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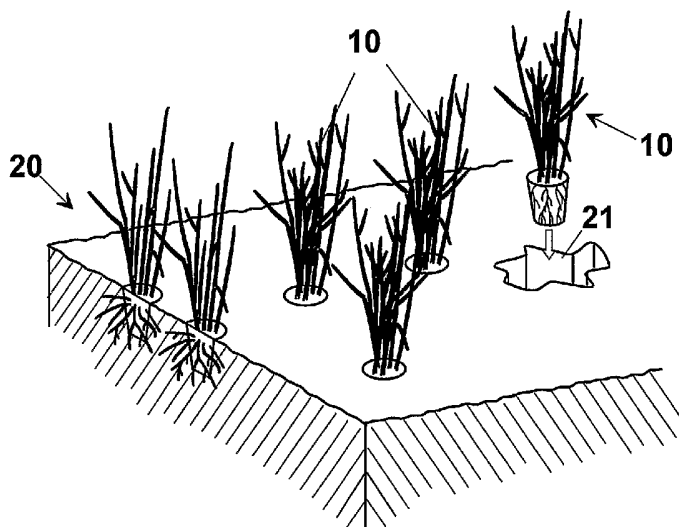
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(54) Title: METHOD FOR MAKING A TURF



(57) Abstract: The method for making a turf provides a seedling tray (1), for example, of plastic material, having a plurality of cells (5) having flaring or prismatic shape. Each cell (5) has a hole (6) at the basis (7) suitable for outflow of the irrigation water throughout cultivation of the plant species. In particular, the method provides the introduction in each cell (5) of a measured amount of growth substrate (13) containing the nutritive substances necessary to ensure the development of a seedling (10) of herbaceous species ready for being planted in a plantation site (20), once achieved a suitable maturation. The seedling (10) can be obtained starting from seeds (16), or alternatively, starting from parts of plants. The cultivation in the seedling tray (1) carried out starting from parts of plants is particularly advantageous in case seeds are not available of the chosen grass species, for example in case of hybrid species.

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TITLE

METHOD FOR MAKING A TURF

DESCRIPTIONField of the invention

5 The present invention relates to a method for making a turf for sporting, recreational or ornamental purposes. For example, a turf according to the invention can be used as a surface on which to play sports like golf, soccer, tennis, hockey, football, athletics, rugby, baseball and
10 other sports that require turf fields, as well as for ornamental use.

Background of the invention

Traditional systems are well known for making turfs that provide a preliminary step of working the ground
15 (ploughing, digging, milling) and refining it with complementary work (harrowing) and rolling it in order to provide an optimal sowing bed. A step follows of creating a turf chosen among direct sowing, transplanting parts of plants, laying turf sods or providing rolls of ready-to-
20 lay turf. However, such methods have different drawbacks, as outlined below.

In case of direct sowing, various are the risks of failure of the operation, among which predation by birds and ants or lose the seeds in case of storms. Furthermore,
25 the seeds germinate with difficulty when water availability is low or the temperature extreme. The young seedlings that germinate from the seeds can be, in the first stages, affected by fungus pathologies. Furthermore, many good varieties of species for turfs are not
30 reproducible from seeds.

In case of use of parts of plants, for example stolons, their conservation is troublesome, and their transportation requires refrigeration. In addition, the stolons have to be spread on the ground and readily filled

up with earth and watered frequently.

The technique that provides laying turf sods requires long time of completion and the final turf is not planar for the presence of relief zones at the sods.

5 The use of rolls of turf that cover completely the ground has the advantage that the turf is ready to use but the method is expensive, because soil has to be removed from the ground of cultivation, and the receiving ground has to be cleaned from vegetation as well as a preparation
10 work thereof is necessary.

Furthermore, techniques exist for cultivation into moulds of not grassy plants and ground cover plants with exclusively ornamental function. These plants once grown up to a predetermined size are planted on flowerbeds,
15 usually in private or public gardens. These techniques of cultivation are, however, suitable only to particular types of plant species, owing to long time required before having adequate sprouting on the plantation site. For this reason, ground cover plants cannot be used when they are
20 subject to walking and wearing action, such as surfaces of sport fields that require to be ready and available for playing in a short time.

One of the problems met in regenerating turfs is that the starting ground is a firm ground. Effective
25 methods do not exist, in particular, for regenerating turfs directly on firm ground, since it is necessary to till the exhausted parts and sowing them again, causing the whole surface of the turf to be unavailable for all the time.

30 Summary of the invention

It is therefore a feature of the present invention to provide a method for making a turf capable to overcome the difficulties of the prior art.

It is another feature of the present invention to

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provide a method for making a turf to assist the operations of carrying and planting desired plant species on a final site.

It is also a feature of the present invention to provide a method for making turfs capable to avoid the production of weeds on the ground that is going to receive desired plant species.

It is another feature of the present invention to provide a method for making turfs for putting desired plant species on a plantation site, also on firm ground and without the need to carry out preliminary work also in case of ground treated with herbicidal, cleared from weed, or subject to other treatments.

It is still a feature of the present invention to provide a method for making a turf that can be carried out even with bad weather.

These and other objects are achieved with the method for making a turf, according to the present invention, comprising the steps of:

- 20 - prearranging a seedling tray having a plurality of cells;
- introducing a measured amount of growth substrate in said cells;
- arranging at least one seed or plant portion of a plant species into the growth substrate of each cell;
- 25 - raising in each cell at least one seedling provided with a root plug developed in the substrate forming a melded root plug with shape corresponding to the cell;
- 30 - carrying out a transplantation and vegetative propagation on the plantation site of said at least one seedling along with its melded root plug, wherein the plant species belongs to a family of

herbaceous plants.

Preferably, the plant species is selected from the group comprised of: the following plants, or families of herbaceous plants:

- 5 - Graminaceae,
 - Convolvulaceae, in particular, *Dichondra repens*.
- Preferably, the graminaceae are chosen among;
- Stoloniferous plants,
 - Rhizomatous plants,
 - 10 - Cool-season grasses, in particular, *Lolium perenne*, *Poa pratensis*, *Festuca arundinacea*,
 - Warm-season grasses, in particular, *Cyanodon dactylon*, *Zoysia japonica*, *Paspalum vaginatum*.

Preferably, the maximum width of the melded root
15 plugs is set between 1 mm and 10 cm, and, in particular, the melded root plugs may have a maximum width set between 5 mm and 5 cm.

Advantageously, the height h of each melded root
plug is set between 1 mm and 10 cm, and, in particular,
20 the height of each melded root plug is set between 5 mm and 5 cm.

In a preferred embodiment, the step of arranging at
least one seed on the growth substrate provides the step
of making at least one impression on the substrate at
25 which the seed is arranged.

In particular, on the surface of the substrate a
plurality of spaced impressions are made, for example
arranged along a circumference of predetermined diameter.

Advantageously, the vegetative propagation of the
30 plant species is carried out by stolonization.

Preferably, the growth substrate can be selected
from the group comprised of:

- organic material, in particular, peat, coconut, compost,

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- agricultural waste,
- inorganic material, in particular, volcanic rock, pumice, zeolite, vermiculite or perlite,
- mixture between organic material and inorganic material.

Preferably, in case of arranging seeds in the cells, a preferred ratio between the number of seeds and the maximum width (cm) of the melded root plugs is set about 1 to 2.

Advantageously, in case of arranging parts of plants in the cells the following steps are provided:

- breaking a plant into a plurality of plant portions;
- mixing said plurality of plant portions with soil or other substrate obtaining a mixture substrate-plant portions;
- distributing the mixture substrate-plant portions in the cells.

Preferably, the vegetative propagation is selected from the group comprised of:

- hand planting,
- machine planting,
- planting on firm ground,
- planting on worked ground,
- scatter planting,
- row planting.

Preferably, in case of scatter planting a step is provided of distributing seedlings with their melded root plugs on the surface of the plantation site with or without a step of filling them with earth.

This type of vegetative propagation, similar to scatter seeding, allows the use of hybrid species, for which seeds are unavailable, and is particularly indicated

in case of stoloniferous plants, or rhizomatous plants.

The method for making turfs as above described offers, furthermore, a vegetative propagation without preliminarily working the ground. The seedlings obtained
5 by means of cultivation in the trays can be easily transported and stored by means of cryogenic systems, partially dehydrated, vacuum stored, stored in a refrigerator, or by a combination of such techniques.

Brief description of the drawings

10 The method according to the invention will now shown with the following description of an embodiment thereof, exemplifying but not limitative, with reference to the attached drawings wherein:

- figure 1 shows diagrammatically a perspective view of a
15 possible embodiment of a seedling tray that can be used for carrying out the method for making a turf, according to the present invention,
- figure 2 shows the seedling tray of figure 1 in a cross sectional view according to arrows II-II,
- 20 - figure 3 shows diagrammatically a perspective view of an alternative exemplary embodiment of the seedling tray of figure 1,
- figure 4 shows the seedling tray of figure 3 in a cross sectional view according to arrows IV-IV,
- 25 - figure 5 shows the seedling tray of figure 1 in a cross sectional view showing diagrammatically some of the steps of the method according to the invention,
- figure 6 shows a perspective elevation front view of a seedling raised in the seedling tray of figure 1,
- 30 - figure 7 shows a perspective elevational front view of a tool that can be used to impress a substrate surface for seeds according to the invention,
- figure 8 shows diagrammatically a perspective view of a plurality of holes made by the tool of figure 7,

- figure 9 shows a cross sectional view of the profile of the substrate after the use of the tool of figure 8,
- figure 10 shows diagrammatically a perspective view of a possible type way of planting step of the seedling of
5 figure 6 in a plantation site,
- figure 11 shows diagrammatically a perspective view of a possible vegetative propagation step for laying on the ground the seedlings;
- figure 12 shows diagrammatically a perspective view of
10 a step of scattering the seedlings with their melded root plugs alternative to that of figure 11.

Description of a preferred exemplary embodiment

With reference to figures from 1 to 4, the method for making a turf, according to the invention, provides a
15 seedling tray 1, for example of plastic material. It has a plurality of cells 5 having flaring shape (figures 1 and 2), or alternatively, prismatic shape (figures 3 and 4). Each cell 5 has a hole 6 on a basis 7 suitable for allowing irrigation water to flow away throughout
20 cultivation of plant species.

In particular, the method for making turfs provides the introduction in each cell 5 a measured amount of growth substrate 13 containing nutritive substances necessary to raise a seedling 10 of herbaceous species
25 ready for being planted in a plantation site 20, once achieved a desired maturation. Seedlings 10 can be obtained starting from seeds 16, or alternatively, starting from parts of plants. The cultivation in the seedling tray 1 carried out starting from parts of plants
30 is particularly advantageous when seeds of the plant are unavailable, for example in case of hybrid species.

Some substances used as growth substrate 13 comprise organic material, such as peat, coconut, compost, agricultural waste, or inorganic material, for example

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volcanic rock, pumice, zeolite, vermiculite, perlite, or a mixture thereof.

Once achieved a maturation of seedlings 10 they are planted in a desired plantation site 20. A seedling 10 of herbaceous species ready for transplantation has a root 11 grown as a melded root plug 15. Root 11 allows the seedling 10 to adapt even in a ground not much worked and with weather that would be unfavourable for other types of plants. This assists, in particular, the conversion of turfs having cool-season grasses into turfs having warm-season grasses without the need of working the ground. Seedlings 10 are planted in a plantation site 21 made in the ground 20 (figure 10). The use of melded root plugs 15 allows concentrating nutritive substances without scattering them on a wide area, as it is necessary instead for other grass cultivation systems. This way, the risk is avoided of creating conditions that promote the growth of weeds around the cultivated species. The seedlings 10 can be manipulated like large seeds and then can be planted with classic methods used for seeds like scatter planting or row planting or single seedling planting.

In particular, to assist the manipulation, the seedling can be cut, leaving mainly the melded root plug and a short cropped seedling protruding therefrom. Once in the ground, owing to its herbaceous nature, the vegetative propagation of the melded root plug occurs very quickly.

A seedling 10 can be obtained starting from a seed 16 that sprouts and is raised up to a desired maturation. Alternatively, it is possible to start from parts of plants put in a growth substrate 13 (figure 5).

In case of use of seeds 16 a special substantially frustumconical instrument 50 can be used having openings 51 where the seeds 16 come out. The seeds are, this way, spread at a measured distance from one another on the

surface of the substrate in order not to interfere with one another while sprouting and growing up to becoming a seedling.

In particular, the melded root plug 15 of seedling 5 10 provides a maximum width d comprised in a range between 1 mm and 10 cm, and a height h set between 5 mm and 5 cm. Such size of root plugs 15 ensures to store enough nutrients and at the same is small and easy to transport. The seedlings 10, furthermore, owing to their minimum 10 encumbrance can be easily stored by traditional methods such as refrigeration, dehydration, vacuum storage, so that they can be used in different time and places.

Plant species particularly suitable for being cultivated with the method according to the invention are 15 graminaceae, both cool-season grasses, such as *Lolium perenne*, *Poa pratensis*, *Festuca arundinacea*, and warm-season grasses, such as *Cyanodon dactylon*, *Zoysia japonica*, *Paspalum vaginatum*, etc.

These plant species are in particular, suitable for 20 a vegetative propagation by means of rhizomes or stolons, according to the invention. In figure 11 for example a vegetative propagation step is diagrammatically shown starting from a few seedlings 10, or plant portions, scattered on ground 20, thus covering the whole surface by 25 means of stolonization, i.e. pressing the stolons on the ground, for example by means of special machines having rollers.

Another technique of vegetative propagation that does not provide instead any preliminary work on the 30 plantation site 20 is shown in figure 12. It provides distributing the seedlings with their melded root plugs 30 on the surface of the plantation site 20. This distribution can be executed either manually or with the aid of agricultural machines 80, for example comprising a

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centrifugal drum 85. This type of vegetative propagation, similar to scatter seeding, is quick and simple to carry out, and provides a rapidity of propagation, even with adverse environmental conditions, thanks to the adopted
5 plant species. Furthermore, the method above described can be used for cultivating hybrid species, for which seeds are not available, by using plant portions thereof.

The foregoing description of a specific embodiment will so fully reveal the invention according to the
10 conceptual point of view, so that others, by applying current knowledge, will be able to modify and/or adapt for various applications such an embodiment without further research and without parting from the invention, and it is therefore to be understood that such adaptations and
15 modifications will have to be considered as equivalent to the specific embodiment. The means and the materials to realise the different functions described herein could have a different nature without, for this reason, departing from the field of the invention. It is to be
20 understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

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CLAIMS

1. Method for making a turf for sporting, recreational or ornamental purposes, **characterised in that** it comprises the steps of:
- 5 - prearranging a seedling tray having a plurality of cells;
- introducing a measured amount of growth substrate in said cells;
- arranging at least one seed or a plant portion
10 plant portion of a plant species, into the growth substrate of each cell;
- raising in each cell at least one seedling resulting therefrom provided with a root plug developed in said substrate forming a melded root plug
15 with shape corresponding to said cell;
- carrying out a plantation and vegetative propagation of at least one seedling along with said melded root plug on a plantation site, wherein said plant species belongs to a family of
20 herbaceous plants.
2. Method, according to claim 1, wherein said plant species is selected from the group comprised of the following plants, or families of herbaceous plants:
- Graminaceae,
25 - Convolvulaceae, in particular, *Dichondra Repens*.
3. Method, according to claim 2, wherein said graminaceae are selected from the group comprised of:
- Stoloniferous plants,
 - Rhizomatous plants,
30 - Cool-season grasses, in particular, *Lolium perenne*, *Poa pratensis*, *Festuca arundinacea*
 - Warm-season grasses, in particular, *Cyanodon dactylon*, *Zoysia japonica*, *Paspalum vaginatum*.

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4. Method, according to claim 1, wherein the maximum width of said melded root plugs is set between 1 mm and 10 cm, and, in particular, have a maximum width set between 5 mm and 5 cm.
- 5 5. Method, according to claim 1, wherein said melded root plugs have a height set between 1 mm and 10 cm and, in particular, have a height set between 5 mm and 5 cm.
6. Method, according to claim 1, wherein said step of arranging said seeds on said growth substrate provides the step of making at least one impression in said substrate at which is arranged said seed, and, in particular, on the surface of said growth substrate a plurality of spaced impressions are made.
- 10
7. Method, according to claim 1, wherein said vegetative propagation of said plant species is carried out by stolonization .
- 15
8. Method, according to claim 1, wherein the growth substrate is selected from the group comprised of:
- organic material, in particular, peat, coconut, compost,
 - inorganic material, in particular, volcanic rock, pumice, zeolite, vermiculite or perlite,
 - a mixture between said organic material and said inorganic material.
- 20
9. Method, according to claim 1, wherein in case of arranging seeds in said cells, the ratio between the number of said seeds and the maximum width (cm) of said melded root plugs is set about 1 to 2.
- 25
10. Method, according to claim 1, wherein said step of arranging plant portions provides:
- breaking a plant into a plurality of plant portions;
- 30

- mixing said plurality of plant portions with soil or other substrate obtaining a mixture of substrate-plant portions;

5 - distributing said mixture of substrate-plant portions into said cells.

11. Method, according to claim 1, wherein said vegetative propagation is selected from the group comprised of:

- hand planting,
- machine planting,
- 10 - planting on firm ground,
- planting on worked ground,
- scatter planting,
- row planting.

Fig. 1

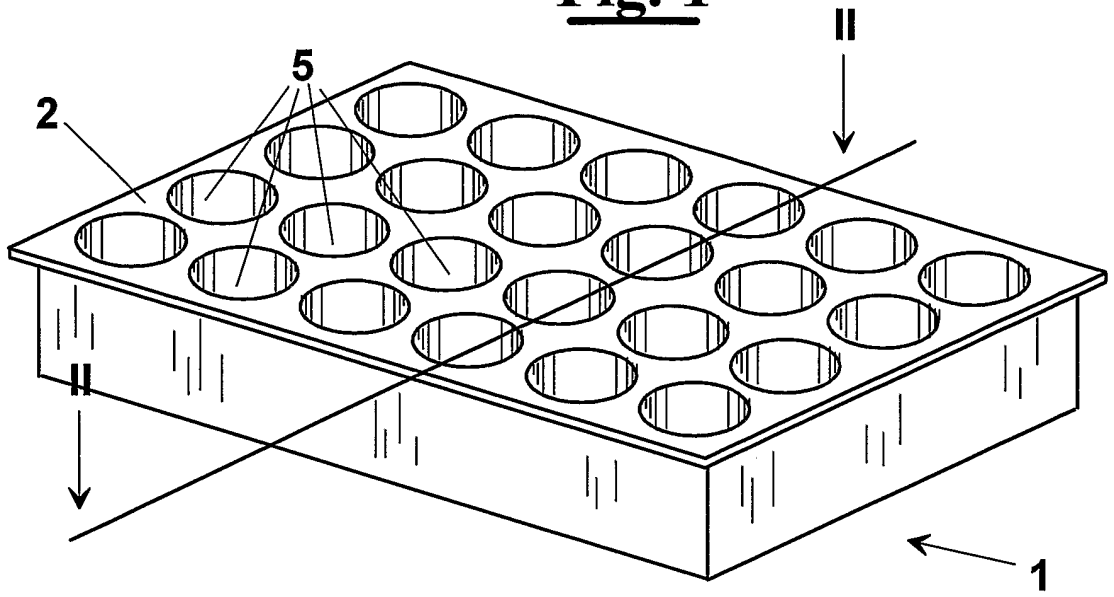


Fig. 2

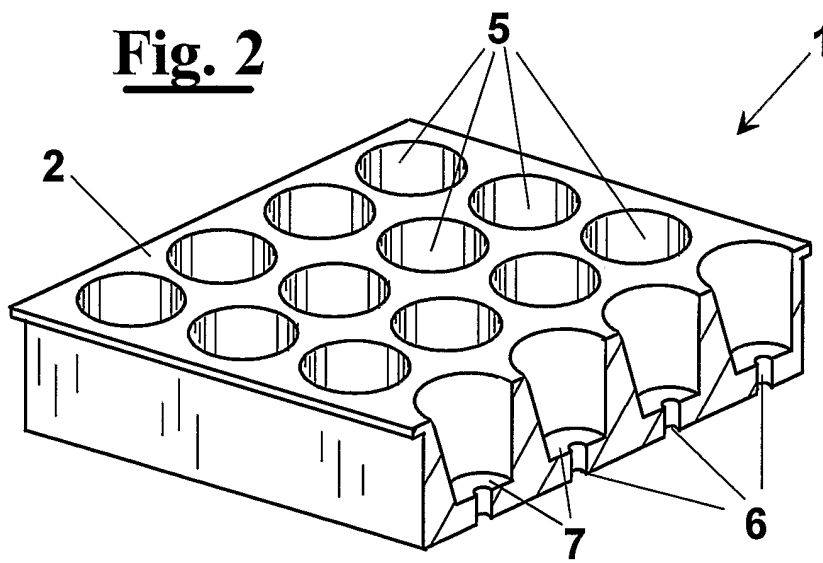


Fig. 3

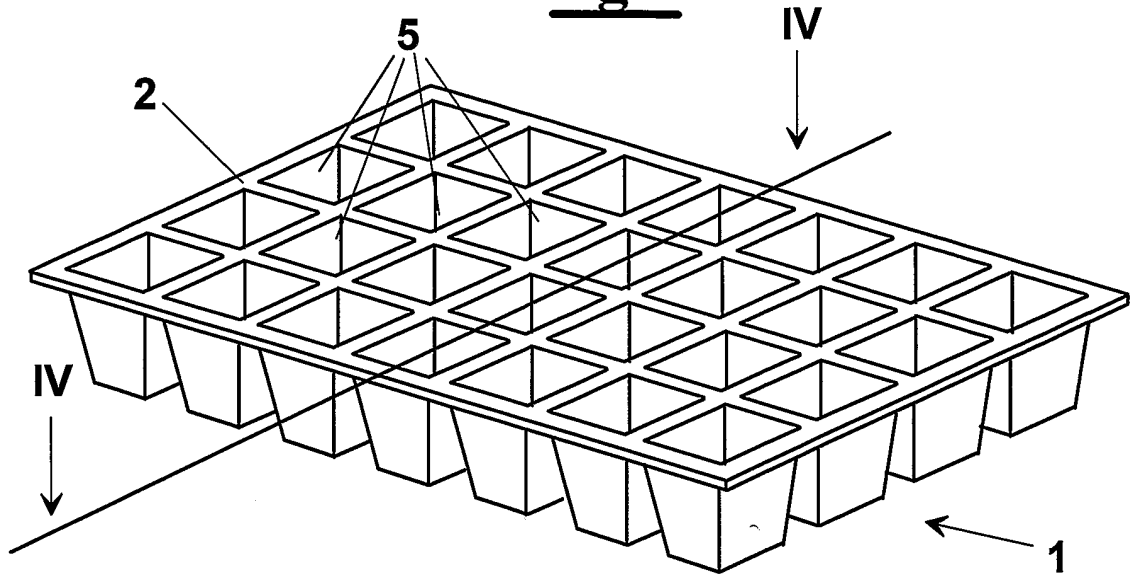


Fig. 4

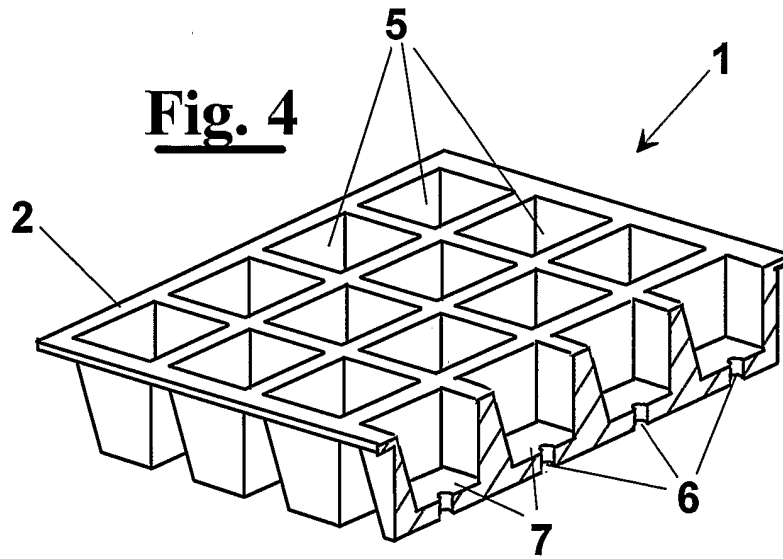


Fig. 5

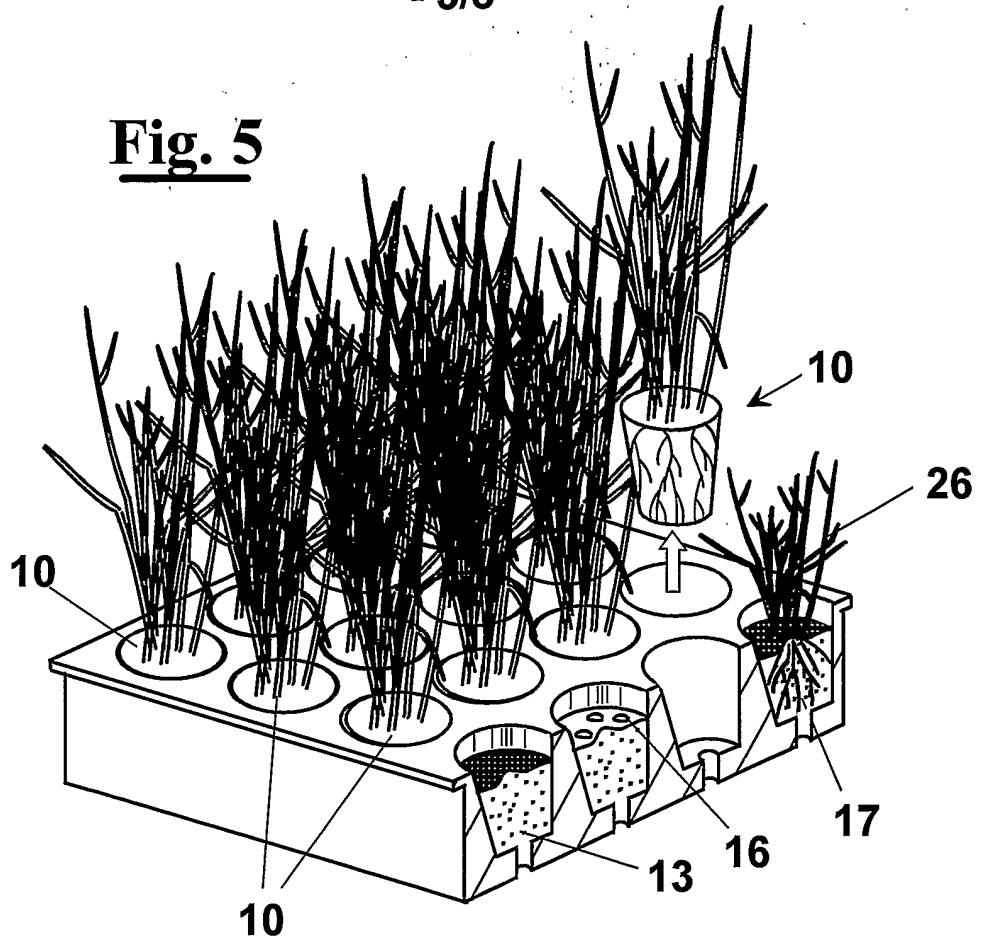


Fig. 6

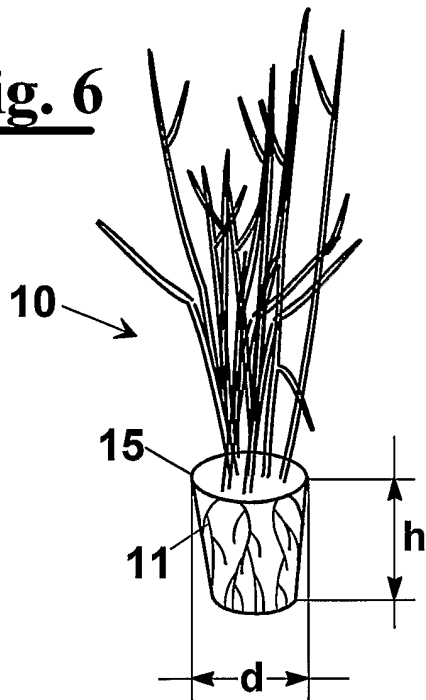


Fig. 7

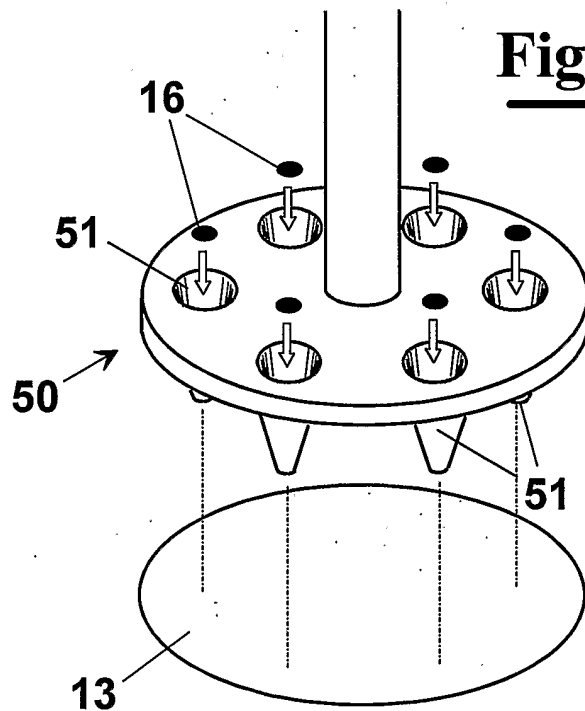


Fig. 8

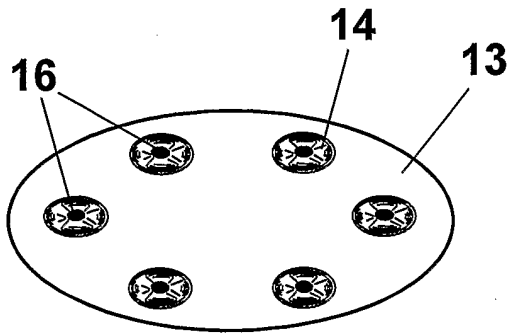


Fig. 9

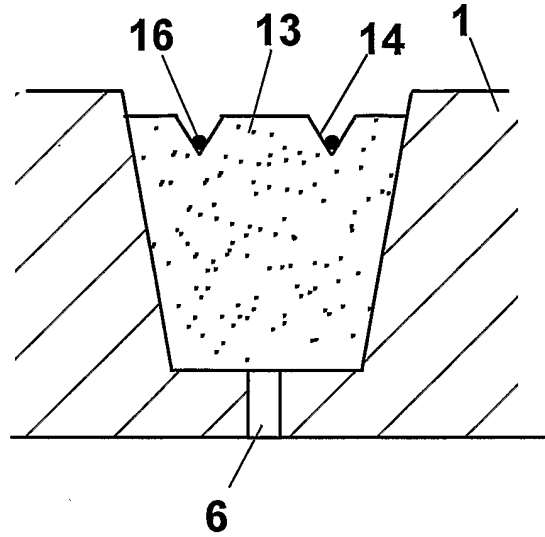


Fig. 10

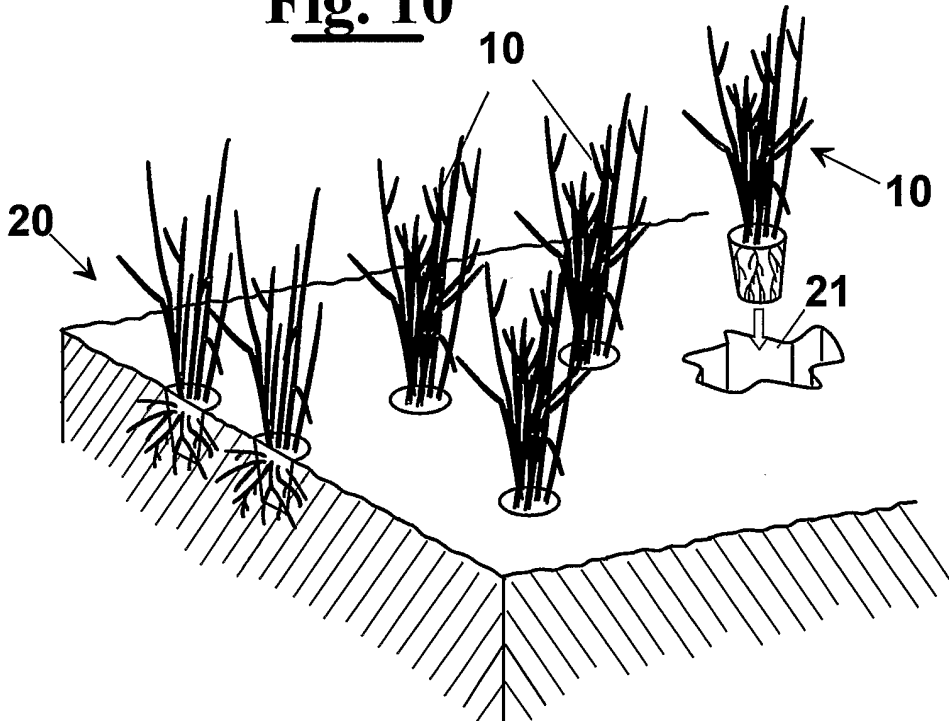


Fig. 11

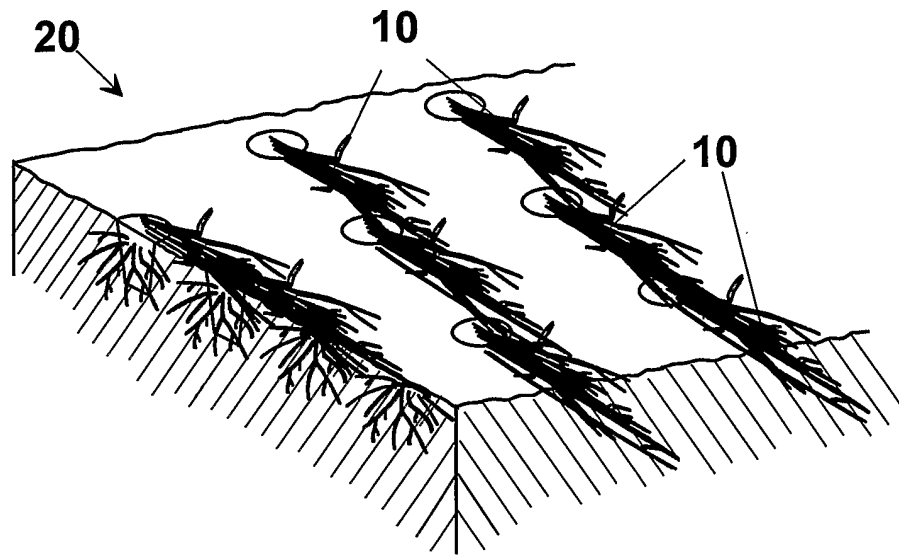
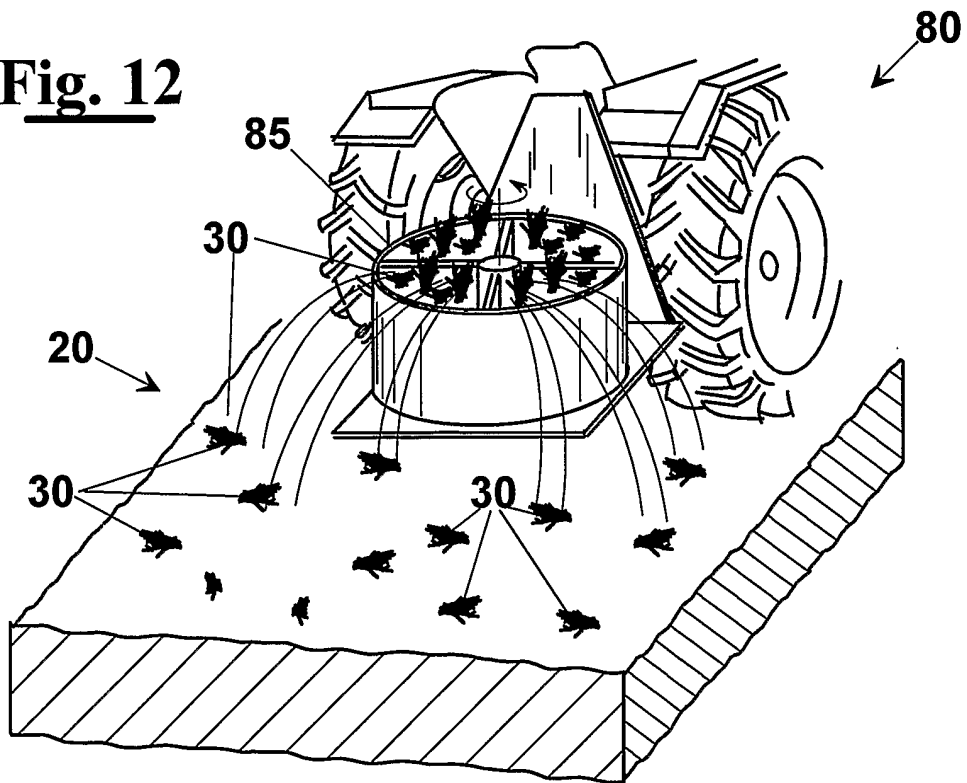


Fig. 12



INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2005/003000

<p>A. CLASSIFICATION OF SUBJECT MATTER A01G9/10 A01G1/00</p>		
<p>According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p>B. FIELDS SEARCHED</p>		
<p>Minimum documentation searched (classification system followed by classification symbols) A01G</p>		
<p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal</p>		
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 296 746 A (DAVID RACK) 15 November 1972 (1972-11-15) page 1, column 2, lines 72-76 page 2, column 2, lines 95-125 page 3, column 1, lines 27,28; figures	1-11
A	US 5 187 894 A (RIPLEY, SR. ET AL) 23 February 1993 (1993-02-23)	1-11
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<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.</p>		
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<p>Date of the actual completion of the international search 10 February 2006</p>		<p>Date of mailing of the international search report 20/02/2006</p>
<p>Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016</p>		<p>Authorized officer Claude1, B</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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