

DESCRIPTION

TITLE OF THE INVENTION: Plant Cultivation Device

5 TECHNICAL FIELD

[0001] The present invention relates to a plant cultivation device including a plant cultivation vessel having a water storage section capable of storing an amount of plant cultivation water therein, a water-absorbing plant cultivation bed material placed in the water storage section, and a water
10 feeding means for feeding plant cultivation water to the water storage section, wherein in the water storage section, there is provided an overflow pipe for discharging an amount of the plant cultivation water in excess of a predetermined level.

15 BACKGROUND ART

[0002] As a prior-art technical document information relating to this type of plant cultivation device, there is Patent Document 1 identified below. With a plant cultivation device disclosed in this Patent Document 1, when an amount of plant cultivation water is fed by a water feeding means such as a
20 pump to the water storage section of the plant cultivation vessel, an amount of plant cultivation water will be accumulated to a level not exceeding the upper end of the overflow pipe.

[0003] Then, the plant cultivation bed material having a portion thereof submerged in the accumulated plant cultivation water will absorb the plant
25 cultivation water for holding an appropriate amount of the plant cultivation water inside, so that a plant planted in the plant cultivation bed material can be cultured appropriately.

[0004] If an amount of plant cultivation water exceeding the water absorbing capacity of the plant cultivation bed material is fed or if the feeding
30 rate of plant cultivation water by the water feeding means exceeds the water absorbing rate of the plant cultivation bed material, the excess amount of plant cultivation water will be discharged via the overflow pipe.

[0005] In particular, when a plurality of plant cultivation vessels are vertically stacked in use, the plant cultivation water discharged via the
35 overflow pipe is fed as plant cultivation water to a plant cultivation vessel disposed downwardly thereof; and eventually, the plant cultivation bed

materials of all the stacked plant cultivation vessels will respectively absorb a necessary amount of plant cultivation water.

[0006] Incidentally, the plant cultivation water discharged from the overflow pipe of the plant cultivation vessel disposed at the lowest stage is collected in an appropriate water storage container, to be used, when needed, as plant cultivation water for a next watering operation.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0007] Patent Document 1: Japanese Unexamined Patent Application Publication No. 2009-45015 (paragraph 0021, Fig. 2).

SUMMARY OF THE INVENTION

OBJECT TO BE ACHIEVED BY INVENTION

[0008] However, in the case of the most popular use, for allowing the plant cultivation bed material to be watered sufficiently, a sufficient amount of water exceeding the water absorbing capacity of the plant cultivation bed material may sometimes be fed to the water storage section of the plant cultivation vessel.

[0009] In such case as above, with the plant cultivation device disclosed in Patent Document 1, there is possibility that plant cultivation water in an amount exceeding a predetermined amount is left as it is for a long period of time downwardly of the upper end of the overflow tube. If the plant cultivation water is left for a long period of time, this can be detrimental to the outside appearance.

[0010] Then, in view of the problem provided by the plant cultivation device of the above-described conventional art, the object of the present invention is to provide a plant cultivation device that suffers less deterioration in its outside appearance even if an amount of plant cultivation water exceeding the water absorbing capacity of the plant cultivation bed material of the water storage section of the plant cultivation vessel is fed.

MEANS FOR ACHIEVING THE OBJECT

[0011] According to a characterizing feature of a plant cultivation device of

the present invention:

A plant cultivation device comprises a plant cultivation vessel having a water storage section capable of storing an amount of plant cultivation water therein, a water-absorbing plant cultivation bed material placed in the water storage section, and a water feeding means for feeding plant cultivation water to the water storage section;

wherein in the water storage section, there is provided an overflow pipe for discharging an amount of the plant cultivation water in excess of a predetermined level; and

in the bottom face of the water storage section, there is provided a drain section having a water discharging capacity below the water feeding rate of the water feeding means.

[0012] With the plant cultivation device having the above-described characterizing feature, in the bottom face of the water storage section, there is provided a drain section having a water discharging capacity below the water feeding rate of the water feeding means. Therefore, an amount of plant cultivation water remaining in the water storage section as being un-absorbed in the plant cultivation bed material at the time of completion of water feeding to the water storage section by the water feeding means is discharged via the drain section.

[0013] Accordingly, plant cultivation water will not be left as it is for a long time in the water storage section, so there will not occur generation of mold or the like in the plant cultivation bed material or generation of germs in the plant cultivation water or deterioration of the aesthetic appearance, either.

[0014] Moreover, since the water discharging capacity of the drain section is below the water feeding rate of the water feeding means, during water feeding operation to the water storage section by the water feeding means, the plant cultivation water is kept at an appropriate level in the water storage section. Hence, the plant cultivation bed material can absorb this plant cultivation water appropriately, thus realizing a water holding state.

[0015] According to a further characterizing feature of the present invention, a water discharge pipe communicated to the overflow pipe projects downward from the water storage section, and the drain section is configured to establish communication between a bottom face of the water storage section and an inner face of the water discharge pipe.

[0016] For instance, in case the drain section is formed at a position

different from the disposing position of the overflow pipe or the water discharge pipe, discharging of excess plant cultivation water will still be possible, but the plant cultivation water which has entered the drain section will tend to move laterally along the lower face of a bottom wall member forming the bottom face of the water storage section. Hence, there is the possibility that the water may soil the lower face of the bottom wall member in association with the movement or the water may ooze to the outside via the border between the vertically stacked plant cultivation vessels.

[0017] With the above-described arrangement of the invention, however, the plant cultivation water which has entered the drain section will first move downwards along the inner face of the water discharge pipe projecting downwards from the water storage section and then fall from the lower end of this water discharge pipe, so the water can generally reach the water storage section or the plant cultivation bed material of the lower positioned plant cultivation vessel in a reliable manner.

[0018] Further, with the above inventive arrangement, in comparison with an arrangement in which the plant cultivation water that has entered the drain section moves downward along the outer face of the water discharge pipe, the plant cultivation water discharged from the drain section of the lowermost positioned plant cultivation vessel can be collected reliably in an appropriate tank via e.g. a hose fitted on the water discharge pipe.

[0019] According to a still further characterizing feature of the present invention, the drain section extends with forming an angle relative to the perpendicular direction.

[0020] With the above-described inventive arrangement, the plant cultivation water discharged downwards by its own weight from the drain section will fall to a position laterally offset from the position immediately below the drain section. As a result, the plant cultivation bed of the plant cultivation vessel which is disposed one-stage lower will generally be watered, advantageously.

[0021] According to a still further characterizing feature of the present invention, laterally of the drain section, there is provided a foreign-object trapping projection for trapping foreign object contained in the plant cultivation water.

[0022] With the above-described inventive arrangement, even if foreign objects float on or in the water surface of plant cultivation water stored in the

water storage section or adjacent the bottom face of the water storage section, most of such foreign objects will be trapped by the foreign-object trapping projection. Hence, clogging of the drain section with such foreign objects will less likely occur and normal water discharging condition can be maintained.

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BRIEF DESCRIPTON OF THE DRAWINGS

[0023] [Fig. 1] is a front view showing a plant cultivation device relating to the present invention in its entirety,

10 [Fig. 2] is a broken side view showing principal portions of the plant cultivation device having a plant cultivation bed material set therein,

[Fig. 3] is a perspective view showing the plant cultivation device relating to the present invention in its entirety,

[Fig. 4] is a perspective view schematically showing the principal portions of the plant cultivation device shown in Fig.1,

15 [Fig. 5] are a perspective view and a section view showing a drain section of the plant cultivation device shown in Fig. 4,

[Fig. 6] are a perspective view and a section view showing a drain section according to a second embodiment,

20 [Fig. 7] are a perspective view and a section view showing a drain section according to a third embodiment,

[Fig. 8] are a perspective view and a section view showing a drain section according to a fourth embodiment,

[Fig. 9] are a perspective view and a section view showing a drain section according to a fifth embodiment, and

25 [Fig. 10] is a perspective view showing an embodiment in which a blocking plate is provided in an overflow pipe.

MODES OF EMBODYING THE INVENTION

30 [0024] Next, embodiments of the present invention will be described with reference to the accompanying drawings.

A plant cultivation device relating to the present invention, as shown in Fig. 1, includes a plant cultivation vessel 1 having a water storage section 8 capable of storing an amount of plant cultivation water W, and a pump 30 of e.g. electrically driven type (an example of a water feeding means) for feeding the plant cultivation water W to the water storage section 8. The plant cultivation vessel 1 is formed of synthetic resin and has a horizontally

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elongate shape.

[0025] Although it is possible to employ only one plant cultivation vessel 1 for plant cultivation, generally, a plurality of plant cultivation vessels 1 will be vertically stacked for use with openings of plant cultivation spaces 2 thereof being oriented to a same direction. In this case, if needed, at the corners of such vertically stacked plant cultivation vessels 1, angle members 17 can be disposed, and the plant cultivation vessels 1 and the angle members 17 can be connected via appropriate joints 18.

[0026] **(General Construction of Plant Cultivation Vessel)**

As shown in Fig. 3, each plant cultivation vessel 1 integrally includes a bottom wall 3, and one long side wall 4 and two short side walls 5 which extend upwardly from three sides of the bottom wall 3, thus forming a plant cultivation space 2 inside. Further, from some portions of the upper face of the bottom wall 3, there are integrally extended upward three partition walls 6 that extend parallel with the short side walls 5.

[0027] Therefore, as shown in Fig.4, when another plant cultivation vessel 1 or a lid member 1a is placed and attached on/to the upper face of the plant cultivation vessel 1, the plant cultivation space 2 is partitioned into total four unit plant cultivation spaces 2a by three partition walls 6, with the opening of each unit plant cultivation space 2a being located on the front front face.

[0028] Further, from the front end of the bottom wall 3, a vertically short front wall 7 extends upwards. Then, the bottom wall 3, the long side wall 4, the short side walls 5, the partition walls 6, the front wall 7 together form a water storage section 8 for storing an amount of plant cultivation water W.

[0029] The water storage section 8 too is partitioned by the partition walls 6 into total four unit water storage sections 8a. And, a gap formed at the lower side of each unit plant cultivation space 2a and between each partition wall 6 and the long side wall 4 is configured to serve as a communication passage 9 for establishing communication along the horizontal direction between the respective unit water storage sections 8a.

[0030] As shown in Fig. 2, a plant P is placed in a plant cultivation bed material A formed of a water absorbing material in the form of a sponge or the like. Generally, one plant A will be placed in one unit plant cultivation space 2a.

[0031] The bottom wall 3 of each unit water storage section 8 includes a rear bottom wall 3a extending horizontally and a front bottom wall 3b inclined

forwardly upwards (at an inclination angle α) so that the wall 3b is positioned progressively upwards as it extends from the upper end of the rear bottom wall 3a toward the opening of each unit plant cultivation space 2a. The value of the inclination angle α can be about 14 degrees, for example.

5 **[0032]** The rear end of the plant cultivation bed material A placed in the unit plant cultivation space 2a is placed on the rear bottom wall 3a, whereas the front end of this plant cultivation bed material A is placed generally adjacent the front end of the front bottom wall 3b.

10 **[0033]** The plant cultivation bed material A can be prepared by mixing e.g. a water retentive filler material (peat moss), urethane prepolymer, polyester type polyol, and water in a ratio of e.g. 100: 120: 1: 800 (the numeric values all represent weight parts) and then molded into an appropriate shape. The shape of the plant cultivation bed material A is not particularly limited, but can be any various desired shape such as a cubic, a rectangular
15 parallelepiped, a cylindrical shape, etc.

20 **[0034]** On and from the rear bottom wall 3a of the plant cultivation vessel 1, an overflow pipe 10 projects upward for maintaining the plant cultivation water W present inside the water storage section 8 below a predetermined level by discharging an amount of the plant cultivation water W in excess of the predetermined level. In this example, the overflow pipe 10 is comprised
of two overflow pipes 10 disposed inside the water storage section 8 and rearwardly of the left and right partition walls 6.

25 **[0035]** Incidentally, downwardly of the overflow pipe 10, there is integrally connected a water discharge pipe 11 for downwardly guiding an amount of plant cultivation water W that has entered the overflow pipe 10.

30 **[0036]** On the other hand, rearwardly of the partition wall 6 disposed at the left-right center, there is integrally provided a guide tube 13 for guiding a length of water feeding hose H2 for pumping plant cultivation water as will be described later, with the guide tube 13 vertically extending through the rear bottom wall 3a.

35 **[0037]** The partition wall 6 and the overflow pipe 10 disposed adjacent each other along the front-rear direction are connected to each other via a plate-like first reinforcing rib 19a projecting upwardly from the rear bottom wall 3a.

40 **[0038]** Also, the partition wall 6 and the guide tube 13 disposed adjacent each other along the front-rear direction are connected to each other via a

plate-like second reinforcing rib 19b. Further, the guide tube 13 and the portion of the long side wall 4 most adjacent thereto are connected to each other via a plate-like third reinforcing rib 19c extending along the front-rear direction having an equal height to the guide tube 13.

5 **[0039]** As the guide tube 13 and the long side wall 4 rearwardly thereof are partitioned from each other by the third reinforcing rib 19c, the second reinforcing rib 19b formed between the guide tube 13 and the partition wall 6 defines a cutout 19p for allowing coming and going of the plant cultivation water W between the two unit plant cultivation spaces 2a disposed on the left and right sides of the guide tube 13.

10 **[0040]** The height of the lowermost end of the cutout 19p is about 7 to 8 mm, so as to be sufficiently smaller than the height (about 14 mm) of the overflow pipe 10.

15 **[0041]** Instead of the cutout 19p formed in the second reinforcing rib 19b, it is possible to provide a cutout for allowing coming and going of plant cultivation water W between the two unit plant cultivation spaces 2a disposed on the left and right sides of the guide tube 13 to the vicinity of the lower end of the third reinforcing rib 19c.

20 **[0042]** For the convenience in vertically stacking a plurality of plant cultivation vessels 1, the upper edge of each partition wall 6 is provided as an inclined upper edge 16a corresponding to the inclination of the bottom wall 3.

25 **[0043]** For a purpose similar to the above, a stepped portion 3s for engagement is provided in the circumference of the bottom wall 3, and at the upper edge of the short side wall 5, there is provided a recessed portion 14 for allowing engagement therein of a circular pillar-like body 12a provided at the lower edge of the short side wall 5.

30 **[0044]** More particularly, as shown in Fig. 4, an arrangement is provided such that when the plant cultivation vessels 1 are vertically stacked, the lower face of the bottom wall 3 of the upper-positioned plant cultivation vessel 1 may contact the inclined upper edge 6a of the partition wall 6 of the lower-positioned plant cultivation vessel 1.

35 **[0045]** Further, substantially simultaneously with the above-described contact, the stepped portion 3s of the bottom wall 3 of upper-positioned plant cultivation vessel 1 engages into the upper face opening of the lower-positioned plant cultivation vessel 1 and also the pillar-like body 12a engages into the recessed portion 14.

[0046] The lid member 1a that can be placed on the upper opening of the uppermost-positioned plant cultivation vessel 1 includes a projecting portion 15 that engages into the recessed portion 14 of the short side wall 5.

[0047] Further, in the lower face of the lid member 1a, there is provided a
5 guide member 16 for holding the orientation of the leading end (or a branch joint J2 attached to the vicinity of the leading end) of the water feeding hose H2 appropriately in particular with respect to the right-left direction.

[0048] Incidentally, the pillar-like body 12a provided at the lower edge of the short side wall 5 can be used also, if needed, as a means for feeding the plant
10 cultivation water W from the lateral side.

[0049] In this case, a through hole may be formed in the wall member closing and sealing the inside of this pillar-like body 12a and a hose for pumping the plant cultivation water can be connected to this through hole.

[0050] As shown in Fig. 1, on top of a casing 1c disposed on a floor face
15 inside a room or the like, a plurality of plant cultivation vessels 1 vertically stacked are interconnected through engagements of the respective portions and inside the casing 1c, there may be disposed a plant cultivation water tank 1b capable of storing an amount of the plant cultivation water W to be fed to each plant cultivation vessel 1.

[0051] In the embodiment shown in Fig. 1, the contour shapes in plane view of the casing 1c and the plant cultivation vessels 1 are made same, and the pump 30 is disposed inside the plant cultivation water tank 1b. With these
20 arrangements, the plant cultivation device as a whole exhibits a simple and distinguished outside appearance.

[0052] The excess plant cultivation water W discharged from e.g. the overflow pipe 10 of each plant cultivation vessel 1 will be collected in the plant cultivation water tank 1b via the discharge pipe 11 disposed
25 downwardly of the lowermost-positioned overflow pipe 10 and the water discharge hose H3 fitted on the lower end of the water discharge pipe 11.

[0053] The plant cultivation water W collected in the plant cultivation water tank 1b can be used without any waste as being fed to the uppermost-positioned plant cultivation vessel 1 via an intra-tank hose H1
30 connecting between the exit of the pump 30 and a joint J1 provided on the upper face of the plant cultivation water tank 1b and the water feeding hose

H2 guided upward from the joint J1 via the respective guide tube 13.

[0054] The leading end of the water feeding hose H2 is bifurcated by a branch joint J2 so that the water can be fed substantially equally to the left and right unit water storage sections 8a of the uppermost-positioned plant cultivation vessel 1.

[0055] Each plant cultivation bed material A is placed with its lower portion being submerged in the plant cultivation water W inside the unit water storage section 8a. Therefore, as each plant cultivation bed material A absorbs the plant cultivation water W, the plant cultivation water W can be fed to the root R of the plant P for allowing culturing thereof.

[0056] As described hereinbefore, the front bottom wall 3b on which the plant cultivation bed material A is placed is formed as an inclined face having the inclination angle α so that the wall 3b is positioned progressively upwards as it extends toward the opening of the respective unit plant cultivation space 2a and it is positioned progressively downwards as it extends away from the opening.

[0057] Therefore, the plant cultivation bed material A, as shown in Fig. 2, will have its side away from the opening submerged in the plant cultivation water W and have its opening side slightly submerged or not submerged at all in the plant cultivation water W in some cases.

[0058] As a result, it is possible to ensure sufficient rhizosphere (the region where the root R of the plant will grow longer). And, as a sufficient amount of plant cultivation water W can be fed to this rhizosphere, favorable growth of the plant can be ensured.

[0059] (Construction of Drain Section)

As shown in Figs. 3-10, in the bottom face of the water storage section 8, there is provided a drain section 20a, 20b, 20c, 20d, 20e, 20f for discharging the plant cultivation water W remaining in this water storage section 8 in a comparatively short term.

[0060] Therefore, an amount of plant cultivation water W remaining in the water storage section 8 as being un-absorbed by the plant cultivation bed material A at the time of completion of water feeding to the water storage section 8 by the pump 30 will be discharged via the drain section 20a, 20b,

20c, 20d, 20e, 20f. Hence, the water will not be left as it is for a long period of time in the water storage section 8. As a result, germs, molds, or other microorganisms will hardly be generated in the plant cultivation bed material A or the plant cultivation water W.

5 [0061] All of the drain sections 20a, 20b, 20c, 20d, 20e, 20f are configured so as to establish communication between the bottom face of the water storage section 8 and the inner face of the water discharge pipe 11.

[0062] The inner diameter of the hole or the gap side of the slit constituting each drain section 20a, 20b, 20c, 20d, 20e, 20f is set such that the water
10 discharging capacity of the drain section may fall short of the water feeding rate of the pump 30.

[0063] Therefore, during a water feeding operation to the water storage section 8 by the pump 30, the water storage section 8 will hold the plant cultivation water W at an appropriate level such as a level of 10 mm or more,
15 so that the plant cultivation bed material A can absorb water with an appropriate efficiency, thus realizing water-retentive state advantageously.

[0064] Further, the inner diameter of the hole or the gap side of the slit constituting each drain section 20a, 20b, 20c, 20d, 20e, 20f is set also such that the drain section 20a, 20b, 20c, 20d, 20e, 20f will hardly be clogged with
20 a particulate or fibrous foreign matter which may be contained in the plant cultivation water W.

[0065] (First Embodiment)

The drain section 20a according to the first embodiment shown in
25 Figs. 3-5 has a form of a single through hole defined in the lateral face of the overflow pipe 10. This through hole extends along the radial direction of the overflow pipe 10 and the position of the lower end of this through hole is in agreement with the level of the bottom face of the water storage section 8. In this example, the inner diameter of the drain section 20a is set to about 5
30 mm.

[0066] More particularly, as illustrated in Fig. 5 (a), a portion of the cylindrical portion constituting the overflow pipe 10 is comprised of a recessed wall portion 10a having a reverse arcuate shape protruding radially inward as seen in its plane view. And, the drain section 20a is formed laterally through the lower end of this recessed wall portion 10a, thereby to establish communication between the bottom face of the water storage section 8 and the inner face of the water discharge pipe 11.

[0067] Laterally of the upstream end of the drain section 20a, there are provided a pair of left and right foreign-object trapping projections 21a projecting radially outwards. As shown in Fig. 5 (b), each foreign-object trapping projection 21a exhibits a partially spherical shape having its center at the position where the upper face of the rear bottom wall 3a and the outer circumferential face of the recessed wall portion 10a intersect each other.

[0068] The recessed wall portion 10a has a circumferential length which slightly falls short of a quarter of the whole circumference of the overflow pipe 10 as seen in the plane view and is disposed so as to face the unit plant cultivation space 2a on the outermost side in the left-right direction and its end adjacent the front side is placed adjacent the first reinforcing rib 19a.

[0069] As a result, the pair of left and right drain sections 20a extend rearward and also to the inner side in the left-right direction as seen in the plane view.

[0070] The drain section 20a, in this embodiment, extends generally horizontal with an angle relative to the perpendicular direction. Hence, as illustrated in Fig. 5 (b), most of the plant cultivation water W discharged from the drain section 20a will fall along a parabolic line extending basically laterally away from the recessed wall portion 10a as it extends downwards and will eventually reach not the inside of the overflow pipe 10 of the lower-positioned plant cultivation vessel 1, but will reach the rear bottom wall 3a different than the overflow pipe 10.

[0071] **(Second Embodiment)**

In a plant cultivation vessel 1 shown in Fig. 6, in a portion of the cylindrical portion constituting the overflow pipe 10, there is formed a flat-plate-like wall portion 10b. And, in this flat-plate-like wall portion 10b, a drain section 20b is provided.

5 [0072] The flat-plate-like wall portion 10b faces the opening of the unit plant cultivation space 2a positioned outermost in the left-right direction and is inclined relative to the first reinforcing rib 19a as seen in the plane view.

[0073] The drain section 20b establishes communication between the bottom face of the water storage section 8 and the inner face of the water
10 discharge pipe 11 in the form of a through hole formed laterally at the lower end of the flat-plate-like wall portion 10b.

[0074] Incidentally, in the face radially outward of the flat-plate-like wall portion 10b, there is formed a groove portion 10d extending vertically with a width substantially equal to the inner diameter of the drain section 20b.

15 [0075] In this embodiment, portions adjacent the lower ends of the left and right flat-plate-like wall portions 10b projecting radially outward relative to the groove portion 10d constitute the foreign-object trapping projections 21b.

[0076] In this case too, the drain section 20b extends generally horizontally. Hence, as illustrated in Fig. 6 (b), most of the plant cultivation water W
20 discharged from the drain section 20b will fall along a parabolic line extending basically laterally away from the flat-plate-like wall portion 10b as it extends downwards and will eventually reach not the inside of the overflow pipe 10 of the lower-positioned plant cultivation vessel 1, but will reach the rear bottom wall 3a different than the overflow pipe 10.

25 [0077] **(Third Embodiment)**

In the case of a plant cultivation vessel shown in Fig. 7, a portion of the cylindrical portion constituting the overflow pipe 10 is comprised of an arch-like wall portion 10c protruding radially inward as seen in its plane view.

30 [0078] Unlike the first and second embodiments, this drain section 20c is

provided not in a portion of the arch-like wall portion 10c, but in the form of a through hole formed with a vertical orientation relative to the rear bottom wall 3a along the ceiling portion located most radially inner side of the arch-like wall portion 10c, for establishing communication between the bottom face of the water storage section 8 and the inner face of the water discharge pipe 11.

[0079] The drain section 20c is formed at a position retracted more radially inward than the basic outer circumferential face of the overflow pipe 10. In this embodiment, portions adjacent the lower ends of the outer circumferential faces of the right and left overflow pipes 10 projecting radially outward relative to the drain section 20c constitute the foreign-object trapping projections 21c.

[0080] As illustrated in Fig. 7 (b), most of the plant cultivation water W discharged via the drain section 20c will flow down inside the water discharge pipe 11 and eventually reach the inside of the overflow pipe 10 of another plant cultivation vessel 1 located downward or the rear bottom wall 3a other than the overflow pipe 10.

[0081] In the case of the mode of plant cultivation vessel 1 illustrated in Fig. 7, the drain section 20c extends vertically, just like the long side wall 4, the short side walls 5 and the partition wall 6.

[0082] Therefore, when the plant cultivation vessel 1 is to be produced by injection molding of resin, projections for forming the drain section 20c will be provided in advance in two molds (not shown) that are vertically split. With this, the drain section 20c can be formed simultaneously at the time of molding of the plant cultivation vessel 1.

[0083] (Fourth Embodiment)

A drain section 20d provided in a plant cultivation vessel shown in Fig. 8 is in the form of a vertical slit formed in a circumferential portion of the cylindrical portion constituting the overflow pipe 10.

[0084] This vertical slit extends vertically over the whole length of the

overflow pipe 10, thus establishing communication between the bottom face of the water storage section 8 and the inner face of the water discharge pipe 10.

[0085] As illustrated in Fig. 8 (b), most of the plant cultivation water W discharged via this slit-like drain section 20d will flow down inside the water discharge pipe 11 and eventually reach the inside of the overflow pipe 10 of another plant cultivation vessel 1 located downward or the rear bottom wall 3a other than the overflow pipe 10.

[0086] In the case also of the mode of plant cultivation vessel 1 illustrated in Fig. 8, the drain section 20d extends vertically, just like the long side wall 4, the short side walls 5 and the partition wall 6.

[0087] Therefore, when the plant cultivation vessel 1 is to be produced by injection molding of resin, projections for forming the drain section 20d will be provided in advance in two molds (not shown) that are vertically split. With this, the drain section 20d can be formed simultaneously at the time of molding of the plant cultivation vessel 1.

[0088] (Fifth Embodiment)

In the case of a plant cultivation vessel 1 shown in Fig. 9, the overflow pipe 10 has a simple cylindrical shape. And, a drain section 20e is provided in the form of a through hole oriented laterally at the lower end of the overflow pipe 10 in the vicinity of the outer side face of the first reinforcing rib 19a.

[0089] The drain section 20e, in this embodiment, extends generally horizontally. Hence, as illustrated in Fig. 9 (b), most of the plant cultivation water W discharged via the drain section 20e will fall along a parabolic line extending basically laterally away from the first reinforcing rib 19a as it extends downwards and will eventually reach the rear bottom wall 3a excluding the overflow pipe 10, not the inside of the overflow pipe 10 of another plant cultivation vessel disposed downwards.

[0090] (Sixth Embodiment)

In the case of a plant cultivation vessel 1 shown in Fig. 10, at a lower portion of each partition wall 6, a communication passage 9 for establishing communication along the horizontal direction between the respective unit water storage sections 8a is provided in the form of a rectangular cutout.

5 **[0091]** A drain section 20f is in the form of a single through hole formed in the lateral face of the overflow pipe 10. And, this through hole extends along the radial direction of the overflow pipe 10 and has an inner diameter of about 3 mm.

10 **[0092]** As shown in Fig. 10 (b), the position of the lower end of this through hole is set at a level 5 mm higher than the upper face of the center bottom wall 3c constituting the substantial bottom face of the water storage section 8. This arrangement is provided for further restricting the phenomenon of clogging of the drain section 20f with foreign objects in the form of particulate or fibrous matter.

15 **[0093]** As shown in Fig. 6 (a) and Fig. 6 (b), a portion of the cylindrical portion constituting the overflow pipe 10 (a front portion offset toward the center than the corresponding partition wall 6) is comprised of a flat-plate-like wall portion 10b extending generally parallel with the long side wall 4.

20 **[0094]** The drain portion 20f is formed with front-rear orientation through the lower end of this flat-plate-like wall portion 10b, thus establishing communication between the bottom face of the water storage section 8 and the inner face of the water discharge pipe 11.

25 **[0095]** On the left-right side and lower side of the drain section 20f, there is provided a foreign-object trapping projection 21d projecting radially outwards. The foreign-object trapping projection 21d exhibits a partial spherical shape protruding generally forwards on the left and right sides of the drain section 20f in particular.

30 **[0096]** The drain section 20f extends generally horizontal with an angle relative to the perpendicular direction. Hence, most of the plant cultivation

water W discharged from the drain section 20f will fall along a parabolic line extending basically rearwardly away from the flat wall portion 10b as it extends downwards and will eventually reach the water storage section 8 or the plant cultivation bed material A of another plant cultivation vessel disposed downwards, other than the overflow pipe 10.

[0097] Incidentally, in this embodiment, there are provided a rear bottom wall 3a extending obliquely downward from the lower end of the long side wall 4 to the forward side thereof, and an intermediate vertical wall 3d extending generally parallel with the long side wall 4 from the lower end of the rear bottom wall 3a toward the generally horizontal center bottom wall 3c disposed downward. The drain section 20f is disposed at the level adjacent the vertical mid position of this intermediate vertical wall 3d.

[0098] As shown in Fig. 10 (a) and Fig. 10 (b), a blocking plate 24 is provided upwardly of the upper end of the overflow pipe 10.

[0099] The blocking plate 24 is a means for restricting inadvertent entrance of the plant cultivation water W entering the overflow pipe 10 via the upper end of the overflow pipe 10 or the drain section 20f and flowing down the water discharge pipe 11 into the overflow pipe 10 without being fed to the water storage section 8 of the downwardly positioned plant cultivation vessel 1.

[0100] The blocking plate 24 projects laterally from the respective sides of the outer sides of the two left and right partition walls 6, so as to intersect the axis of the overflow pipe 10, and as seen in its plane view, so as to cover most the opening of the overflow pipe 10.

[0101] In the upper end of the overflow pipe 10, from front and rear two portions corresponding to the border relative to the partition wall 6, a pair of connecting portions 25 extend immediately upward toward the blocking plate 24 and are smoothly connected to the front end and the rear end of the blocking plate 24.

[0102] Further, from the circumferential edge portion of the blocking plate

24 excluding the connecting portions 25, a guide wall portion 26 in the form of a thin plate extends upwards. As a result, as the upper face of the blocking plate 24 is sandwiched between the partition wall 6 and the guide wall portion 26, there is formed a groove-like passage extending in the front-rear direction.

[0103] That is, even when the plant cultivation water W flowing down from the upper end of the overflow pipe 10 or the drain section 20f of the upwardly positioned plant cultivation vessel 1 flows down toward the overflow pipe 10, most of this water will be received by the upper face of the blocking plate 24 and then guided by the partition wall 6 and the guide wall portion 26, thus being caused to flow along the front and rear connecting portions 25 via e.g. the outer periphery of the overflow pipe 10 to be fed to the water storage section 8.

[0104] Therefore, there will occur no direct entrance of a great amount of plant cultivation water W from the water discharge pipe 11 of the upper positioned plant cultivation vessel 1 to the inner face of the overflow pipe 10.

[0105] The excess amount of plant cultivation water W accumulated in the water storage section 8 will overflow to the inner side of the overflow pipe 10 via openings Q formed in the upper end of the overflow pipe 10 and the lower face of the blocking plate 24.

[0106] [Other Embodiments]

(1) In the respective first through fifth embodiments described above, the placing face for placing the plant cultivation bed material A thereon is comprised of the rear bottom wall 3a and the front bottom wall 3b of the water storage section 8. Further, in the sixth embodiment described above, this placing face is comprised of the center bottom wall 3c and the rear bottom wall 3a, etc.

[0107] Instead, however, there may be provided a flat bottom wall 3 that extends horizontally from the rear end to the front end of the water storage

section 8 and at frontal positions of this bottom wall 3, there may be provided a plurality of inclined ribs as placing-face forming members.

[0108] In this case, the upper end faces of the plurality of inclined ribs constitute the placing face for placing the plant cultivation bed material A thereon, and these upper end faces form an inclined face having an inclination angle α so that the face is positioned progressively upwards as it extends on the side of the opening of the plant cultivation space 2a and is positioned progressively downwards as it extends away from the opening portion.

[0109] Such plurality of inclined ribs can be formed integral with the bottom wall 3. Alternatively, these inclined ribs can be formed separately from the bottom wall 3. In the case of the separate arrangement, the inclined ribs may be embodied to be placed on the bottom wall 3 to be freely movable thereon, but may be fixed at specific positions on the bottom wall 3.

[0110] In the foregoing first through fifth embodiments, the numeric example of the inclination angle α is set to 14 degrees. However, this may be set appropriately, in accordance with the level of the plant cultivation water W and the size of the plant cultivation bed material A in the water storage section 8 as well as the nature of the plant P, etc. Further, in the case of providing the inclined ribs separately from the front bottom wall 3b, a plurality of kinds of inclined ribs having differing inclination angles α may be prepared for allowing selective use thereof later.

[0111] (2) In the foregoing respective embodiments, the overflow pipe 10 and the guide tube 13 respectively are provided integral with the partition wall 6. Instead, the overflow pipe 10 and the guide tube 13 may be provided separately from the partition wall 6, and may be provided rearwardly of the partition wall 6 for instance.

[0112] (3) In the foregoing respective embodiments, the plant cultivation

space 2 is partitioned by the partition wall 6 into a plurality of unit plant cultivation spaces 2a juxtaposed on the left and right sides. The invention may alternatively be embodied with provision of a single plant cultivation space 2, without this plant cultivation space being partitioned by the partition wall 6 into the unit plant cultivation spaces 2a. Further, in case the partition wall 6 is provided, the number of unit plant cultivation spaces 2a to be partitioned thereby may be chosen as desired, and the invention may be embodied with partitioning it into two or more unit plant cultivation spaces 2a.

10

INDUSTRIAL APPLICABILITY

[0113] For a plant cultivation device including a plant cultivation vessel having a water storage section capable of storing an amount of plant cultivation water therein, a water-absorbing plant cultivation bed material placed in the water storage section, and a water feeding means for feeding plant cultivation water to the water storage section, wherein in the water storage section, there is provided an overflow pipe for discharging an amount of the plant cultivation water in excess of a predetermined level, the invention may be used as a technique for allowing this plant cultivation device to suffer less deterioration in its outside appearance even if an amount of plant cultivation water exceeding the water absorbing capacity of the plant cultivation bed material of the water storage section of the plant cultivation vessel is fed.

25

DESCRIPTION OF REFERENCE SIGNS

[0114]	1	plant cultivation vessel
	1b	plant cultivation water tank
	2	plant cultivation space
	2a	unit plant cultivation space
30	3	bottom wall

	3a	rear bottom wall (bottom wall)
	3b	front bottom wall (bottom wall)
	8	water storage section
	8a	unit water storage section
5	10	overflow pipe
	11	water discharge pipe
	20	drain section (20a, 20b, 20c, 20d, 20e, 20f)
	21a	foreign-object trapping projection
	21b	foreign-object trapping projection
10	21c	foreign-object trapping projection
	30	pump (water feeding means)
	A	plant cultivation bed material
	W	plant cultivation water

15

CLAIMS

1. A plant cultivation device comprising a plant cultivation vessel having a water storage section capable of storing an amount of plant cultivation water therein, a water-absorbing plant cultivation bed material placed in the water storage section, and a water feeding means for feeding plant cultivation water to the water storage section;

wherein in the water storage section, there is provided an overflow pipe for discharging an amount of the plant cultivation water in excess of a predetermined level; and

in the bottom face of the water storage section, there is provided a drain section having a water discharging capacity below the water feeding rate of the water feeding means.

2. The plant cultivation device according to claim 1, wherein a water discharge pipe communicated to the overflow pipe projects downward from the water storage section, and the drain section is configured to establish communication between a bottom face of the water storage section and an inner face of the water discharge pipe.

3. The plant cultivation device according to claim 1 or 2, wherein the drain section extends with forming an angle relative to the perpendicular direction.

4. The plant cultivation device according to claim 1 or 2, wherein laterally of the drain section, there is provided a foreign-object trapping projection for trapping foreign object contained in the plant cultivation water.
