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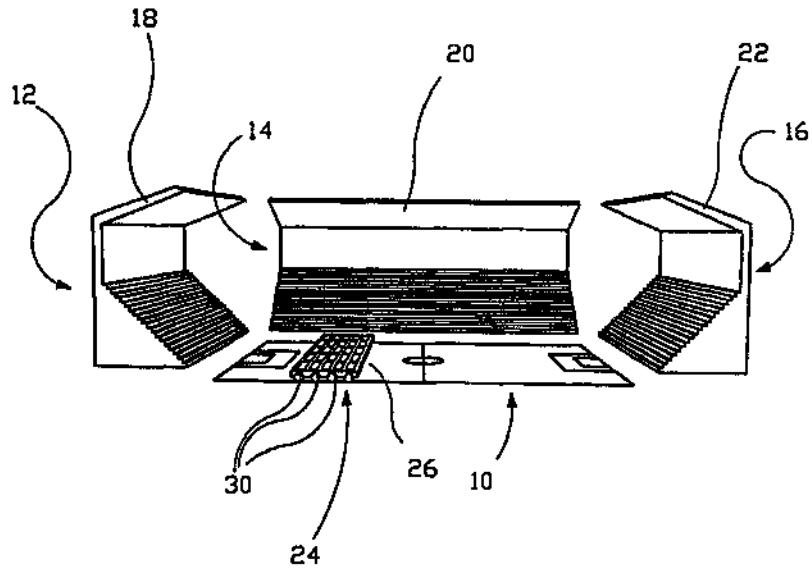
(54) Title: SYSTEM AND METHOD TO BENEFIT THE GROWTH CONDITIONS OF GRASS PLANTS ENTERED IN GRASS COURTS



(57) Abstract

A system for and a method of making growth and thriving conditions more favourable for grass plants in grass pitches of the type used as football pitches and for other sports, are described. The system and the method are especially intended to be put into use for treatment of grass pitches that are put partly in the shade by high, covered stands (12, 18; 14, 20; 16, 22). Another criterion for requiring additional lighting etc. is seasons with short days. This system for making growth/thriving conditions distinguishes itself by comprising and moving at least one lighting unit (24), preferably also having other functions (water/air supply, ventilation, lawn clean–up and more), so as to be able to exhibit the characteristics of a mobile greenhouse/hothouse.

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System and method to benefit the growth conditions of grass plants entered in grass courts.

This invention regards a system for and a method of making the growth conditions for grass and other grass pitch/lawn plants, for example clover, more favourable, which plants form part of grass pitches for sports and athletics purposes.

In particular, but not exclusively, the invention regards the growth conditions for grass and lawn plants that form the blanket of grass that is surrounded by towering stands that put large areas of the grass pitch in the shade. Football pitches with tall stands are particularly exposed to these types of conditions, which block the normal access of light to the pitch, inhibits growth and causes the growth conditions for the grass and the rest of the plants that form part of the lawn/pitch to deteriorate.

Such poor lighting conditions will inevitably result in a poor quality grass pitch. Shorter days reduce the general quality of the grass pitch, and the time of the poorest condition of football pitches must be reckoned to be from the

middle of December to the middle of February in the following year, at which time the weather conditions are also the least favourable for the plants of the turf. As a consequence, most European football leagues normally take a winter break during this two-month period, so as to ensure that the quality of the already poor grass pitches does not deteriorate any further.

A serious, large-scale attempt at solving the problems of keeping the grass pitch reasonably dry during periods of heavy rains is known, however it does not improve the growth conditions of the grass pitch in other respects. At the home ground stadium of the Ajax football club in Amsterdam, a mobile roof has been built which, when in the operative position, covers the entire area of the stadium, but even when the roof is retracted to the inoperative position, the tall stands cause the aforementioned deep shade that inhibits and partly prevents the grass from growing normally, at least across large parts of the pitch. Here, they have taken the consequences of the solution of one problem causing another, by replacing the entire turf twice a year. It is intended that the same, costly principle be used at the new, modern stadium in Coventry, which has been estimated to cost NOK 1.5 billion.

The "Amsterdam solution" is a very costly, and not least time consuming solution. Each time the turf is to be replaced, the stadium must be closed for approximately 2 months. Removing the blanket of grass that is to be replaced is time consuming and requires a lot of work, and laying the new grass is equally time consuming and demanding, almost regardless of the method used. In the Nordic countries, snow and adverse

temperature conditions will make it difficult to produce a replacement turf outside (or indoors) during the winter.

A primary object of the present invention has therefore been to make the growth and thriving conditions for natural grass pitch plants more favourable, so as to achieve a higher quality of grass pitch in general, and perfectly useful grass pitches in the wintertime in particular, referred to e.g. Nordic weather and temperature conditions. As the weather, temperature and not least lighting conditions in the Scandinavian countries are always considerably better, from the point of view of plant growth/thriving, in the summer half-year than in late autumn and in the winter, it will, through the system and method according to the invention, which will be used unaltered regardless of the time of year, be possible to achieve greater improvements relative to normal conditions in late autumn and during the winter than during the summer half-year. And this is exactly what is needed. High quality natural grass pitches that can be made available in the winter/early spring/late autumn will be invaluable when arranging among other things the well-known international football tournaments the UEFA Cup and the Champions League, in which, among others, Norwegian and other Nordic teams participate.

Said object is realised through the system and the method specified in the following Claims.

The system according to the invention comprises at least one displaceable light source-bearing unit that includes a frame with a low height, and which consequently extends essentially in the horizontal plane, where it from an inoperative ready position at a distance from a grass pitch for which the

system is provided, depending on its own area in the horizontal plane, can be brought to cover all of or a smaller percentage of the area of the grass pitch that is to be lit and possibly also treated in other ways by means of said system.

This light source-bearing unit that forms part of a system of preferably a plurality of such units, which in said inoperative position may interlock telescopically, or the units may be arranged in a space saving manner on top of each other, in both cases ready positions from which they can be moved to operative positions in which the light source-bearing units/frames singly cover their own share of the area of the grass pitch. A good storage space in the ready position for the system according to the invention would be underneath one of the stands or in some other place where the moving distance to the grass pitch is not too long.

The light source-bearing unit/frame is equipped with running wheels. If the lighting unit is of the embodiment preferred according to the invention, in which it is dimensioned with a width (in the direction of the width of the grass pitch) that slightly exceeds the width of the grass pitch itself, and with a length (in the longitudinal direction of the grass pitch) that constitutes only a fraction of the length of the grass pitch, for instance a fourth or a fifth of the length of the pitch, it is practical to arrange fixed, guiding running rails along the longitudinal edges of the pitch. For driving on these guide rails, the frame of the lighting unit is equipped with intermediary wheels with softer tires for running on top of the grass pitch itself.

In addition, the frame of the lighting unit, which frame forms the support for both types of wheels, is designed with holders for electrical light sources, preferably in the form of mains/electro aggregate operated fluorescent tubes.

The number and placing of the fluorescent tubes depend on the delivered wattage, and the amount of light per unit area that is considered to be the optimum in each case.

The frame of the lighting source can have a closed top, and reflectors may be arranged inside the box in order to maximise the utilisation of the light. The frame of the unit may be provided with downward/sideways projecting jets or other nozzles for directional jetting action of water and/or air.

In a preferred embodiment, the lighting unit/greenhouse described is provided with equipment for lighting, heating, ventilation, watering, aeration and possibly addition of soil improvement agents, sprays etc. The system according to the invention may be subordinated to process control that is known *per se*, based on the specific types of grass that form part of the grass mix of the grass pitch, and the prevailing climatic conditions.

In said preferred embodiment, in which the travelling greenhouse/lighting unit moves on wheels, the unit may be moved forward step by step, and may cover about ¼ of the area of the grass pitch in each operative position. When the entire grass pitch has been submitted to lighting and other treatment for a sufficient length of time and with sufficient intensity, the unit is retracted to the inoperative position. The movement that is guided by the longitudinal rails may be

implemented through use of powerful, electrically driven winches via wires, by means of electric motors or in another manner that is known *per se*.

An electrical aggregate or transmission station for electrical power placed outside one of the touchlines, by the middle of the grass pitch can, via a long, freely disposed cable, lead to a connection point in the lighting unit/greenhouse for supply of electrical power to the fluorescent tubes or other light sources, and to possible heating elements. A corresponding water and/or air hose may be connected to a pressurised water aggregate or a compressor for supply of water for watering and wind-imitating air respectively, via jets or other suitable nozzles provided in the framework of the unit.

A non-limiting example of a preferred embodiment of a system according to the invention comprises at least one travelling lighting unit or one mobile greenhouse/hothouse, which may possibly be divisible/collapsible. The invention is illustrated in the attached drawings, in which:

Figures 1 and 2 show the system according to the invention used in connection with a football grass pitch, which is surrounded by tall stands that prevent light from getting to the grass pitch covering in the normal manner, and where the stands put parts of the pitch in the shade, as;

Figure 1 shows the system in the inoperative ready position, where the travelling lighting unit/the mobile greenhouse (hothouse) in the arrangement shown is partly retracted underneath a stand, while

Figure 2 shows the travelling lighting unit in the operative position;

Figure 3 shows the football pitch (without the stands being shown) and the travelling lighting unit/greenhouse in the working position shown in Figure 2, and shows visible running wheels and power supply means that are suitable for this embodiment;

Figure 4 corresponds to Figure 3, but shows the lighting unit/greenhouse in a different working position;

Figure 5 shows details in a part drawing on an enlarged scale, where the lighting unit/greenhouse, in addition to lighting elements, exhibit watering and ventilation functions.

According to Figures 1 and 2, a football grass pitch 10 is surrounded by covered stands 12, 14 and 16 on three sides, as the fourth side may correspond to stand 14. These are modern, covered stands where the roof sections consist of freely projecting roof structures 18, 20 and 22 respectively, which shut out sun and light, and are the source of large areas of shade on the pitch 10 itself.

In order to favour the growth of the grass, particularly in those area that are most shaded, but also in order to promote in general the growth and thriving conditions for those grass plants and other lawn plants that form part of the mix of the blanket of grass, not least through those seasons when the days of sun and light are short, a system according to the invention has been developed to comprise at least one lighting unit 24. This lighting unit 24 may have those

properties one would wish for in a mobile greenhouse/ hothouse: Lighting, possible heating, as well as possibilities for watering, aeration, fertilisation, trimming etc. These functions of the travelling lighting unit/ greenhouse 24 will vary with the nature of the grass pitch, climatic conditions etc. As such, any extra, artificial heating will be superfluous e.g. in countries in southern Europe with a relatively high average temperature throughout the year, even though the need for extra lighting due to large, shadowing stands is great also in these countries.

In the embodiment shown, the lighting unit 24 that is built onto a low sectional frame 26 is constructed from light materials, so as to give it a reasonable weight in spite of a large area in the horizontal plane, which weight in this and other similar embodiments will not damage the grass pitch during the travelling along this.

In the embodiment shown, the lighting unit 24 has a lateral extent in the horizontal plane that slightly exceeds the width of the grass pitch 10, but an extent in the longitudinal direction of the pitch that may as an example correspond to $^1/_4$ to $^1/_6$ of the length of the pitch. It has previously been stated that the width and length of the lighting unit may vary within the scope of the invention. According to Figures 1 and 2, a storage space has been provided for the lighting unit 24 underneath one 12 of the end stands.

Just outside of each of the straights of the grass pitch there is arranged a guide rail 28 for the outer rail wheels 30. Between these widthways outer running wheels 30 there are

mounted further wheels (not shown) with soft tires for driving on top of the grass.

A long electrical cable leads from an aggregate or similar 32 to the lighting unit/greenhouse 24.

The unit 24 is furnished with a number of light sources, here in the form of lamps or fluorescent tubes 33, which will normally be placed in transverse and longitudinal rows. The roof of the unit 24 will normally be tight and opaque.

If the lighting unit 24 is also to be used for watering, ventilation, aeration etc., it will be connected to a feed hose for pressurised water/compressed air.

According to figure 5, there is shown a water feed hose 34 that may also be connectable to an outside compressor for supply of compressed air. Water/air passes from the feed hose 34 into a manifold 36, from where short, downward projecting branch pipes are terminated in separate nozzles 40.

Reference number 42 in Figure 5 denotes a stepped motor that constitutes a propulsion device for the wheels 30, while 44 denotes transverse lawn clean-up brushes distributed along a shaft 46.

Claims

1. A system for making the growth conditions for grass and other plants that form part of the grass mix in grass pitches for outdoor and indoor sports and athletics more favourable, in particular where the grass pitch (10), or parts of this, is put in the shade by stands (12, 18; 14, 20; 16, 22), characterized in that the system for making growth conditions more favourable comprises at least one travelling lighting unit (24) that, in addition to light sources, may be equipped as a mobile greenhouse/hothouse.

2. A system in accordance with Claim 1, characterized in that the travelling lighting unit (24) is provided with light sources in the form of lamps/fluorescent tubes (33) arranged in intersecting rows.

3. A system in accordance with Claim 1 or 2, characterized in that the lighting unit (24) in the operative position has a horizontal extent in the longitudinal and widthwise direction of the grass pitch (10) that essentially matches the dimensions of said grass pitch (10), the system comprising one such lighting unit (24) that may be designed to be folded up, retracted, e.g. telescopically, over or underneath each other in sections, hinged together etc. in order to assume a space saving parked/ready position.

4. A system in accordance with Claim 1 or 2, characterized in that the lighting unit

(24) has a horizontal extent that in the longitudinal direction of the grass pitch (10) represents a dimension that only measures a fraction of the length of the grass pitch (10), while it exceeds the grass pitch (10) slightly in the widthways direction.

5. A system in accordance with Claims 1 and 2, c h a r a c t e r i z e d i n that the lighting unit (24) has an extent in the longitudinal and widthways direction of the grass pitch (10) that measures a fraction of the length of the pitch and a fraction of the width of the pitch.

6. A system in accordance with any of the preceding claims, c h a r a c t e r i z e d i n that the lighting unit (24) is movable on running wheels (30).

7. A system in accordance with one or more of Claims 1, 2 and 4-6, c h a r a c t e r i z e d i n that the system comprises preferably longitudinal guide rails (28) at ground level and running immediately outside the touchlines of the grass pitch (10).

8. A system in accordance with Claim 1, c h a r a c t e r i z e d i n that the travelling lighting unit (24) is built onto a low framework construction with a tight roof and which inernal, in addition to the light sources (33), has distribution pipes (36) for water/air fed from the outside, which pipes are provided with nozzles (40) for spraying the medium supplied.

9. A method of making the growth and thriving conditions for grass and other plants that form part of grass mixes more favourable, for instance on football pitches, and in particular football pitches (10) that are put partly in the shade, especially by covered stands (12, 18; 14, 20; 16, 22), characterized in that the grass pitch (10) primarily is lit artificially by use of lamps/fluorescent tubes (33) installed on a low vehicle (26) of large extent in the horizontal plane, and that this artificial lighting of the grass pitch (10) is carried out so often and so long each time that the blanket of grass is supplied with light energy, possibly in connection with supply of water/air, ventilation, cleaning, so as to achieve a grass pitch of improved quality, which may also be used outside of the growing season.

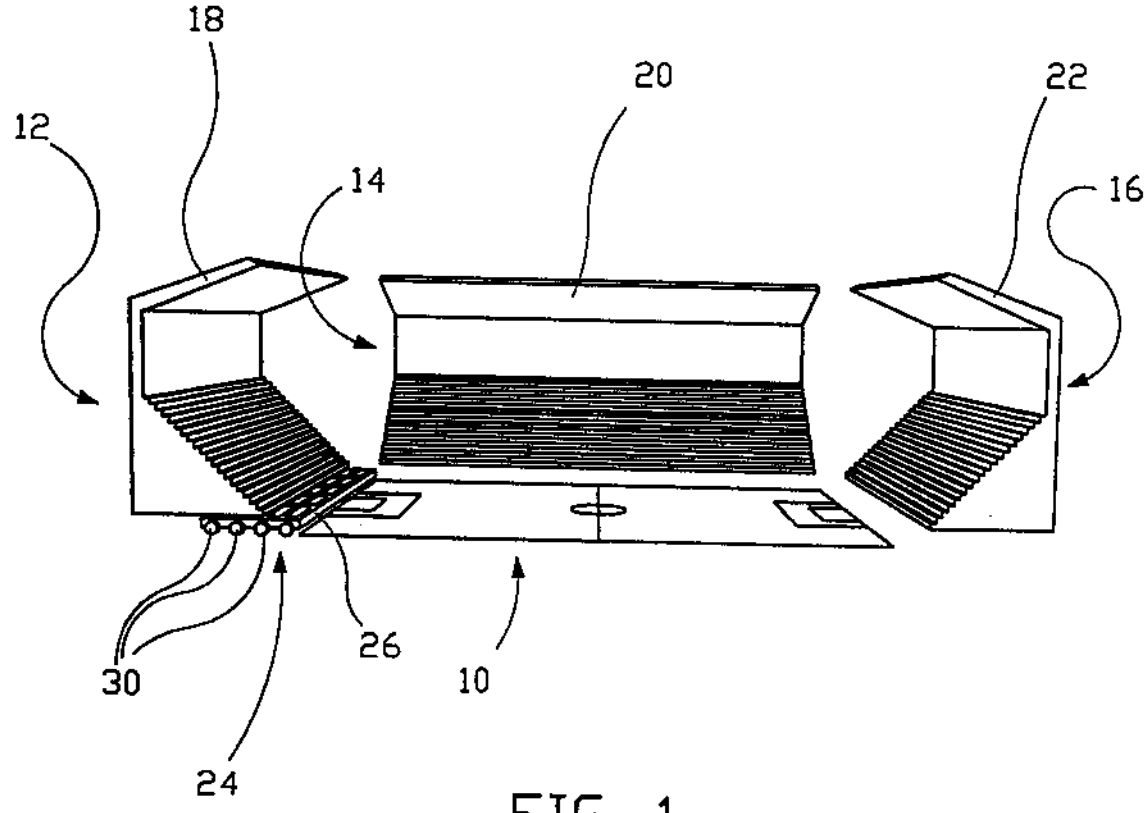

FIG. 1

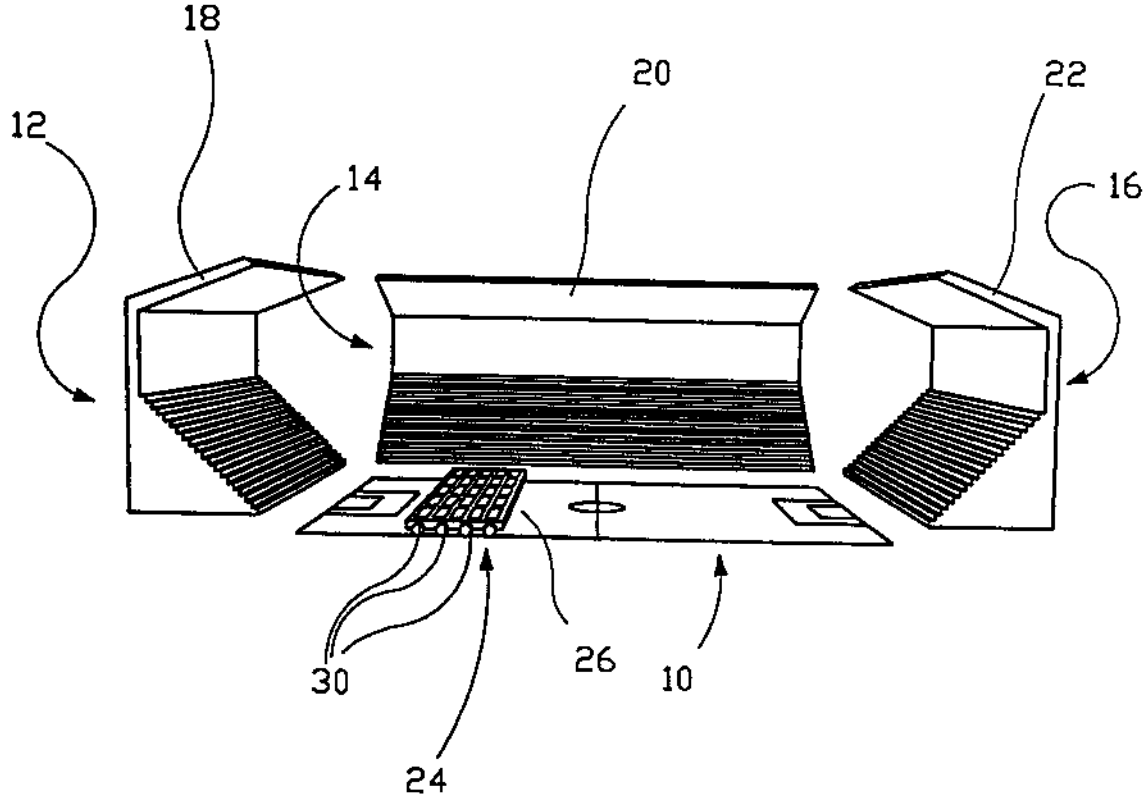

FIG. 2

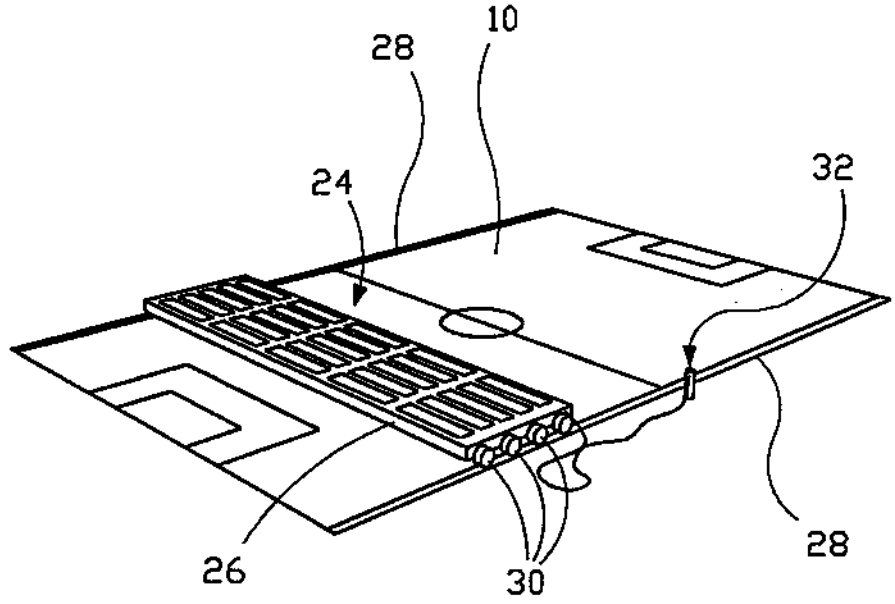

FIG. 3

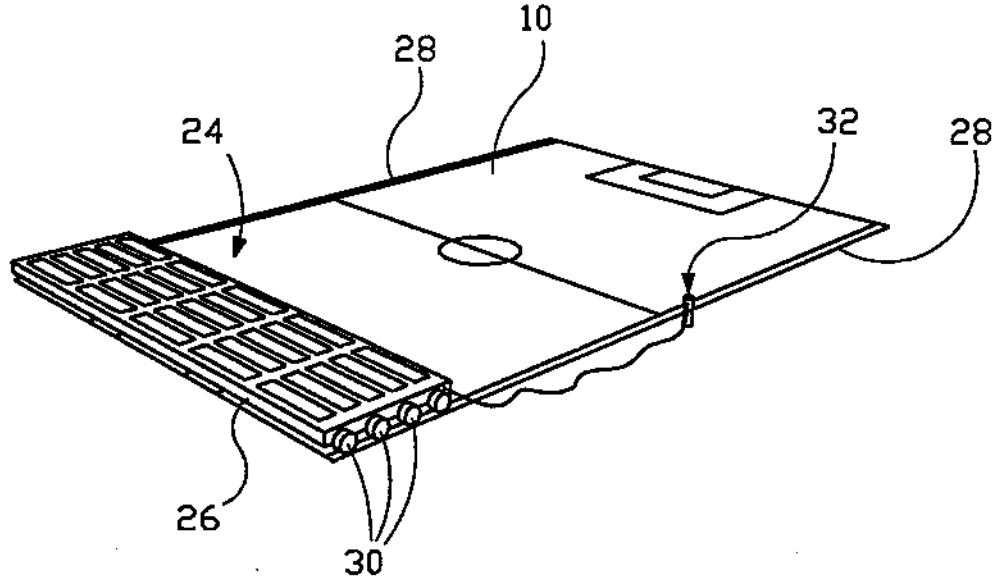

FIG. 4

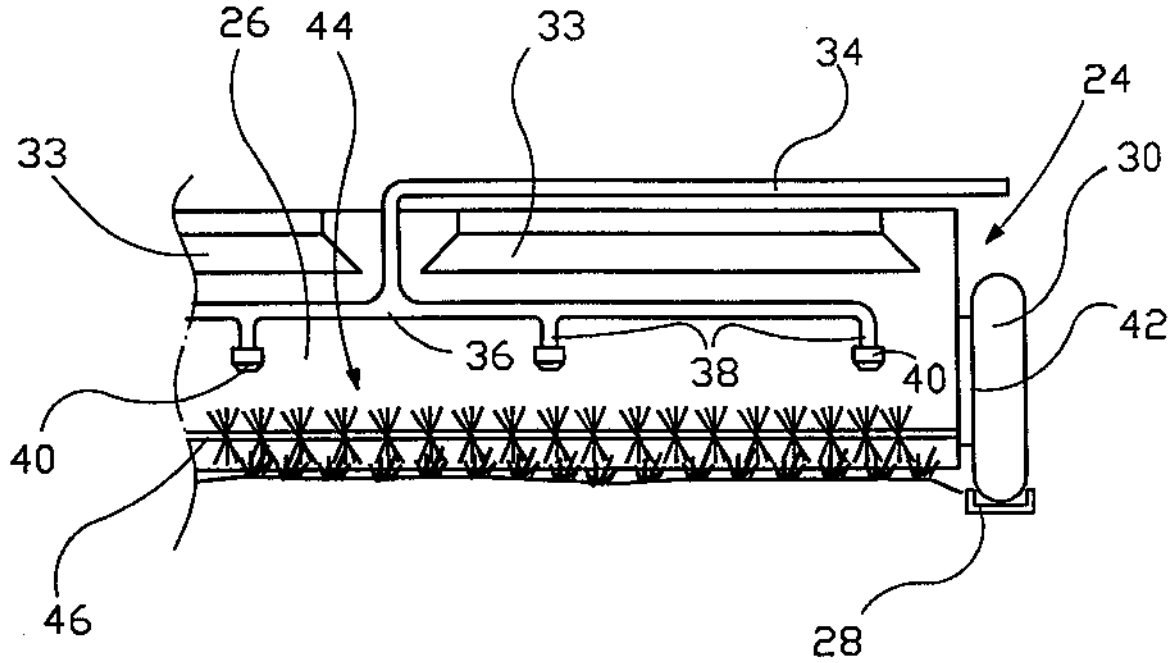

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 00/00094

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A01G 1/12 // A01G 25/09, A63C 19/12
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A01G, A63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9509681 A2 (L.C.J. KOOT HOLDING .V.), 13 April 1995 (13.04.95), page 5, line 14 - line 18, claim 16 ---	1-9
A	US 4907793 A (WUND), 13 March 1990 (13.03.90), abstract --- --------	1-9

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/NO 00/00094

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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