it is known that currently the quality of the grass sward on sports fields tends to deteriorate inexorably within only a few years, particularly regarding the resistance of the plants to trampling and uprooting.

The causes of this deterioration in quality are to be found in the progressive compaction of the nutritive layer which impedes the deep rooting of the plants and, consequently their firm anchorage in the ground.

In its turn the compaction of the nutritive layer is due to the different specific gravities of the two fundamental consistent components, peat and sand. The latter, being heavier, tends to form a sediment which forms a deep and heavily compacted layer and which prevents the roots of the grass plants and also the nutritious substances delivered by means of fertilisers applied to the surface from penetrating deeply.

Consequently, the roots of the grass plants increasingly tend to become orientated parallel to the surface of the ground.

Owing to the lack of deep development of the roots, the plants are poorly anchored in the ground and therefore offer insufficient resistance to mechanical stresses such as trampling and abrasion, tending to be uprooted easily.

The problem on which the present invention is based is to increase the above-mentioned resistance to mechanical stresses of the grass plants in grounds used for sporting purposes, or otherwise subject to heavy use and wear.

This problem is resolved according to the invention by a device for consolidating the grass sward of grounds used for sporting purposes or otherwise subject to heavy use and wear, characterised in that it comprises

at least one net of non-degradable plastics material introduced into the ground, parallel to its surface.

The aforesaid device includes preferably a net of non-degradable plastics material disposed parallel to the surface of the ground at a depth of 5-8cm.

The mesh of the aforesaid net is preferably square or rectangular, and is 5 to 13mm in size.

Preferably the aforesaid net is of a material chosen from the group consisting of polypropylene, nylon and polystyrene.

In a preferred embodiment of the invention, the device further includes a net of the same material disposed parallel to the surface of the ground at a depth of 1-2cm.

Advantageously, the device according to the invention further includes a net of the same material disposed parallel to the surface of the ground at a depth of 11-18cm.

In forming the device of the invention the nets can be used directly in the pieces provided by the manufacturers without any preliminary cutting to size.

The present invention also relates to a method for consolidating the grass sward of grounds used for sporting purposes or which are otherwise subject to heavy use and wear, characterised in that it comprises the introduction into the said grounds of at least one net of a non-degradable plastics material, disposing said nets parallel to the surface of said grounds.

Preferably, the method according to the invention comprises the steps:

- removing the surface layers of said ground to expose the drainage layer,
- depositing a first nutritive layer to a thickness of 16-40cm over said drainage layer,
- covering the said first nutritive layer with a net of non-degradable plastics material,
- depositing over the said net a second nutritive layer to a thickness of 4-6cm,
- sowing grass seed on to the said second nutritive layer,
- depositing a third nutritive layer to a thickness of 1-2cm.

Preferably, in performing the method of the invention, before depositing the said third nutritive layer, the second nutritive layer is covered with a further net of non-degradable plastics material.

In an alternative embodiment, the method according to the invention comprises the steps of:

- depositing a first nutritive layer to a thickness of 10-30cm over the drainage layer of said sites,
- covering the said first nutritive layer with a first net of non-degradable plastics material,
- depositing over the said first layer a second nutritive layer to a thickness of 6-10cm,
- covering the said second nutritive layer with a second net of non-degradable plastics material,

- depositing over the said second net a third nutritive layer to a thickness of 4-6cm,
- sowing grass on to the said third nutritive layer,
- depositing a fourth nutritive layer to a thickness of 1-2cm.

The device and method according to the invention allow a significant increase in the resistance of grass plants to mechanical stresses such as, for example, trampling by horses hoofs, or by rugby or football players etc, since they use a net which offers a support to which the roots can attach themselves, therefore firmly anchoring the plants' roots to the net and, indirectly, to the ground.

When a device according to the invention is used comprising a net placed just above the seed, as well as obtaining the effect described above, there is also a protective effect on the neck of the grass plants, ensuring the regeneration of aerial parts of the plant that could possibly be damaged.

The greatest anchorage and protection effect occurs when the device comprises three nets at the distances specified above.

It should be noted that the device according to the invention allows the execution of the usual spiking and "verticut" operations aimed at increasing the permeability and aeration of the ground, in that the net can easily be pierced by the spiking apparatus and the "verticut".

The device and the method according to the invention can be embodied advantageously utilising a composition described in a patent application by the same applicant, having the same filing date as the current application, as the nutritive layer, rather than the traditional mixture of peat and sand. Such a nutritive layer composition comprises, in parts by volume, 40%-80% volcanic gravel and 20-60% a green vegetable compost.

Further advantages of the device and the method according to the invention will become evident from the following illustrative and non-limitative examples given with reference to the accompanying Figure 1. The aforesaid drawing schematically represents the device according to the invention in section.

EXAMPLE 1

The surface layers of the ground of a football pitch are completely removed so as to uncover the underlying drainage layer.

Over one of the two halves of the field, from now on called "field half 1" the nutritive layer is reconstituted by depositing on to the drainage layer a mixture in equal parts by volume of black peat of the "Russian" type, and sand to a thickness of 33cm.

In the other half of the field ("field half 2") a mixture of black peat and sand in equal parts by volume is deposited on to the drainage layer 1 to a thickness of 20cm, levelling with a mechanical leveller.

Over this first layer 2 is stretched a net 3 of polypropylene having a rectangular mesh with a mesh size of

10mm x 12mm of the "ORTOMAGLIA" type distributed by the company Tenax S.p.A. and provided in pieces 500m in length and 2m in width (weight per square metre = 12.0g), so as completely to cover the aforesaid layer.

A second layer 4 of the mixture of sand and peat is then deposited to a thickness of 8cm. After having levelled the aforesaid second layer, it is covered with a second net 5 identical to the preceding one.

Then a third layer 6 of the aforesaid mixture is deposited to a thickness of 5cm, and after having levelled it, it is covered with a third net 7 identical to those preceding it.

Seed is then sown directly over the third net using a mixture consisting of *Festuca arundinacea*, *Agropyron repens*, *Festuca ovina*, *Agrostis gigantea* and *Lolium perenne* in equal parts.

The sowing is also effected in field half 1.

Once the sowing is complete, the seeds are covered with a layer 8 1.5cm thick of the sand and peat mixture and it is then watered and fertilised in the conventional way.

After about 20 days the grass plants start to develop; the growth is controlled and assisted by periodic watering and fertilising according to customary agricultural practices.

After three months the football pitch is used for training and football matches for an average of four hours per day for a period of two months.

After such a period, it is apparent that the grass sward of the second half of the field is in better condition than that of the first half, especially in the zones of maximum trampling and use, such as in the penalty area.

In particular, while field half 1 shows some areas that are completely without grass, in field half 2 only a slight thinning of the lawn in some parts of the penalty area is seen.

EXAMPLE 2

The surface layers of the ground of a horse riding field are completely removed so as to expose the underlying drainage layer. On the latter a 26cm thick nutritive layer is deposited of the following composition, in parts by volume:

Volcanic gravel	43.997
Green vegetable compost	20
Pumice sand	10
Granular pumice	8
Silt	10
Manure	8
Bone meal	0.002
Chemical fertiliser	0.001

After levelling, a polypropylene net with a rectangular mesh 6mm x 8mm is stretched over this first layer so as to cover it completely.

On this first net another nutritive layer of the same composition as described above is deposited, with a thickness of 6cm, levelling in the normal way.

This second layer is covered with a second net identical to the preceding one, and on this second net the same seed mix as in the preceding example is sown, covering this with a 1.5cm thick layer of the composition described above.

Finally, watering, fertilisation and similar conventional treatments are performed in the same way as the preceding example.

Also in this case, the sward that develops after sowing shows excellent characteristics of resistance to trampling and to use during a period of three months constant use for an average of three hours a day.

EXAMPLE 3

The surface layers of ground of a green area suitable for parking are completely removed so as to expose the underlying drainage layer. Upon this a 25cm thick nutritive layer of the following composition is deposited, with parts by volume:

Volcanic gravel	50
Green vegetable compost	20
Pumice sand	10
Pumice granules	10
Manure	8.9968
Bone meal	0.003
Chemical fertiliser	0.0002

After levelling, a nylon 6.6 net with a mesh of 8mm square is stretched over this first layer so as to cover it completely.

On this net another nutritive layer of the composition described above 6cm thick is deposited, levelling in the conventional way.

On to this second layer the same seed mixture as the preceding example is sown, covering this with a layer of the aforesaid composition to a thickness of 1.5cm.

Finally, watering, fertilising and similar conventional treatments are carried out in a manner analogous to that described in example 1.

In this case also, the sward which develops following seeding shows excellent characteristics of resistance to mechanical stresses and to compression caused by vehicles in movement or at rest.

Claims

1. A device for the consolidation of grass sward used for sporting activities or subject to intensive trampling and wear, characterised in that it comprises at least one net of non-degradable plastics material introduced into the ground, parallel to its surface.
2. A device according to Claim 1, characterised in that it comprises a net of non-degradable plastics material disposed parallel to the surface of the ground at a depth of 5-8cm.
3. A device according to Claim 2, characterised in that the said net has a square or rectangular mesh of 5 to 13mm.
4. A device according to Claim 3, characterised in that said net is of a material chosen from the group consisting of polypropylene, nylon and polystyrene.
5. A device according to any of claims 2 to 4, characterised in that it further comprises a net of the same material disposed parallel to the surface of the ground at a depth of 1-2cm.
6. A device according to Claim 5, characterised in that it further includes a net of the same material disposed parallel to the surface of the ground at a depth of 11-18cm.
7. A method for the consolidation of a grass sward of grounds used for sporting activities or otherwise subject to intense trampling and wear, characterised in that it comprises the introduction into said grounds of at least one net of non-degradable plastics material, disposing said net parallel to the surface of said grounds.
8. A method for the consolidation of a grass sward of ground used for sporting activities or otherwise sub-

ject to intense trampling and wear, including a drainage layer, characterised in that it comprises the steps of:

- removing the surface layers of said ground so as to expose the said drainage layer, 5
- depositing a first nutritive layer of 16-40cm in thickness on said drainage layer,
- covering the said first nutritive layer with a net of non-degradable plastics material, 10
- depositing on the said net a second nutritive layer of 4-6cm in thickness,
- sowing grass seed on the said second nutritive layer, and
- depositing a third nutritive layer 1-2cm in thickness. 15

9. A method according to Claim 8, characterised in that before depositing the said third nutritive layer, the second nutritive layer is covered with a further net of non-degradable plastics material. 20

10. A method for the consolidation of the grass sward of ground used for sporting activities or otherwise subject to intense trampling and wear, including a drainage layer, characterised in that it comprises the steps of: 25

- removing the surface layers of the said ground so as to expose the said drainage layer, 30
- depositing a first nutritive layer 10-30cm in thickness on a drainage layer of the said ground,
- covering the said first nutritive layer with a first net of non-degradable plastics material, 35
- depositing on to the said first net a second nutritive layer 6-10cm in thickness,
- covering the said second nutritive layer with a second net of non-degradable plastics material, 40
- depositing on the said second net a third nutritive layer 4-6cm in thickness,
- then sowing grass seeds on to the said third nutritive layer, and
- depositing a fourth nutritive layer 1-2cm in thickness. 45

11. A method according to any of claims 7 to 10, characterised in that the said net has a square or rectangular mesh of a size 5 to 13mm. 50

12. A method according to Claim 11, characterised in that said net is made of a material chosen from the group consisting of polypropylene, nylon and polystyrene. 55

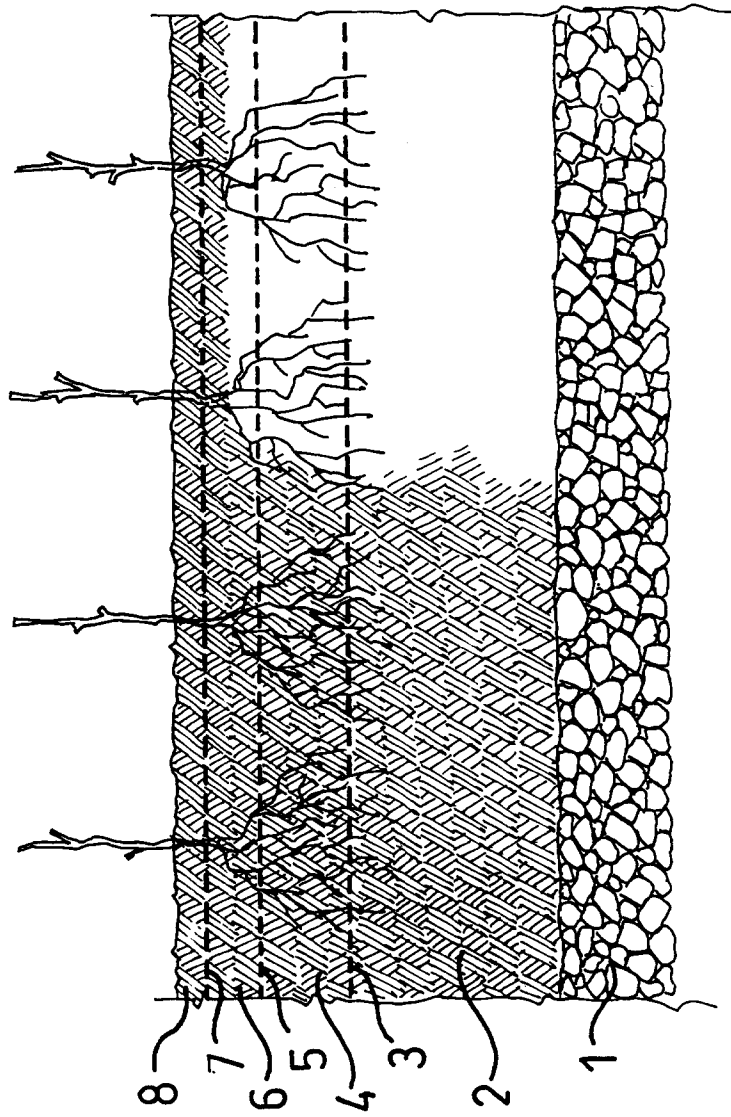


FIG.1



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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0140

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.6)
X	US-A-4 023 506 (ROBEY MELVIN J) 17 May 1977	1-4, 7, 11, 12	E01C13/08
A	* the whole document * ---	5, 8, 10	
X	EP-A-0 322 090 (ROYAL HONG KONG JOCKEY CLUB ; NETLON LTD (GB)) 28 June 1989	1-3, 7, 11	
A	* the whole document * -----	5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E01C A01C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 September 1995	Examiner Dijkstra, G
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