

Description

BACKGROUND OF THE INVENTION

The present invention relates to an indoor hydroponic cultivation arrangement which is used for forming indoor green ornamentation by increasing greens of hydroponically cultivated foliage plants or the like in general homes, offices, public spaces, etc., and more specifically to an indoor multiple-purpose hydroponic cultivation arrangement which is capable of many arrangement pattern variations thereof suitable to indoor conditions and is possible to be designed in combination with indoor furniture and utensils.

It is common to position a pot type planter having a foliage plant so as to increase greens indoors. However, in this type planter, the root area of the plant as the plant environment is limited to the size of the pot. Since the weight of the pot increases many times if the root area is desired to be expanded, the pot is not suitable to the indoor use in which the light weight is required. If the root area is limited, the tree growth is suppressed within this limitation and it is difficult that the greens occupy the large indoor space. In addition, the conventional pot type planter has an individual construction, so that it is not proper to multiple-usages and multiple-purposes in combination with the indoor furniture and utensils.

Another prior art is to cultivate the indoor plants with a sort of hydroponic cultivation instead of soil cultivation, i.e., to form the indoor green ornamentation with the foliage plants cultivated by so-called hydroculture. In this instance, it is common to position the pot on a table or a carpet. This prior art has the same disadvantages as the above-described pot type planter.

Another prior art is a multiple-purpose planter which has a knockdown type construction for increasing the greens at an outdoor artificial base, such as a rooftop of a building, a terrace of a house. This prior art is of multiple-purposes to be capable of various kinds of plant cultivation designs by growing a big tree and to form the green ornamentation in conjunction with a bench, a stand or a flower bed. This multiple-purpose planter is useful, because the trees can grow up, a large amount of the greens can be maintained, the planter can be used for many objects, such as the bench or the stand, many kinds of plant designs are possible, and it is possible to change the design after completed. However, such a multiple-purpose planter is not suitable to the indoor usage, since the indoor plants are cultivated basically with earth.

Water management is difficult in a case to cultivate the plants with earth indoors. It is not proper to apply much water enough to spoil the roots and, of course, to lack the water. A basic component would appear on the surface of earth in the planter and form a thin layer. This layer may be a cause to spoil the

plants. Thus, it is necessary in the indoor plant to apply much water enough to wash the basic component and to remove excess water on all such occasions so as to prevent the root from spoiling. However, in general, it cannot be possibly accepted to provide a waste pipe indoors to draining surplus water of the planter because of a fine view.

There are many arrangement variations in this multiple-purpose planter, but the basic design is that the arrangement expands from the center of the plant box and there is no flexibility in design. Moreover, this multiple-purpose planter is constructed as an indoor fixture after setting once, and thereby it is not easy to disjoint and remove the planter. It is well known to take a few months for digging around the root of the tree before transplanting, and only a specialist can do so. One known type of multiple-purpose planter is disclosed in french patent no. 2437 776. However, this type of planter as with other known types restricts the growth of a plant by not allowing it to expand into other planters.

SUMMARY OF THE INVENTION

According to an indoor multiple-purpose hydroponic cultivation planter of the present invention, the aforementioned disadvantages of the prior arts are improved by the following construction. The planter is, according to Claim 1, a non-water-leaking construction which includes an upper surface having an opening for a plant, and a side surface having a coupling opening the size of which is enough to pass the rootstock of the plant. A plurality of planters are jointed in seal to each other through the coupling openings thereof in a desired arrangement pattern. Each of the planters receives predetermined amounts of water and porosity grain fillers, such as foaming brick stones, and desired plants are set in entire or a part of the planters.

In the hydroponic cultivation planter, no earth is used and it is not apprehended to appear a basic component. Thus, it is possible to fill the planter to repletion with water, it is not necessary to manage surplus water, and the plant is free from insects and smell. Therefore, this planter is proper to the indoor plants. Since the plurality of planters are coupled as one group through the coupling openings, if the water is supplied to one of the planters, all the planters receive the water. The porosity grain fillers are provided in the planter, so that each the filler contains the water via a so-called capillary phenomenon even if the water supply level is very low. As the water level decreases, the contained water is disgorged for the resupplement. Thus, the interval of the water supply is a range from two weeks to four weeks, and no much labor is required for the maintenance.

The foaming grain fillers are characterized to contain the water by supplying the water and further con-

tain air after disgorging the water, which are different from earth. Thus, the rootstocks of the plants are exposed to the air properly, so that there is no possibility to spoil the roots. In addition, as the plants grow up, the rootstocks thereof would expand to other planters of the group through the coupling openings, and thereby being able to grow the plants large and keeping much greens. If the plant size is small, flowering plants may be cultivated in each the planter as the flower bed.

Each the planter is a so-called individual water vessel, and it is unnecessary to dig the root of the tree before transplanting. The porosity grain fillers do not make the surrounding thereof dirty no similarly to earth, and they are easy in handling. The planters have a flexibility to separate and move them. Thus, there are many variations in the ornamentation design. Each the planter may be used for the multiple-purpose in common homes, offices, lobbies or public spaces by combining with the indoor furnishings and utensils, such as sofas and tables.

It is therefore one object of the present invention to provide an indoor multiple-purpose hydroponic cultivation planter which is possible to arrange in various kinds of patterns.

It is another object of the present invention to provide an multiple-purpose hydroponic cultivation planter which can be combined with indoor furnishings and utensils.

It is a further object of the present invention to provide an improved multiple-purpose hydroponic cultivation planter which can grow up plants large to increase greens indoors.

It is an additional object of the present invention to provide an improved multiple-purpose hydroponic cultivation planter which is easy in maintenance.

Other objects, advantages and features of the present invention will become apparent to those having ordinary skill in the art from a reading of the following detailed description when in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGs. 1 and 2 depict perspective views of preferred embodiments of an indoor multiple-purpose hydroponic cultivation planter according to the present invention ;

FIG. 3 is a plan view of a single planter of one embodiment according to the present invention ;
FIG. 4 is a cross sectional view along lines IV-IV in FIG. 3 ;

FIG. 5 is a cross sectional view along lines V-V in FIG. 3 ;

FIG. 6 is a cross sectional view of another embodiment according to the present invention ;

FIGs. 7A through 7D depict various kinds of arrangement patterns of planters according to the

present invention ;

FIG. 8 is a cross sectional view of a plurality of coupled planters according to the present invention ;

FIGs. 9 through 12 depict cross sectional views of planter coupling means according to the present invention ; and

FIG. 13 is a cross sectional view of another embodiment according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGs. 1 and 2, there are shown embodiments of a multiple-purpose hydroponic cultivation planter according to the present invention, these embodiments serving as a seat and being combined with a table. In the drawings, a reference "A" represents a hydroponic cultivated plant.

In FIG. 1, steel frames 7 are positioned so as to surround each the planter 1. Cushions 8 are put on the steel frames 7 surrounding the planters 1 except for cultivating the plants A, so that the seats are formed. In FIG. 2, each the planter 1 is accommodated in a smoothly planed box 5, and covers 6 are put on the boxes 5 for receiving the planters 1 except for cultivating the plants A. Thus, these covers 6 serve as the seats.

FIGs. 3 through 5 illustrate one example of the shape and structure of the single planter 1. The planter 1 is a substantially cubic or rectangular non-water-leaking structure which includes an upper opening 2 for cultivating the plant A and side surface portions having coupling openings 3. The size of the opening 2 is enough to pass freely the rootstock of the plant A regardless of the growth thereof. The material of the planter 1 is strong, hard and light Fiber-Reinforced-Plastic (FRP) which has corrosion resistance against water and manure. However, the material may not be limited to this and may be normal synthetic resins or metal, such as aluminum. The planter 1 is as large as about 400 x 350 x 300 mm, its average thickness is 2.4 mm, and the caliber of the coupling opening 3 is 200 mm.

There are various arrangements of the planters 1 in the plane view. For example, the L-shaped planter may be arranged at the corner portion, and the width of the planter arranged at the straight portion may be two or three times as long as the normal width. In addition, the plane shape of the planter 1 may be any desired shape, such as triangle, hexagon, other polygon, circle or ellipse.

A pair of the coupling openings 3 may be provided symmetrically at the side wall portions of the planters 1 facing each other as shown in FIG. 4. The coupling opening 3 may be provided at only one side surface of the planter 1 as the end part of the arrangement pattern as shown in FIG. 6. In addition, it may be possible to provide the coupling openings 3 at all the four side

surfaces or the three side surfaces. Since there are many kinds of shapes and structures of the planters 1, the arrangement pattern would be flexible and the manufacturing would be easy as discussed hereinafter.

A plurality of planters 1 may be jointed in a desired arrangement pattern by facing the adjacent coupling openings 3 and connecting them to seal up as shown in FIG. 4. Thus, the multiple-purpose hydroponic cultivation planter can be obtained for the indoor green ornamentation. For simply connecting the coupling openings 3-3 to each other in seal, flanges 3b extending outwardly are formed at the end portions of pipes 3a of the coupling openings 3, waterproof packings 10 are inserted between the flanges 3b-3b, waterproof rubber bands 11 seal the outsides of the pipes 3a, and bands 12 are fastened as shown in FIG. 4. However, a waterproof adherent tape may be used for the connection instead of the waterproof packing 10. In this instant, the band 12 is not needed. By connecting a predetermined number of the planters with such a non-water-leaking connection method, various kinds of the arrangement patterns of the indoor multiple-purpose hydroponic cultivation planters would be accomplished as shown in FIGs. 7A through 7D. FIG. 4 illustrates that the unused coupling opening 3 at the end planter 1 of this arrangement pattern is closed by a side cover 13 which is easy to be attached and removed.

Porosity grain fillers 4 are put in each the planter 1 connected in the arrangement pattern, the depth of the fillers 4 being within a range between 50 and 80 percents of the planter height. The maximum water level is about 5 cm from the bottom of the planter 1. The plant A is cultivated in hydroponic by using the grain fillers 4 (refer to FIG. 8). Foaming brick stones called artificial pumice stones are proper for the porosity grain fillers (hydroballs) 4, the foaming brick stones being formed by calcining them at a high temperature about 1200 degrees centigrade.

A hydrograph 14 is set in the planter 1 (refer to FIG. 8) which is used when supplying the water as occasion demands. The planters 1 in the same group are coupled to each other via the coupling openings 3, so that the water flows to all the planters if the water is supplied to one planter. Thus, it is easy to manage the water supply. The next water supply is necessary after about one week has passed since the hydrograph 14 indicates zero because of the dryness by the evaporation and the absorption of the plant A. Then, the porosity grain fillers 4 disgorge all the water contained therein, and the porosity portions thereof will absorb the air. As a result, sufficient air and water are applied to the rootstock of the plants A in the balanced ratio.

As the plants A to be cultivated, almost all of foliage plants and flower plants may be proper to be cultivated in hydroponic. For example, the followings

are proper: deciduous tree, such as ginkgo tree and zelkova tree; evergreen tree, such as camphor tree and oak tree; bamboo; rosebay; azalea; box tree; Philodendron Schott and Dieffenbachia Schott of color asia antiquorum family; Collinia Liebm and Chrysallidocarpus H. Wendl of cocos nucifera family; Ficus L. of morus family; Dracaena L. and Chlorophytum Ker-Gawl. of Illium family; Adiantum L. and Neprolepis of Polypodiaceae family; centpollia; cyckamen indicum; and dendrovieum.

The upper portion of the planter 1 excluding the plant may be opened to cultivate flower plants for forming the flower bed, or may be covered with a transparent acryloyl plate 9 to see the inside through it, this plate serving as the seat (refer to FIGs. 4 and 6).

The connection between the coupling openings 3 of the planters 1 may be accomplished as follows:

(1) The waterproof packing 10 is, as shown in FIG. 9, inserted between the flanges 3b of the pipes 3a forming the coupling openings 3 of the planters 1, and the flanges 3b are fixed to each other by screw bolts 15 and nuts 16.

(2) As shown in FIG. 10, the side walls of the planters 1 are ganged with each other by long screw bolts 17 and nuts 17 after the waterproof packing 10 is inserted between the flanges 3b.

(3) In FIGs. 11A and 11B, a coupler 19, inserted into the coupling openings 3 of the adjacent planters 1, is a cylinder pipe which is able to be clamped at the center portion thereof and has reverse threads of the screws at the both end portions. Nuts 20 are mounted at both the end thread portions for pushing packings 22 via washers 21.

(4) In FIG. 12, a pair of cylindrical pipe joints 23 include stopper flanges 23a at one ends and threads at the outsides of the other one ends. The joints 23 are inserted into the coupling openings 3 through waterproof packings 24, and the joints 23 are faced each other to be connected with a coupler 25.

FIG. 13 shows another embodiment wherein the planters 1 are positioned on places having different heights, such as a mound formed indoors. In the adjacent planters 1, the higher level planter 1 is connected at the water supply level to the lower level planter 1 through a coupling pipe 27, and the lowest level planter has a draining nozzle 26 for disgorging the surplus water. If sufficient water is supplied to the highest level planter 1, all the plantes receive the water until each the water supply level. Thus, it is possible to save time for the water supply. The coupling pipe 27 may be an individual type or may be constructed by connecting the coupling openings 3. According to this embodiment, the greens can be increased on the indoor mound with the hydroponic cultivation. Moreover, this embodiment can be applied to a staircase and a slope to increase the

greens.

As discussed hereinbefore, the multiple purpose hydroponic cultivation planter of the present invention uses the water instead of earth, so that it is free from insects and smell. It is necessary to supply the water once a week and thereby saving time to maintain the plants. Anybody can handle the planter easily, and this planter is proper to increase the greens indoors. In addition, the planter of this invention is light, and it is not necessary to reinforce and waterproof the floor. It is easy to make a large size green ornamentation. Since the root area is not limited and the rootstock can extend freely, it is possible to grow a large tree such that the indoor space has plenty of greenery. There are many connection arrangement patterns in this multiple purpose planter. Thus, it is possible to make a large green area in accordance with the indoor space by designing and building the green ornamentation free. Moreover, the planter of the present invention can be used as the multiple purpose, such as the bench, seat, stand or the like by combining with the furnishings and utensils, and thereby satisfying the diversification and multiple purpose of the ornamentation design.

While I have shown and described herein the preferred embodiments of my invention, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from my invention in its broader aspects. Therefore, the scope of the present invention should be determined only by the following claims.

Claims

1. An indoor hydroponic cultivation arrangement for plants forming root structures comprising more than one planter, the or each said planter is a non-water-leaking structure (1) including an upper opening for a plant (A) and a side surface having a coupling opening (3), whereby a plurality of said planters (1) can be coupled to each other via said coupling openings (3) and positioned in a desired arrange pattern, the or each said planter is adapted to receive porosity grain fillers and water, characterised in that the size of the coupling openings (3) is enough to allow the root structures to pass through without construction.

2. An indoor multiple purpose hydroponic cultivation arrangement according to claim 1, wherein the or each said planter is put in a smoothly planed box (5), and a cover (6) is put on said box (5) except for said planter receiving said plant.

3. An indoor multiple purpose hydroponic cultivation arrangement according to claim 1, wherein a steel frame (7) is provide to surround the or each said planter, and a seat (8) is put on said steel frame (7) to cover at least one planter.

4. An indoor multiple purpose hydroponic culti-

vation arrangement according to claim 1, wherein two or more planters are positioned at different heights, and said planters are coupled to each other such that the water flows to the lower level planter from the higher level planter.

Patentansprüche

1. Zimmer-Hydrokulturanordnung für Pflanzen, welche Wurzelstrukturen ausbilden, wobei mehr als ein Pflanzgefäß vorgesehen ist, und wobei jedes dieser Pflanzgefäße aus einem nicht-wasserdurchlässigen Bauteil (1) gebildet ist, welches eine obere Öffnung für eine Pflanze (A) aufweist, und eine Seitenfläche mit Kupplungsöffnungen (3), wodurch eine Vielzahl von diesen Pflanzgefäßen (1) mit Hilfe dieser Kupplungsöffnung (3) einandergekoppelt werden können, und in einem gewünschten Anordnungsmuster angeordnet werden können, und wobei jedes der Pflanzgefäße dafür vorgesehen ist, eine Füllung mit porösen Körnern und Wasser aufzunehmen, dadurch gekennzeichnet, daß die Größe der Kupplungsöffnung (3) groß genug ist, um den Durchtritt der Wurzelstrukturen ohne Beeinträchtigung zu ermöglichen.

2. Zimmer-Vielzweck-Hydrokulturanordnung gemäß Anspruch 1, wobei jedes dieser Pflanzgefäße in einer glatt ausgeführten Box (5) angeordnet ist und wobei ein Deckel (6) an der Seite dieser Box (5) angeordnet ist, jedoch nicht bei den Pflanzgefäßen, welche diese Pflanze aufnehmen.

3. Zimmer-Vielzweck-Hydrokulturanordnung gemäß Anspruch 1, wobei ein Stahlrahmen (7) vorgesehen ist, um jedes dieser Pflanzgefäße zu umgeben, und wobei ein Sitz (8) auf diesem Stahlrahmen (7) angeordnet ist, um zumindest ein Pflanzgefäß abzudecken.

4. Zimmer-Vielzweck-Hydrokulturanordnung gemäß Anspruch 1, wobei zwei oder mehr Pflanzgefäße in unterschiedlichen Höhen angeordnet sind, und wobei diese Pflanzgefäße miteinander derart gekoppelt sind, daß das Wasser von dem Pflanzgefäß mit dem höheren Niveau zu dem Pflanzgefäß mit dem niedrigeren Niveau fließt.

Revendications

1. Un ensemble de jardinière d'intérieur de culture hydroponique pour plantes à racines, comprenant plus d'une jardinière, ladite ou chacune desdites jardinières étant une construction sans fuite d'eau (1) comprenant une ouverture supérieure pour une plante (A) et une surface latérale comportant une ouverture d'assemblage (3), permettant d'assembler plusieurs desdites jardinières (1) par l'intermédiaire desdites ouvertures d'assemblage (3) et de les dispo-

greens.

As discussed hereinbefore, the multiple purpose hydroponic cultivation planter of the present invention uses the water instead of earth, so that it is free from insects and smell. It is necessary to supply the water once a week and thereby saving time to maintain the plants. Anybody can handle the planter easily, and this planter is proper to increase the greens indoors. In addition, the planter of this invention is light, and it is not necessary to reinforce and waterproof the floor. It is easy to make a large size green ornamentation. Since the root area is not limited and the rootstock can extend freely, it is possible to grow a large tree such that the indoor space has plenty of greenery. There are many connection arrangement patterns in this multiple purpose planter. Thus, it is possible to make a large green area in accordance with the indoor space by designing and building the green ornamentation free. Moreover, the planter of the present invention can be used as the multiple purpose, such as the bench, seat, stand or the like by combining with the furnishings and utensils, and thereby satisfying the diversification and multiple purpose of the ornamentation design.

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2. An indoor multiple purpose hydroponic cultivation arrangement according to claim 1, wherein the or each said planter is put in a smoothly planed box (5), and a cover (6) is put on said box (5) except for said planter receiving said plant.

3. An indoor multiple purpose hydroponic cultivation arrangement according to claim 1, wherein a steel frame (7) is provide to surround the or each said planter, and a seat (8) is put on said steel frame (7) to cover at least one planter.

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Revendications

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er selon un plan voulu, ladite ou chacune desdites jardinières pouvant recevoir des granulés de remplissage poreux et de l'eau, caractérisé en ce que la taille des ouvertures d'assemblage (3) est suffisamment grande pour permettre le passage libre des racines.

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2. Un ensemble de jardinière d'intérieur à usage multiple de culture hydroponique selon la revendication 1, dans lequel ladite ou chacune desdites jardinières est posée dans un bac à finition lisse (5) et dans lequel un couvercle (6) est posé sur ledit bac (5), à l'exception de ladite jardinière recevant ladite plante.

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3. Un ensemble de jardinière d'intérieur à usage multiple de culture hydroponique selon la revendication 1, dans lequel un cadre en acier (7) contourne ladite ou chacune desdites jardinières, un siège (8) étant posé sur ledit cadre en acier (7) pour recouvrir au moins une jardinière.

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4. Un ensemble de jardinière d'intérieur à usage multiple de culture hydroponique selon la revendication 1, dans lequel deux ou plusieurs jardinières sont placées à des hauteurs différentes, lesdites jardinières étant assemblées, de sorte que l'eau coule de la jardinière de niveau élevé vers la jardinière de niveau plus bas.

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