HYDROPONICS

FIELD OF INVENTION

This invention relates to hydroponics. In particular the invention relates to a planter, a planter tower and a hydroponic greenhouse

BACKGROUND OF THE INVENTION

The inventors are aware of hydroponic systems and arrangements. In particular, the inventors filed an earlier South African Patent application number 2014/02082.

Existing planters are prone to plants growing into each other and getting attached to each other in the planter, which make the harvesting of plants from the planter cumbersome.

Furthermore, the present invention has the object of improving planting density without compromising growth.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a planter which includes: a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising: a first longitudinally extending liquid channel having a first channel inlet opening and a first channel outlet opening, wherein a first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening; and a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels, in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel and includes an inlet opening and an outlet opening, the inlet opening and the outlet opening positioned between the first channel inlet opening and the first channel outlet opening and are included in the first flow path between the first channel inlet opening and the first channel outlet opening, and in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

According to a second aspect of the invention, there is provided a planter tower, which includes: a plurality of planters, connected together to form an elongate upright planter with plant holders extending from the sides of the planter tower, at least one planter of the plurality of planters comprising: a longitudinal body defining two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising: a first longitudinally extending liquid channel having a first channel inlet opening and a first channel outlet opening, wherein a first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening; and a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the two longitudinally extending liquid channels, in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel and includes an inlet opening and an outlet opening, the inlet opening and the outlet opening positioned between the first channel inlet opening and the first channel outlet opening and are included in the first flow path between the first channel inlet opening and the first channel outlet opening, and in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

According to a third aspect of the invention, there is provided a hydroponic greenhouse, which includes: an array of planter towers arranged in parallel spaced rows, the rows being provided with a top liquid supply line and a top gas supply line, connected via an intake closure to a top of each of the planter towers, the rows further being provided with a bottom liquid collection line and a bottom gas collection line, connected via an outlet closure to a bottom of each of the planter towers, at least one of the plant towers including a planter comprising: a longitudinal body defining two longitudinally extending liquid channels; and at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with one of the two longitudinally extending liquid channels, in which a first plant holder of the at least two plant holders is in fluid flow communication with a first longitudinally extending liquid channel of the two longitudinally extending liquid

channels, and in which a second plant holder of the at least two plant holders is in fluid flow communication with a second longitudinally extending liquid channel of the two longitudinally extending liquid channels, the second longitudinally extending liquid channel distinct from the first longitudinally extending liquid channel; a liquid circulation system, connected to the top liquid supply lines and the bottom liquid collection lines; and a gas circulation system, connected to the top gas supply lines and the bottom gas collection lines.

According to a fourth aspect of the invention, there is provided a planter comprising: a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising: a first longitudinally extending liquid channel; and a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; at least two plant holders defined in the longitudinal body, the at least two plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels, in which at least one plant holder has a corresponding mouth; and an external attachment formation associated with the at least one plant holder for attaching a plant support; and in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel, and in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

According to a fifth aspect of the invention, there is provided a planter comprising: a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising: a first longitudinally extending liquid channel; and a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels; and a planting insert shaped and dimensioned to fit into mouths of the at least two plant holders, in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel, and in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

CLAIMS

1. A planter which includes:

a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising:

a first longitudinally extending liquid channel having a first channel inlet opening and a first channel outlet opening, wherein a first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening; and

a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and

at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels,

in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel and includes an inlet opening and an outlet opening, the inlet opening and the outlet opening positioned between the first channel inlet opening and the first channel outlet opening and are included in the first flow path between the first channel inlet opening and the first channel outlet opening, and

in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

2. The planter as claimed in claim 1, in which the longitudinal body includes a longitudinal conduit which is internally divided to define the at least two longitudinally extending liquid channels.

3. The planter as claimed in claim 1, in which the at least two plant holders are located on opposed sides of the longitudinal body, wherein each of the at least two longitudinally extending liquid channels extends from an upper end of the longitudinal body.

4. The planter as claimed in claim 1, in which the at least two plant holders are alternatively spaced on opposed sides over the length of the longitudinal body, and in which the at least two plant holders defined in the longitudinal body are integrally formed with the longitudinal body, and each of the plant holders defined in the longitudinal body are integrally formed with the longitudinal body.

5. The planter as claimed in claim 1, in which:

the first plant holder has the inlet opening, the outlet opening, and a corresponding mouth that is distinct from the inlet opening and the outlet opening, and

the longitudinal body includes connecting formations at the ends of the longitudinal body, the connecting formations are shaped and dimensioned to fit into corresponding connection formations of corresponding planters, and the connecting formations include:

liquid channel connecting formations for connecting the liquid channels of longitudinal bodies of adjacent planters; or

gas channel connecting formations for connecting the gas channels of longitudinal bodies of adjacent planters.

6. The planter as claimed in claim 1, in which each plant holder includes an inlet opening and an outlet opening, which is in flow communication with its corresponding longitudinally extending liquid channel, and in which the inlet opening is located above the outlet opening to enable gravitational liquid flow into the plant holder through the inlet opening and liquid flow from the plant holder through the outlet opening.

7. The planter as claimed in claim 1, in which the planter includes at least one longitudinally extending gas channel, the at least one longitudinally extending gas channel having gas outlets spaced along its length, and in which the planter is configured to be coupled to a plurality of planters connected together to form a plant tower having interconnected liquid channels, the plant tower included in an array of planter towers included in a hydroponic greenhouse, the array of planter towers arranged in parallel spaced rows, the rows being provided with a top liquid and gas supply line, connected via an intake closure to a top of each of the planter towers, the rows further being provided with a bottom liquid and gas collection line, connected via an outlet

closure to a bottom of each of the planter towers, the liquid supply lines and the liquid collection lines connected to a liquid circulation system of the hydroponic greenhouse, and the gas supply lines and the gas collection lines connected to a gas circulation system of the hydroponic greenhouse.

8. The planter as claimed in claim 1, in which each plant holder has a corresponding mouth, and in which the planter includes an external attachment formation associated with each plant holder for attaching a plant support, the attachment formation is located below the plant holder mouth, and the plant support is in the form of a creeper trellis arranged to support a creeper plant, planted in the plant holder when it grows from the plant holder mouth.

9. The planter as claimed in claim 1, in which the planter includes planting inserts shaped and dimensioned to fit into mouths of the at least two plant holders. and in which the planting inserts are selected from any one or more of: a seedling tray, a planting tray and a seeding clip.

10. The planter as claimed in claim 9, in which each plant holder includes an inlet opening, and in which the seedling tray is in the form of a cylindrical body, shaped to the shape of the plant holder and includes an inlet opening indexed with the inlet opening of the plant holder, the seedling tray includes a planar base cut in sections to provide drainage slits to enable liquid drainage without flushing seedlings from the seedling tray.

11. The planter as claimed in claim 9, in which each plant holder includes an inlet opening, and in which the planting tray is in the form of a cylindrical body shaped to the shape of the plant holder and includes an inlet opening indexed with the inlet opening of the plant holder, the planting tray includes a planar base cut in sections to provide drainage slits to enable liquid drainage without flushing seedlings from the seedling tray.

12. The planter as claimed in claim 9, in which each plant holder has a corresponding mouth, and in which the seeding clip has a planar body for closing the plant holder mouth and provided with a downwardly projecting plate having a slot shaped to engage the stem of a plant.

13. A planter tower, which includes:

a plurality of planters, connected together to form an elongate upright planter with plant holders extending from the sides of the planter tower, at least one planter of the plurality of planters comprising:

a longitudinal body defining two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising:

a first longitudinally extending liquid channel having a first channel inlet opening and a first channel outlet opening, wherein a first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening; and

a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and

at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the two longitudinally extending liquid channels,

in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel and includes an inlet opening and an outlet opening, the inlet opening and the outlet opening positioned between the first channel inlet opening and the first channel outlet opening and are included in the first flow path between the first channel inlet opening and the first channel outlet opening, and

in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

14. The planter tower as claimed in claim 13, in which:

a top end of the plurality of planters defines the first channel inlet opening of the first longitudinally extending liquid channel,

a bottom end of the plurality of planters defines the first channel outlet opening of the first longitudinally extending liquid channel, and

the first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening

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15. The planter tower as claimed in claim 13, in which:

the first longitudinally extending liquid channel has a first channel inlet opening and a first channel outlet opening, wherein a first flow path of the first longitudinally extending liquid channel extends from the first channel inlet opening to the first channel outlet opening; and

the planter tower includes two end members, a top end member for connecting to the top end of the plurality of planters and a bottom end member for connecting to the bottom end of the plurality of planters.

16. The planter tower as claimed in claim 15, in which:

the top end member is in the form of an intake closure attached at a top end of a plurality of inter-connected planters for directing liquid into the two longitudinally extending liquid channels and for directing gas into at least one longitudinally extending gas channel; or

the bottom end member is in the form of an outlet closure attached at a bottom end of a plurality of inter-connected planters for directing liquid from the two longitudinally extending liquid channels and for directing gas from the at least one longitudinally extending gas channel.

17. A hydroponic greenhouse, which includes:

an array of planter towers arranged in parallel spaced rows, the rows being provided with a top liquid supply line and a top gas supply line, connected via an intake closure to a top of each of the planter towers, the rows further being provided with a bottom liquid collection line and a bottom gas collection line, connected via an outlet closure to a bottom of each of the planter towers, at least one of the plant towers including a planter comprising:

a longitudinal body defining two longitudinally extending liquid channels; and

at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with one of the two longitudinally extending liquid channels,

in which a first plant holder of the at least two plant holders is in fluid flow communication with a first longitudinally extending liquid channel of the two longitudinally extending liquid channels, and in which a second plant holder of the at least two plant holders is in fluid flow communication with a second longitudinally extending liquid channel of the two longitudinally extending liquid channels, the second longitudinally extending liquid channel distinct from the first longitudinally extending liquid channel;

a liquid circulation system, connected to the top liquid supply lines and the bottom liquid collection lines; and

a gas circulation system, connected to the top gas supply lines and the bottom gas collection lines.

18. The hydroponic greenhouse as claimed in claim 17, in which gas outlets of the planters, are directed to the outsides of the planter bodies, the gas outlets being directed at plants in an adjacent planter tower.

19. The hydroponic greenhouse as claimed in claim 17, in which:

the hydroponic greenhouse includes a partially closed enclosure, which is provided with any one or more of: air conditioners, high pressure fans, dampers, coiled coolers for recirculation of the liquid or gas from the liquid collection lines to the liquid supply lines or alternatively gas supply lines, geothermal heater/coolers, heat pumps, humidity controllers and infra-red controllers; or

the hydroponic greenhouse is provided with a nutrient supply dosing pump connected to the liquid circulation system for dosing nutrients into the liquid circulation system or is provided with a filtering arrangement connected to the liquid circulation system for filtering the liquid in the liquid circulation system.

20. A planter comprising:

a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising:

a first longitudinally extending liquid channel; and

a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel;

at least two plant holders defined in the longitudinal body, the at least two plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels, in which at least one plant holder has a corresponding mouth; and

an external attachment formation associated with the at least one plant holder for attaching a plant support; and

in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel, and

in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

21. The planter of claim 20, in which the attachment formation is located below the plant holder mouth.

22. The planter of claim 20, in which the plant support is in the form of a creeper trellis arranged to support a creeper plant, planted in the plant holder when it grows from the plant holder mouth.

23. A planter comprising:

a longitudinal body defining at least two longitudinally extending liquid channels, the two longitudinally extending liquid channels comprising:

a first longitudinally extending liquid channel; and

a second longitudinally extending liquid channel that is distinct from the first longitudinally extending liquid channel; and

at least two plant holders defined in the longitudinal body, the plant holders spaced on the outer circumference of the longitudinal body, each one of the at least two plant holders in fluid flow communication with a corresponding single one of the at least two longitudinally extending liquid channels; and

a planting insert shaped and dimensioned to fit into mouths of the at least two plant holders,

in which a first plant holder of the at least two plant holders is in fluid flow communication with the first longitudinally extending liquid channel, and

in which a second plant holder of the at least two plant holders is in fluid flow communication with the second longitudinally extending liquid channel.

24. The planter of claim 23, in which the planter includes multiple planting inserts, each of the multiple planting inserts shaped and dimensioned to fit into the mouths of the at least two plant holders.

25. The planter of claim 23, in which the planting insert is selected from any one or more of: a seedling tray, a planting tray and a seeding clip.