

INDOOR PLANTING DEVICE WITH AUTOMATIC SOWING AND PICKING FUNCTIONS

TECHNICAL FIELD

[0001] The disclosure relates to the technical field of household appliances, in particular to an indoor planting device with automatic sowing and picking functions.

BACKGROUND

[0002] Vegetables are one of the indispensable foods for people. They not only contain minerals, vitamins, fiber, etc., but also have high content in water and dietary fiber. Due to the accelerating pace of life and the popularization of pesticides and auxin, green and pollution-free vegetables are now very precious. Therefore, many families grow vegetables on their balconies. As for an existing household planting method, planting containers and related utensils are usually used for planting. However, by using such method of planting vegetables, the vegetables have long growth cycles, which is difficult to ensure the growth vigour of the vegetables; and people are required to water and take care of the vegetables regularly, which consumes a lot of energy and time, so it is less practical.

[0003] In soilless cultivation activities of the vegetables, especially in household planting activities, in order to increase the effective utilization of space and facilitate management, culturing pots are usually placed on a vertical-type planting device of a multi-layer structure, so that the multiple layers of culturing pots are stacked on each other, reducing the space occupied by the culturing pots and improving the yield per unit space. However, it causes that some vegetables cannot get enough sunlight, which affects the normal photosynthesis of the vegetables. However, if the vegetables or fruits are growing well or have completed their growth and can be picked, they cannot be automatically picked and put into designated collection equipment or storage equipment. At the same time, when it is found that some seeds have not germinated or are poor in growth, they cannot be removed in time, and consequently new seeds cannot be planted.

SUMMARY

[0004] The disclosure mainly aims to solve the problems existing in the prior art, and provides an indoor planting device with automatic sowing and picking functions.

[0005] In order to solve the above problems, the disclosure provides an indoor planting device with automatic sowing and picking functions, including: a circulating water supply. A planting unit is disposed at the top of the circulating water supply. The planting unit is composed of a plurality of sets of planting layers. A picking mechanical arm mechanism is mounted on a column frame of a respective planting layer. The picking mechanical arm mechanism includes:

[0006] grasping portions having grasping faces for grasping outer surfaces of fruits or vegetables, wherein

[0007] the grasping faces are equipped with flexible linings, each including a plurality of pneumatic suction cups;

[0008] a separation portion having a cutting tool for cutting stalks of the fruits or vegetables;

[0009] a positioning portion for acquiring position information of the fruits or vegetables, which communicatively connects the grasping portions with the separation portion; and

[0010] a slidable mount with the positioning portion, the separation portion and the grasping portions being mounted thereon side by side in sequence.

[0011] The separation portion includes a cutting driver and a profiler.

[0012] An output end of the cutting driver is connected with the cutting tool, and the profiler is disposed on one side of the cutting tool and having a guide structure for directing and positioning locations of the stalks.

[0013] A second rotation table is mounted on the slidable mount, the profiler including a profiling wheel and a profiling fixing frame, and the profiling fixing frame includes a fixed segment and a floating segment, one end of the fixed segment being connected with the second rotation table, one end of the floating segment being connected with the profiling wheel, the fixed segment and the floating segment being hinged at a preset angle by means of a pin shaft, a torsional spring being mounted on the pin shaft, one of supporting feet of the torsional spring being connected with the fixed segment, and the other one of the supporting

feet of the torsional spring being connected with the end of the floating segment away from the profiling wheel.

[0014] The cutting driver includes a retractable driving mechanism and a vibrator, a retractable end of the retractable driving mechanism being connected with the vibrator, the vibrator being connected with the cutting tool, a tool edge of the cutting tool facing the grasping portions.

[0015] Further, a lighting part, a fresh air part and a camera are disposed at the bottom of each of the sets of the planting layer. The lighting part is configured to provide light for a respective planting layer therebelow. The fresh air part is configured to speed up the air flow of the planting layer therebelow.

[0016] The column frame of the respective planting layer and the planting layer are provided with a slide at their outer surfaces. The slidable mount is mounted inside the slide to realize movement for positioning.

[0017] Further, the circulating water supply is provided with a water tank and a water pump. The water tank is disposed at the bottom of a planting unit. The water pump is disposed inside the water tank. A water supply end of the water pump is connected with a water supply pipe. The water pump provides water for the planting layers by means of the water supply pipe.

[0018] Further, a water temperature sensor and a liquid level meter are respectively disposed inside the water tank. The water temperature sensor is configured to measure the liquid temperature inside the water tank. The liquid level meter is configured to measure the liquid level height inside the water tank.

[0019] Further, each of the planting layers includes a planting box, a planting plate, a diversion vertical column and a routing vertical column. The planting box is internally provided with an S-shaped diversion cavity. A plurality of sets of planting holes are evenly formed in the planting plate. Ends of the diversion vertical column and ends of the routing vertical column are both connected with adjacent planting boxes. The diversion vertical column and the routing vertical column are configured to support adjacent planting layers. The diversion vertical column is also configured to contain the water supply pipe, and the routing vertical column is also configured to contain wires.

[0020] Further, slots are disposed in the ends of the diversion vertical columns and the ends of the routing vertical columns, respectively. Inserts are disposed on each of the planting boxes. The structure of each of the inserts is matched with that of a respective one of the slots.

[0021] Further, a water delivery channel is also disposed in the diversion vertical column, and the water delivery channel is configured to provide water for a respective planting box therebelow.

[0022] Further, two sets of auxiliary vertical columns are also disposed between every two adjacent planting layers. Plug connection portions are disposed at the two ends of each of the auxiliary vertical columns. Plug connection holes are disposed in the planting box. The structure of each of the plug connection portions is matched with that of a respective one of the plug connection holes.

[0023] Further, a silent block is disposed in the S-shaped diversion cavity inside each of the planting boxes. The silent block is located below an outlet end of a respective water delivery channel. A water outlet is disposed in an outlet end of the S-shaped diversion cavity. The water outlet is configured to discharge water into a respective planting layer therebelow.

[0024] Further, the lighting part is disposed as LED strip.

[0025] Further, the fresh air part is disposed as cross flow fan.

[0026] Further, a control box is disposed at the top of planting unit. A control unit is disposed in the control box. A control panel is disposed on the outer wall of the control box. A carbon dioxide sensor and a cooling fan are adjacently disposed in the control box.

[0027] Specifically, the control unit is electrically connected with the control panel, the lighting parts, the fresh air parts, the carbon dioxide sensor, the cooling fan, the water pump, the liquid level meter and the water temperature sensor, respectively.

[0028] Further, a box cover is disposed at the top of the control box. Ventilation windows are formed in the box cover.

[0029] Further, a lighting part and a fresh air part are adjacently disposed at the bottom of the control box. The lighting part is configured to provide light for the planting layer at the top of the planting unit. The fresh air part is configured to increase the air flowing speed between the corresponding planting layers.

[0030] The disclosure is expected to exhibit the following advantages and beneficial effects:

[0031] 1. A nutrient solution storage box is provided with a liquid level sensor which feeds back the condition of a nutrient solution in the box body, thus the nutrient solution is added in time.

[0032] 2. By disposing a camera to be connected with a personal computer, a person can learn about the planting of vegetables by observing their videos.

[0033] 3. It is found through observation that if the vegetables lack the nutrient solution or water, they can be automatically irrigated by turning on the circulating water supply.

[0034] 4. If the vegetables are growing well or have completed their growth and can be picked, they can be picked by means of a disposed manipulator and put into designated collection equipment or storage equipment.

[0035] 5. When it is found that some seeds have not germinated or are poor in growth, they are removed by means of the disposed manipulator, and new seeds are planted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] FIG. 1 is a schematic structural diagram of the disclosure;

[0037] FIG. 2 is a schematic structural diagram of a picking mechanical arm mechanism ;

[0038] FIG. 3 is a schematic structural diagram of a grasping portion in an open state;

[0039] FIG. 4 is a schematic structural diagram of a grasping portion in a grasping state;

[0040] FIG. 5 is a schematic structural diagram of a water tank;

[0041] FIG. 6 is a schematic exploded diagram of a planting layer;

[0042] FIG. 7 is a top view of a planting box;

[0043] FIG. 8 is a bottom view of a planting box;

[0044] FIG. 9 is a schematic diagram of the positional relationship among a control box, a control unit, a carbon dioxide sensor and a cooling fan;

Reference signs:

1. circulating water supply; 101. water tank; 102. water pump; 2. planting layer; 201. planting box; 202. planting plate; 203. diversion vertical column; 204. routing vertical column; 3. lighting part; 4. fresh air part; 5. water temperature sensor; 6. insert; 7. slot; 8. auxiliary vertical column; 9. plug connection portion; 10. plug connection hole; 11. silent block; 12.

control box; 13. control unit; 14. control panel; 15. carbon dioxide sensor; 16. cooling fan; 17. box cover; 18. ventilation window; 19. diversion cavity; 20. picking mechanical arm mechanism; 2001. grasping portion; 20011. rotation segment; 20012. pneumatic suction cup; 20013. leg segment; 20014. shin segment; 20015. tarsus segment; 20016. rotation driving segment; 2002. separation portion; 20021. retractable driving mechanism; 20022. vibrator; 20023. cutting tool; 2003. positioning portion; 2004. slidable mount; 2005. second rotation table; 2006. first rotation table; 200222. profiling wheel; 200223. profiling fixing frame; 205. slide; 21. camera.

DETAILED DESCRIPTION

[0045] For a better understanding of the disclosure, the disclosure is further described below in conjunction with specific embodiments and accompanying drawings.

[0046] As shown in FIGS.1 to 9, an indoor planting device with automatic sowing and picking functions includes a circulating water supply 1. A planting unit is disposed at the top of the circulating water supply 1. The planting unit is composed of a plurality of sets of planting layers 2. A lighting part 3 and a fresh air part 4 are disposed at the bottom of each set of the planting layers 2. The lighting part 3 is configured to provide light for the planting layers 2 therebelow. The fresh air part 4 is configured to speed up the air flow of the planting layer 2 therebelow. In the disclosure, the circulating water supply 1 can be configured to conduct circulating water supply on the planting unit, so as to ensure that each planting layer 2 contained in the planting unit can obtain sufficient water, and the lighting part 3 is configured to provide light for vegetables planted at a respective planting layer 2, ensuring that the vegetables receive sufficient light for their photosynthesis. Since the photosynthesis of plants can consume carbon dioxide and reduce the concentration of the carbon dioxide around the plants, by using the fresh air parts 4, the flow of gas near the planting layers 2 can be sped up to ensure the stability of the concentration of carbon dioxide around the planting layers 2 so as to ensure that the planted vegetables can stably grow.

[0047] In the disclosure, a picking mechanical arm mechanism 20 includes grasping portions 2001 each having grasping faces for grasping outer surfaces of fruits or vegetables; a separation portion 2002 having a cutting tool 20023 for cutting stalks of the fruits or

vegetables; a positioning portion 2003 configured to acquire position information of the fruits or vegetables and to communicatively connect the grasping portions 2001 with the separation portion 2002.

[0048] Specifically, when the fruits or vegetables are picked by the fruit/vegetable picking mechanical arm mechanism 20 shown in this embodiment, after the fruits or vegetables are delivered to the positions near the fruits or vegetables through the cooperative motion of slide and a slidable mount relative to each other, based on the position information of the fruits or vegetables acquired by the positioning portion 2003, postures of the grasping portions 2001 and the separation portion 2002 can be adjusted respectively. The column frame of the respective planting layer 2 and the planting layer 2 are provided with a slide 205 at their outer surfaces. After the fruits or vegetables are hooked, held and fixed successively by the grasping portions 2001, the corresponding stalks of the fixed fruits or vegetables may be cut by the separation portion 2002, which can effectively reduce the interference and disturbance in the picking process, thereby ensuring the positioning accuracy of the fruits or vegetables, and improving the quality and success rate of picking.

[0049] When the positioning portion 2003 shown in this embodiment acquires the position information of the fruits or vegetables, a two-dimensional laser radar, an ultrasonic sensor, a binocular camera, etc. as known in the art can be used. Since the binocular camera, which is small in size and convenient to mount, can directly acquire images of current locations of the fruits or vegetables to perform binocular vision positioning on the fruits or vegetables, and can effectively track the postures of the fruits or vegetables, the positioning portion 2003 shown in this embodiment is preferably a binocular camera.

[0050] Both the grasping portions 2001 and the separation portion 2002 shown in this embodiment can be electric parts, and can adjust their postures based on the position information of the fruits or vegetables provided by the positioning portion 2003, so that fruits or vegetables at the corresponding locations are grasped by the grasping portions 2001, and the stalks of the fruits or vegetables are cut by the separation portion 2002.

[0051] The positioning portion 2003, the separation portion 2002 and the grasping portions 2001 shown in this embodiment are mounted on the slidable mount 2004 side by side in sequence. When the slidable mount 2004 is vertically arranged, the positioning portion 2003,

the separation portion 2002 and the grasping portions 2001 are arranged side by side from top to bottom in sequence. Here, disposing the positioning portion 2003 on the uppermost position is beneficial to acquire a position with a greater angle of view so as to position the fruits or vegetables and prevent the influence caused by branches and leaves of plants to positioning operation of the positioning portion 2003. When the fruits or vegetables are ripe, usually the stalks are on the top, and the fruits or vegetables are located on the lower sides of the stalks, thus the separation portion 2002 is disposed on the lower sides of the grasping portions 2001, so that the fruits or vegetables are grasped by the grasping portions 2001 firstly, and then the stalks of the fruits or vegetables are cut by the separation portion 2002.

[0052] The grasping portions 2001 can be mounted at the rotation end of the first rotation table 2006, and the fixed end of the first rotation table 2006 is mounted on the slidable mount 2004. When the current state of the grasping portions 2001 has a large deviation from the position information of the fruits or vegetables fed back by the positioning portion 2003, the first rotation table 2006 can be controlled to conduct rotation adjustment on the grasping portions 2001 in a direction perpendicular to the end face of the slidable mount 2004 (in the axial direction of the first rotation table 2006), so as to adjust the postures of the grasping portions 2001 based on the first rotation table 2006, thereby facilitating better grasping of the fruits or vegetables by the grasping portions 2001. Correspondingly, the separation portion 2002 can be mounted at the rotation end of the second rotation table 2005, and the fixed end of the second rotation table 2005 is mounted on the slidable mount 2004, so as to adjust the posture of the separation portion 2002 based on the second rotation table 2005, thereby facilitating accurate cutting operation of the stalks of the fruits or vegetables by the separation portion 2002.

[0053] The grasping portions 2001 are each specifically provided with four bionic segments, which are respectively a rotation segment 20011, a leg segment 20013, a shin segment 20014 and a tarsus segment 20015. The rotation segment 20011, the leg segment 20013, the shin segment 20014 and the tarsus segment 20015 are connected in sequence by means of rotation driving segments 20016. Since one end of the rotation segment 20011 is directly connected with the first rotation table 5, the rotation segment 20011 can be disposed into a straight rod shape. Since the leg segment 20013, the shin segment 20014 and the tarsus segment 20015

are respectively used to grasp the fruits or vegetables, in order to adapt to the shapes of the outer walls of the fruits or vegetables, the leg segment 20013, the shin segment 20014 and the tarsus segment 20015 can be designed into a circular arc shape. However, the leg segment 20013 is designed to have a length larger than that of the shin segment 20014, and the leg segment 20013 and the shin segment 20014 each can be of a rigid structure. In order to prevent the tarsus segment 20015 from damaging the outer surfaces of the fruits or vegetables during any possible action, the tarsus segment 20015 can be made of a flexible plate.

[0054] Further, the cutting tool 20023 is driven by means of the retractable driving mechanism 20021 and the vibrator 20022.

[0055] The circulating water supply 1 is provided with a water tank 101 and a water pump 102. The water tank 101 is disposed at the bottom of the planting unit. The water pump 102 is disposed inside the water tank 101. The water supply end of the water pump 102 is connected with a water supply pipe. The water pump 102 supplies water to the corresponding planting layer 2 by means of the water supply pipe. A water temperature sensor 5 and a liquid level meter are respectively disposed inside the water tank 101. The water temperature sensor 5 is configured to measure the liquid temperature inside the water tank 101. The liquid level meter is configured to measure the liquid level height inside the water tank 101.

[0056] Specifically, in the disclosure, the circulating water supply 1 is configured to continuously provide a nutrient solution for various planting layers 2 in the planting unit. In the water supplying process, the water pump 102 pumps water inside the water tank 101 and conveys it into each of the planting layers 2 by means of water supply pipe. Meanwhile, the liquid level meter inside the water tank 101 monitors the liquid level height of the water inside the water tank 101, so that the water can be replenished in time when it is insufficient. In order to ensure the rapid growth of the plants, nutrient substances that promote plant growth can be placed into the water tank 101. In order to ensure the appropriate water temperature inside the water tank 101, the water temperature inside the water tank 101 can be measured by means of the water temperature sensor 5, so as to make the nutrient substances inside the water tank 101 fully dissolved.

[0057] The planting layers 2 each includes a planting box 201, a planting plate 202, a diversion vertical column 203 and a routing vertical column 204. Each planting box 201 is

internally provided with an S-shaped diversion cavity 19. A plurality of sets of planting holes are evenly formed in each planting plate 202. The ends of the diversion vertical column 203 and the ends of the routing vertical column 204 are both connected with adjacent planting boxes 201. The diversion vertical column 203 and the routing vertical column 204 are configured to support adjacent planting layers 2. The diversion vertical column 203 is also configured to contain the water supply pipe, and the routing vertical column 204 is also configured to contain wires. Slots 7 are disposed at the ends of the diversion vertical column 203 and the ends of the routing vertical column 204, respectively. Inserts 6 are disposed on each of the planting boxes 201. The structure of each of the inserts 6 is matched with that of a respective one of the slots 7. Water delivery channel is also disposed in the diversion vertical column 203, and the water delivery channel is configured to provide water for the planting boxes 201 therebelow.

[0058] Specifically, in the disclosure, the vegetables are planted and cultivated by means of the planting layers 2. The vegetables can be planted inside the planting holes by forming the plurality of sets of planting holes in the planting plate 202. The water supply pipe can be contained in the corresponding diversion vertical column 203. The circulating water supply 1 can pump a water flow into the topmost planting layer 2 of the planting unit by means of the water supply pipe, so that the water supply pipe releases water into the water delivery channel of the diversion vertical column 203 in the top planting layer 2 to make the water flow into the S-shaped diversion cavity 19 of the corresponding planting box 201. By forming the slots 7 in the ends of the diversion vertical column 203 and the ends of the routing vertical column 204 and disposing the inserts 6 on the planting box 201, each of the planting layers 2 will be convenient to dismount and mount and also convenient to assemble, so as to select an appropriate number of planting layers 2 according to actual needs.

[0059] Two sets of auxiliary vertical columns 8 are also disposed between every two adjacent planting layers 2. Plug connection portions 9 are disposed at the both ends of each of the auxiliary vertical columns 8. Plug connection holes 10 are disposed in the planting box 201. The structure of each of the plug connection portions 9 is matched with that of a respective one of the plug connection holes 10. Supporting firmness between the planting boxes 201 can be improved by means of the auxiliary vertical columns 8, and plug

connection ends disposed at the ends of the auxiliary vertical columns 8 are matched with the plug connection holes 10 disposed in the planting boxes 201 in structure, so as to facilitate assembly and disassembly between the planting layers 2.

[0060] A silent block 11 is disposed in the S-shaped diversion cavity 19 inside each planting box 201. Each silent block 11 is located below an outlet end of the corresponding water delivery channel. A water outlet is disposed in the outlet end of each S-shaped diversion cavity 19. The water outlet is configured to discharge water into the planting layer 2 therebelow. When the water flow inside the water delivery channels flows into the planting layers 2 from top to bottom, the outflowing water will drop on the silent blocks 11. The sound produced when the water flows can be reduced by means of the sound reduction effect of the silent blocks 11. By disposing the S-shaped diversion cavities 19 inside the planting boxes, roots of the vegetables planted on the planting plates 202 can be immersed in the water, and the water flows into the planting layers 2 below the water outlets by means of the water outlets. In order to ensure that there is water inside a water flow cavity of each planting layer 2, the water outlets can be disposed slightly higher than the bottom faces of the S-shaped diversion cavities 19.

[0061] The lighting part 3 is disposed as LED strip. The fresh air part 4 is disposed as cross flow fan. By disposing the lighting part 3 into the LED strip, electric energy can also be saved under the condition of ensuring sufficient light. When the fresh air part 4 is disposed into the cross flow fan, the air from which is relatively concentrated, the air flow is conveyed farther, so it is easy to change the direction of the air flow.

[0062] A control box 12 is disposed at the top of planting unit. A control unit 13 is disposed in the control box 12. A control panel 14 is disposed on the outer wall of the control box 12. A carbon dioxide sensor 15 and a cooling fan 16 are adjacently disposed in the control box 12. The control unit 13 is electrically connected with the control panel 14, the lighting parts 3, the fresh air parts 4, the carbon dioxide sensor 15, the cooling fan 16, the water pump 102, the liquid level meter and the water temperature sensor 5, respectively. A box cover 17 is disposed at the top of the control box 12. Ventilation windows 18 are formed in the box cover 17, so as to facilitate exchange and circulation of gas inside and outside the control box 12.

[0063] Specifically, during operation of the disclosure, the carbon dioxide sensor 15 can be

configured to detect the concentration of carbon dioxide in the nearby area and feeds back its detection result to the control unit 13. When the concentration of the carbon dioxide is too low, the control unit 13 will control the fresh air parts 4 to work, and use the fresh air parts 4 to speed up the air flow near the planting layers 2 to ensure the stable concentration of the carbon dioxide near the planting layers 2. Continuous operation of the control unit 13 inside the control box 12 will generate a certain amount of heat, and the heat inside the box body can be dissipated by means of the cooling fan 16 to ensure that the temperature inside the control box 12 will not be too high. By means of the control panel 14, on-off switching of the circulating water supply 1 and the lighting parts 3 can be controlled, and meanwhile light brightness of the lighting parts 3 are adjustable, so as to meet different lighting needs of vegetable growth.

[0064] The corresponding lighting part 3 and fresh air part 4 are adjacently disposed at the bottom of the control box 12. The corresponding lighting part 3 is configured to provide light for a respective planting layer 2 at the top of the planting unit. The corresponding fresh air part 4 is configured to increase the air flowing speed between the corresponding planting layers. By disposing the corresponding lighting part 3 and fresh air part 4 at the bottom of the control box 12, light can be provided for the topmost planting layer 2 of the planting unit, and the flow of gas near the topmost planting layer 2 can be sped up. Similarly, in order to ensure that the bottommost planting layer 2 in the planting unit can be stably disposed on the circulating water supply 1, the planting layer 2 at the bottom of the planting unit can be embedded in the water tank 101, and a water filling port is formed in this planting layer 2, so as to replenish water inside the water tank 101.

[0065] Additionally, the above-mentioned silent blocks 11 can be made of a material with good water absorption such as sponge, so that the water flow is absorbed in time when it drops on the silent blocks 11, and it is not prone to rebound and impact and produce a large sound. A submersible pump can be used as the water pump 102, which is convenient for working in the water for a long time. An electronic liquid level meter can be used as the liquid level meter, which is accurate in metering and convenient to use. Both the specific structures and working principles of the silent block 11, the control unit 13, the control panel 14, the lighting parts 3, the fresh air parts 4, the carbon dioxide sensor 15, the cooling fan 16,

the water pump 102, the liquid level meter and the water temperature sensor 5 all belong to the prior art of the technical field, and have not been modified herein. Moreover, the electric connection relationship, the electric connection structures and the electric connection modes of the control unit 13 with the control panel 14, the lighting parts 3, the fresh air parts 4, the carbon dioxide sensor 15, the cooling fan 16, the water pump 102, the liquid level meter and the water temperature sensor 5 all belong to the prior art of the technical field, and have not been modified and thus will not be described in detail.

[0066] The disclosure is simple in structure, stable and reliable. By utilizing the planting unit composed of the plurality of sets of planting layers 2, a planting area can be provided for the vegetables. By using the lighting parts 3, sufficient light can be provided for the growth of the vegetables to ensure that the vegetables can conduct their photosynthesis. By cooperatively using the fresh air parts 4, the flow of air near the planting layers can be sped up to ensure the stability of the concentration of the carbon dioxide around, thereby ensuring the stable growth of the vegetables. The circulating water supply 1 is configured to supply water to each of the planting layers 2 to ensure that each planting box 201 has sufficient water for vegetables to absorb. The silent blocks 11 are disposed inside the S-shaped diversion cavities 19 inside the planting boxes 102, which can reduce the noise when the water flow flows onto the silent blocks 11, so the practicability is good. The basic operation principle of the disclosure is described as follows.

[0067] A user plants vegetables on the planting layers 2 in the planting unit, so that the vegetables are cultivated in the planting holes. The control panel 14 controls the disclosed system to work, so that the circulating water supply 1 and the lighting parts 3 provided by the disclosure start to operate to provide light and water for the vegetables in the planting unit. The water pump 102 in the water tank 101 pumps the water inside the water tank 101 into the water supply pipe, conveys it into the topmost planting layer 2 of the planting unit via the water supply pipe disposed in the corresponding diversion vertical column 203, and discharges it into the corresponding water delivery channel. The water flow flows downwards into the corresponding planting box 201 via the corresponding water delivery channel and flows onto the corresponding silent block 11 to reduce the noise produced when the water flows. After flowing into the S-shaped diversion cavity 19 inside the corresponding planting

box 201, the water flow can provide water for the roots of the vegetables immersed in the S-shaped diversion cavity 19, and is discharged out via the water outlet disposed in the S-shaped diversion cavity 19 into the diversion vertical column 203 below the water outlet. The cycle repeats until the water flow is discharged into the bottommost planting layer 2 and then discharged into the water tank 101 by means of the water outlet of the bottommost planting layer 2 to complete the circulating supply of the water flow.

[0068] The carbon dioxide sensor 15 inside the control box 12 is configured to detect the concentration of carbon dioxide in the nearby area and feeds back the measurement result to the control unit 13. When the concentration of the carbon dioxide is too low, the control unit 13 will control the fresh air parts 4 to operate to make the fresh air parts 4 speed up the flow of gas near the planting layers 2 so as to ensure the stable concentration of the carbon dioxide around, thereby ensuring the stable growth of the vegetables.

[0069] The embodiments of the disclosure have been described in detail above, but the above contents are only preferred embodiments of the disclosure, and should not be considered to limit the implementation scope of the disclosure. All equivalent changes and improvements made according to the scope of the disclosure should still fall within the scope of the patent.

CLAIMS:

1. An indoor planting device with automatic sowing and picking functions, comprising a circulating water supply (1), wherein a planting unit is disposed at a top of the circulating water supply (1), the planting unit being composed of a plurality of sets of planting layers (2), a picking mechanical arm mechanism (20) being mounted on a column frame of a respective planting layer (2), the picking mechanical arm mechanism (20) comprising:

grasping portions (2001) having grasping faces for grasping outer surfaces of fruits or vegetables, wherein

the grasping faces are equipped with flexible linings, each comprising a plurality of pneumatic suction cups (20012);

a separation portion (2002) having a cutting tool (20023) for cutting stalks of the fruits or vegetables;

a positioning portion (2003) for acquiring position information of the fruits or vegetables, which communicatively connects the grasping portions (2001) with the separation portion (2002); and

a slidable mount (2004) with the positioning portion (2003), the separation portion (2002) and the grasping portions (2001) being mounted thereon side by side in sequence, wherein

the separation portion (2002) comprises a cutting driver and a profiler;

an output end of the cutting driver is connected with the cutting tool (20023), the profiler being disposed on one side of the cutting tool (20023) and having a guide structure for directing and positioning locations of the stalks;

a second rotation table (2005) is mounted on the slidable mount (2004), the profiler (20022) comprising a profiling wheel (200222) and a profiling fixing frame (200223), the profiling fixing frame (200223) comprising a fixed segment and a floating segment, one end of the fixed segment being connected with the second rotation table (2005), one end of the floating segment being connected with the profiling wheel (200222), the fixed segment and the floating segment being hinged at a preset angle by means of a pin shaft, a torsional spring being mounted on the pin shaft, one of supporting feet of the torsional spring being connected with the fixed segment, and the other one of the supporting feet of the torsional spring being

connected with the end of the floating segment away from the profiling wheel (200222); and
the cutting driver (20021) comprises a retractable driving mechanism and a vibrator, a retractable end of the retractable driving mechanism being connected with the vibrator, the vibrator being connected with the cutting tool (20023), a tool edge of the cutting tool (20023) facing the grasping portions (2001).

2. The indoor planting device with automatic sowing and picking functions according to claim 1, wherein the column frame of the respective planting layer (2) and the planting layer (2) are provided with a slide (205) at their outer surfaces, the slidable mount (2004) being mounted inside the slide (205) to realize movement for positioning.

3. The indoor planting device with automatic sowing and picking functions according to claim 1, further comprising a lighting part (3), a fresh air part (4) and a camera (21) disposed at a bottom of each of the sets of the planting layers (2), the lighting part (4) being configured to provide light for a respective planting layer (2) therebelow, and the fresh air part (4) being configured to speed up air flow of the respective planting layer (2) therebelow;

the circulating water supply (1) is provided with a water tank (101) and a water pump (102), the water tank (101) being disposed at a bottom of a planting unit, the water pump (102) being disposed inside the water tank (101), a water supply end of the water pump (102) being connected with a water supply pipe, the water pump (102) supplying water to the planting layers (2) by means of the water supply pipe.

4. The indoor planting device with automatic sowing and picking functions according to claim 3, further comprising a water temperature sensor (5) and a liquid level meter respectively disposed inside the water tank (101), the water temperature sensor (5) being configured to measure a liquid temperature inside the water tank (101), and the liquid level meter being configured to measure a liquid level height inside the water tank (101).

5. The indoor planting device with automatic sowing and picking functions according to claim 1, wherein each of the planting layers (2) comprises a planting box (201), a planting plate (202), a diversion vertical column (203) and a routing vertical column (204), the planting box (201) being internally provided with an S-shaped diversion cavity (19), a plurality of sets of planting holes being evenly formed in the planting plate (202), ends of the diversion vertical column (203) and ends of the routing vertical column (204) being both

connected with adjacent planting boxes (201), and the diversion vertical column (203) and the routing vertical column (204) being configured to support adjacent planting layers (2), wherein the diversion vertical column (203) is further configured to contain the water supply pipe, and the routing vertical column (204) is further configured to contain wires.

6. The indoor planting device with automatic sowing and picking functions according to claim 5, wherein the diversion vertical column (203) and the ends of the routing vertical column (204) are formed with slots (7) at their ends, respectively, inserts (6) being disposed on each of the planting boxes (201), the structure of each of the inserts (6) being matched with that of a respective one of the slots (7).

7. The indoor planting device with automatic sowing and picking functions according to claim 5, further comprising a water delivery channel disposed in the diversion vertical column (203), and the water delivery channel is configured to provide water for a respective planting box (201) therebelow.

8. The indoor planting device with automatic sowing and picking functions according to claim 5, further comprising two sets of auxiliary vertical columns between every two adjacent planting layers (2), plug connection portions (9) being disposed at two ends of each of the auxiliary vertical columns (8), plug connection holes (10) being disposed in the planting box (201), the structure of each of the plug connection portions (9) being matched with that of a respective one of the plug connection holes (10).

9. The indoor planting device with automatic sowing and picking functions according to claim 7, further comprising a silent block (11) disposed in the S-shaped diversion cavity (19) inside the planting box (201), the silent block (11) being located below an outlet end of a respective water delivery channel, a water outlet being disposed in an outlet end of the S-shaped diversion cavity (19), the water outlet being configured to discharge water into a respective planting layer (2) therebelow.

10. The indoor planting device with automatic sowing and picking functions according to claim 1, further comprising a control box (12) disposed at a top of the planting unit, a control panel (14) being disposed on an outer wall of the control box (12), a carbon dioxide sensor (15) and a cooling fan (16) being adjacently disposed in the control box (12).