Notice

DESCRIPTION CN119183943A

An intelligent duckweed cultivation device

一种智能化浮萍养殖设备

[0001]

Technical Field

技术领域

[n0001]

This invention relates to the field of duckweed cultivation technology, specifically to an intelligent duckweed cultivation device.

本发明涉及浮萍养殖技术领域，具体为一种智能化浮萍养殖设备。

[0003]

Background Technology

背景技术

[n0002]

Duckweed is an aquatic plant, belonging to the floating-leaved plant family, and is commonly found in still or slow-flowing waters.

浮萍是一种水生植物，属于浮叶植物，常见于静水或缓流水域。

Duckweed is characterized by its round or oval floating leaves, which float densely on the water surface and are usually light green to emerald green in color.

浮萍的特点是其圆形或卵形的浮叶，叶片密集浮在水面上，通常具有浅绿色至翠绿色的颜色。

The roots of duckweed hang in the water, allowing it to absorb nutrients from the water.

浮萍的根部悬挂在水中，可以吸收水中的养分。

They have a strong reproductive capacity and can expand their population through branching or budding on their stems. Duckweed plays an important ecological role in water bodies, such as purifying water quality, providing habitat, and oxidizing water. In some areas, duckweed is used as feed or fertilizer. Duckweed is also a source of nutrients (high-quality protein, vitamins, flavonoids, etc.) or food. With the advancement of aquaculture technology, intensive duckweed farming methods have emerged. The existing methods of duckweed farming are mainly natural growth, artificial introduction, and duckweed farming ponds.

它们繁殖能力强，可以通过茎上的分枝或分生芽来扩大种群，浮萍在水体中起到重要的生态作用，如净化水质、提供栖息地、氧化水体等，在一些地区，浮萍被用作饲料或肥料，浮萍还作为营养物质(优质蛋白、维生素、黄酮等)或者食品的来源，随着养殖技术的进步，出现对浮萍进行集约化养殖的手段，现有的对于浮萍养殖的方式主要为自然生长、人工引种和浮萍养殖池等。

[n0003]

However, existing methods of duckweed cultivation have the following problems: While duckweed cultivation ponds have higher survival rates and quality compared to natural ponds, duckweed used for nutrients or food sources requires controlled cultivation conditions (pollution control, rapid reproduction) to ensure its quality. Existing duckweed cultivation ponds often suffer from excessively high duckweed density, leading to lower yields of high-quality duckweed and increased susceptibility to pests and diseases. Selection of the cultivated duckweed is necessary, but the rate of high-quality duckweed is low, and there is a lack of equipment for efficient duckweed cultivation.

然而，现有的对于浮萍养殖的方式存在以下的问题：浮萍养殖池相对于自然池塘投放生长的养殖方式，浮萍养殖的成活率和品质更高，但是对于用于营养物质或者食品来源的浮萍，需要控制培养条件(控制污染、快速繁殖)等以保证浮萍的品质，现有的浮萍养殖池在对浮萍进行养殖的过程中，往往存在浮萍密度过大，导致优质浮萍的产率较低以及病虫害的影响，需要对养成后的浮萍进行挑选，高品质的浮萍率不高，缺乏一种用于对浮萍进行高效养殖的设备。

Therefore, it is necessary to design corresponding technical solutions to address the existing technical problems.

为此，需要设计相应的技术方案解决存在的技术问题。

[0006]

Summary of the Invention

发明内容

[n0004]

The purpose of this invention is to provide an intelligent duckweed cultivation device, which solves the problem that duckweed cultivation ponds have a higher survival rate and quality compared to natural ponds. However, for duckweed used as a source of nutrients or food, it is necessary to control the cultivation conditions (controlling pollution, rapid reproduction, etc.) to ensure the quality of the duckweed. In the process of cultivating duckweed in existing duckweed cultivation ponds, there is often a problem of excessive duckweed density, resulting in a low yield of high-quality duckweed and the impact of pests and diseases. It is necessary to select the duckweed after cultivation, and the rate of high-quality duckweed is not high. This is a technical problem.

本发明的目的在于提供一种智能化浮萍养殖设备，解决了浮萍养殖池相对于自然池塘投放生长的养殖方式，浮萍养殖的成活率和品质更高，但是对于用于营养物质或者食品来源的浮萍，需要控制培养条件(控制污染、快速繁殖)等以保证浮萍的品质，现有的浮萍养殖池在对浮萍进行养殖的过程中，往往存在浮萍密度过大，导致优质浮萍的产率较低以及病虫害的影响，需要对养成后的浮萍进行挑选，高品质的浮萍率不高，这一技术问题。

[n0005]

To achieve the above objectives, the present invention provides the following technical solution: an intelligent duckweed cultivation device, comprising a rotating regulating disc, a duckweed cultivation pond, a floating cultivation tray, and a detection component. The rotating regulating disc includes a base, a rotating ring, and a storage container. The rotating ring is rotatably fitted onto the base. The storage containers are arranged in several groups and evenly distributed on the rotating ring. The duckweed cultivation pond is installed on the top of the base and equipped with a control console on one side. The edge of the duckweed cultivation pond has an outlet, and a guide pipe is vertically arranged inside. The lower end of the guide pipe is connected to a pump body via a pipe, and the pump body is connected to a discharge pipe. The floating cultivation tray is fitted onto the guide pipe. The floating cultivation tray includes a planting tray, an annular float, and a longitudinal adjuster. The planting tray has several planting openings evenly distributed on its surface. A planting tube is installed at the bottom of each planting opening. An annular float is fitted around the periphery of the planting tray. A longitudinal adjuster is installed on the top of the guide tube and works in conjunction with the planting tray. A detection component is installed on one side of the longitudinal adjuster and includes a suction tube, rollers, cameras, supplementary lighting, a suction cover, and an adjustment assembly. The suction tube is horizontally positioned and its outer end is connected to the rollers. The rollers contact the inner wall of the duckweed culture pond. Several cameras are evenly distributed below the suction tubes.

Supplementary lighting is installed on one side of the cameras. Suction covers are symmetrically distributed above and below the cameras. The end of the suction tube is connected to the adjustment assembly, which is installed on the longitudinal adjuster.

为实现上述目的，本发明提供如下技术方案：一种智能化浮萍养殖设备，包括旋转式调节盘、浮萍养殖池、浮动式养殖盘和检测组件，所述旋转式调节盘包括底座、转动环和存储容器，所述转动环转动套嵌于底座上，所述存储容器分设有若干组且均匀设置于转动环上，所述浮萍养殖池安装于底座的顶部且一侧配备有控制台，所述浮萍养殖池的边缘开设有排出口且内部垂直设置有引导管，所述引导管的下端通过管道连接有泵体，所述泵体连接有排出管，所述浮动式养殖盘套嵌于引导管上，所述浮动式养殖盘包括种植盘、环形浮漂和纵向调节器，所述种植盘的表面均匀开设有若干组种植口，所述种植口的底部安装有种植管，所述环形浮漂套嵌于种植盘的外围，所述纵向调节器安装于引导管的顶部且配合种植盘使用，所述检测组件安装于纵向调节器的一侧且包括抽吸管、滚轮、摄像头、补光灯、抽吸罩和调节组件，所述抽吸管水平设置且外端与滚轮相连接，所述滚轮与浮萍养殖池的内壁相接触，所述摄像头分设有若干组且均匀安装于抽吸管的下方，所述补光灯安装于摄像头的一侧，所述抽吸罩于摄像头上下对称分布，所述抽吸管的末端与调节组件相连接，所述调节组件安装于纵向调节器上。

[n0006]

In a preferred embodiment of the present invention, a guide plate is installed at the lower edge of the outlet and a sealing plate is inserted longitudinally above it, the specifications of the sealing plate being the same as those of the outlet.

作为本发明的一种优选方式，所述排出口的下沿安装有引导板且上方纵向穿插有封堵板，所述封堵板的规格与排出口的规格相同。

[n0007]

In a preferred embodiment of the present invention, several groups of implantation openings are evenly distributed in a ring shape, and the diameter of each implantation opening is the same as the diameter of the upper end of the implantation tube.

作为本发明的一种优选方式，若干组所述种植口呈环状均匀分布，所述种植口的直径与种植管的上端直径相同。

[n0008]

In a preferred embodiment of the present invention, the planting tube has a two-section structure and includes a funnel tube and several sets of clamping rods fixed to the lower end

of the funnel tube. The upper diameter of the funnel tube is larger than the lower diameter. The clamping rods are inclined and made of elastic material. The upper distance between two adjacent sets of clamping rods is larger than the lower distance.

作为本发明的一种优选方式，所述种植管为两段式结构且包括漏斗管和固定于漏斗管下端的若干组夹持杆，所述漏斗管的上端直径大于下端直径，所述夹持杆呈倾斜状设置且采用弹性材料，相邻两组所述夹持杆的上端间距大于下端间距。

[n0009]

In a preferred embodiment of the present invention, the longitudinal adjuster includes a sleeve, a cover, a riser, a motor, a drive gear, and a lifter. The sleeve is fitted onto the top of the guide tube, the cover is installed on the top of the sleeve, the riser is rotatably mounted on the top of the cover and has several sets of locking teeth on its surface, the locking teeth meshing with the drive gear, the middle part of the drive gear being connected to the power output end of the motor, the motor being installed on the cover, the sleeve, the cover, and the riser being connected, and the lifter being installed on the cover.

作为本发明的一种优选方式，所述纵向调节器包括套管、罩体、立管、马达、驱动齿轮和升降器，所述套管套嵌于引导管的顶部，所述罩体安装于套管的顶部，所述立管转动设置于罩体的顶部且表面开设有若干组卡齿，所述卡齿与驱动齿轮啮合，所述驱动齿轮的中部与马达的动力输出端相连接，所述马达安装于罩体上，所述套管、罩体和立管三者相连通，所述升降器安装于罩体上。

[n0010]

In a preferred embodiment of the present invention, the lifting device includes a motor and a rotating disk installed at the power output end of the motor. A toggle block is fixed on the edge of the rotating disk. The toggle block has a fan-shaped structure and one end is narrower than the other end. The toggle block is located above the planting tray.

作为本发明的一种优选方式，所述升降器包括电机一和安装于电机一动力输出端的转动盘，所述转动盘的边缘固定有拨动块，所述拨动块呈扇形结构且一端宽度小于另一端宽度，所述拨动块位于种植盘的上方。

[n0011]

In a preferred embodiment of the present invention, the suction hood has a funnel-shaped structure and a valve connected to its inner end, and the outer diameter of the suction hood is the same as the diameter of the implantation opening.

作为本发明的一种优选方式，所述抽吸罩呈漏斗状结构且内端连接有阀门，所述抽吸罩的外端直径与种植口的直径相同。

[n0012]

In a preferred embodiment of the present invention, the adjustment assembly includes a branch pipe, a mounting bracket, a second motor, and a transmission gear. One end of the branch pipe is fixedly connected to the riser pipe and the other end is rotatably connected to the suction pipe. The mounting bracket is fixed to the branch pipe and its outer end is connected to the second motor. The power output end of the second motor is connected to the transmission gear. The inner end of the suction pipe is machined into a toothed structure and meshes with the transmission gear.

作为本发明的一种优选方式，所述调节组件包括支管、安装架、电机二和传动齿轮，所述支管的一端与立管固定连接且另一端与抽吸管转动连接，所述安装架固定于支管上且外端与电机二相连接，所述电机二的动力输出端与传动齿轮相连接，所述抽吸管的内端加工成型为齿状结构且与传动齿轮啮合。

[n0013]

In a preferred embodiment of the present invention, the photothermal control assembly includes a support frame, a top plate, a temperature sensor, electric heating rods, a cooling

assembly, and a full-spectrum spotlight. The support frame is fixed to one side of the duckweed cultivation pond and its top is connected to the top plate. The temperature sensor is built into the duckweed cultivation pond and connected to the control console via wiring. The control console is connected to two sets of electric heating rods via wiring. The two sets of electric heating rods are symmetrically installed on the top plate. The cooling assembly includes a water pumping pipe, a heat exchange pipe, a water-cooled fan, and a return pipe. The lower end of the water pumping pipe is connected to the duckweed cultivation pond, and the upper end of the water pumping pipe is connected to the heat exchange pipe. The water-cooled fan is located directly above the heat exchange pipe, with its outlet facing the heat exchange pipe. One end of the return pipe is connected to the heat exchange pipe, and the other end is connected to the duckweed cultivation pond. The full-spectrum spotlight is installed at the bottom of the top plate.

作为本发明的一种优选方式，所述光温控制组件包括支撑架、顶盘、温度传感器、电加热棒、降温组件和全光谱射灯，所述支撑架固定于浮萍养殖池的一侧且顶部与顶盘相连接，所述温度传感器内置于浮萍养殖池内且通过线路与控制台，所述控制台通过线路与两组电加热棒相连接，两组所述电加热棒对称安装于顶盘上，所述降温组件包括抽水管、换热管、水冷风机和回流管，所述抽水管的下端与浮萍养殖池相连接，所述抽水管的上端与换热管相连接，所述水冷风机位于换热管的正上方且出气端正对换热管，所述回流管的一端与换热管相连接且另一端与浮萍养殖池，所述全光谱射灯安装于顶盘的底部。

[n0014]

Compared with the prior art, the beneficial effects of the present invention are as follows:

与现有技术相比，本发明的有益效果如下：

[n0015]

1.

1.

This invention designs an intelligent aquaculture device for high-quality duckweed cultivation. The device includes a rotating regulating disc, a duckweed cultivation pond, a floating cultivation tray, and a detection component. Duckweed seedlings are evenly planted in the floating cultivation tray, which is then submerged in the duckweed cultivation pond. During cultivation, if the duckweed grows too densely, the floating cultivation tray can be submerged, allowing excess duckweed to float on the water surface and be guided by water flow into a storage container on the rotating regulating disc. This ensures sufficient space for duckweed cultivation within the pond and promotes normal growth. During duckweed

growth, the rotating detection component detects and removes diseased duckweed, preventing the spread of disease and its impact on the normal growth of other duckweed, thereby improving the quality of duckweed cultivation.

本发明设计了一种用于对浮萍进行高品质养殖的智能化养殖设备，该养殖设备包括旋转式调节盘、浮萍养殖池、浮动式养殖盘和检测组件，将浮萍幼苗均匀种植于浮动式养殖盘内，并将浮动式养殖盘沉入浮萍养殖池内进行浮萍养殖，在养殖的过程中，如果浮萍生长过密，可以下沉浮动式养殖盘，使得多余的浮萍可以漂浮于水面并通过水流将多余的浮萍导入至旋转式调节盘上的存储容器内，保证浮萍养殖池内部的浮萍养殖空间以及浮萍的正常生长，在浮萍生长的过程中，通过检测组件旋转式检测，可以对存在病害的浮萍进行抽吸外排，避免病害的扩大影响其他浮萍的正常生长，从而达到提高浮萍养殖品质的目的。

[n0016]

2.

2.

The intelligent aquaculture equipment designed in this invention can effectively guarantee the space for duckweed cultivation and reduce the impact of pests and diseases, thereby improving the intensification and quality of duckweed cultivation.

本发明所设计的智能化养殖设备可以有效的保证浮萍养殖的空间以及减小病虫害的影响，提高养殖浮萍的集约化程度和品质。

[0020]

Attached Figure Description

附图说明

[n0017]

Figure 1 is an overall structural diagram of the present invention;

图1为本发明的整体结构图；

[n0018]

Figure 2 is a structural diagram of the implantation tube described in this invention;

图2为本发明所述种植管结构图；

[n0019]

Figure 3 is a structural diagram of the longitudinal adjuster described in this invention;

图3为本发明所述纵向调节器结构图；

[n0020]

Figure 4 is a structural diagram of the detection component described in this invention;

图4为本发明所述检测组件结构图；

[n0021]

Figure 5 is a cross-sectional view of the detection component in the flipped state of the present invention.

图5为本发明所述检测组件翻转状态剖面图。

[n0022]

In the diagram: 1. Base; 2. Rotating ring; 3. Storage container; 4. Control console; 5. Discharge port; 6. Guide tube; 7. Pump body; 8. Discharge tube; 9. Planting tray; 10. Annular float; 11. Vertical adjuster; 12. Planting port; 13. Planting tube; 14. Suction tube; 15. Roller; 16. Camera;

17. Supplemental light; 18. Suction hood; 19. Adjustment assembly; 20. Guide plate; 21. Sealing plate; 22. Funnel tube; 23. Clamping rod; 24. Sleeve; 25. Cover 26. Main body; 27. Riser; 28. Motor; 29. Drive gear; 30. Lifter; 31. Gear; 32. Motor 1; 33. Rotating disc; 34. Actuating block; 35. Valve; 36. Branch pipe; 37. Mounting bracket; 38. Motor 2; 39. Transmission gear; 40. Duckweed aquaculture pond; 41. Support frame; 42. Top plate; 43. Temperature sensor; 44. Electric heating rod; 45. Full-spectrum spotlight; 46. Water pump pipe; 47. Heat exchanger pipe; 48. Water-cooled fan; 49. Return pipe.

图中:1、底座；2、转动环；3、存储容器；4、控制台；5、排出口；6、引导管；7、泵体；8、排出管；9、种植盘；10、环形浮漂；11、纵向调节器；12、种植口；13、种植管；14、抽吸管；15、滚轮；16、摄像头；17、补光灯；18、抽吸罩；19、调节组件；20、引导板；21、封堵板；22、漏斗管；23、夹持杆；24、套管；25、罩体；26、立管；27、马达；28、驱动齿轮；29、升降器；30、卡齿；31、电机一；32、转动盘；33、拨动块；34、阀门；35、支管；36、安装架；37、电机二；38、传动齿轮；39、浮萍养殖池；40、支撑架；41、顶盘；42、温度传感器；43、电加热棒；44、全光谱射灯；45、抽水管；46、换热管；47、水冷风机；48、回流管。

[0027]

Detailed Implementation

具体实施方式

[n0023]

The technical solutions of the present invention will be clearly and completely described below with reference to the accompanying drawings of the embodiments of the present invention. Obviously, the described embodiments are only some embodiments of the present invention, and not all embodiments.

下面将结合本发明实施例中的附图，对本发明实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例仅仅是本发明一部分实施例，而不是全部的实施例。

Based on the embodiments of the present invention, all other embodiments obtained by those skilled in the art without creative effort are within the scope of protection of the present invention.

基于本发明中的实施例，本领域普通技术人员在没有做出创造性劳动前提下所获得的所有其他实施例，都属于本发明保护的范围。

[n0024]

Please refer to Figures 1-5. This invention provides a technical solution: an intelligent duckweed cultivation device, including a rotating regulating disc, a duckweed cultivation pond 39, a floating cultivation tray, and a detection component. The rotating regulating disc

includes a base 1, a rotating ring 2, and a storage container 3. The rotating ring 2 is rotatably fitted onto the base 1. The storage container 3 is divided into several groups and evenly arranged on the rotating ring 2. The duckweed cultivation pond 39 is installed on the top of the base 1 and equipped with a control console 4 on one side. The edge of the duckweed cultivation pond 39 has an outlet 5, and a guide pipe 6 is vertically arranged inside. The lower end of the guide pipe 6 is connected to a pump body 7 through a pipe. The pump body 7 is connected to a discharge pipe 8. The floating cultivation tray is fitted onto the guide pipe 6. The floating cultivation tray includes a planting tray 9, an annular float 10, and a longitudinal adjuster 11. The surface of the planting tray 9 is evenly decorated with several... The dry planting port 12 has a planting tube 13 installed at its bottom. An annular float 10 is fitted around the planting tray 9. A longitudinal adjuster 11 is installed on the top of the guide tube 6 and works with the planting tray 9. A detection component is installed on one side of the longitudinal adjuster 11 and includes a suction tube 14, a roller 15, a camera 16, a supplementary light 17, a suction cover 18, and an adjustment component 19. The suction tube 14 is horizontally set and its outer end is connected to the roller 15. The roller 15 is in contact with the inner wall of the duckweed culture pond 39. Several groups of cameras 16 are evenly installed below the suction tube 14. The supplementary light 17 is installed on one side of the camera 16. The suction cover 18 is symmetrically distributed above and below the camera 16. The end of the suction tube 14 is connected to the adjustment component 19, which is installed on the longitudinal adjuster 11.

请参阅图1-5，本发明提供一种技术方案：一种智能化浮萍养殖设备，包括旋转式调节盘、浮萍养殖池39、浮动式养殖盘和检测组件，旋转式调节盘包括底座1、转动环2和存储容器3，转动环2转动套嵌于底座1上，存储容器3分设有若干组且均匀设置于转动环2上，浮萍养殖池39安装于底座1的顶部且一侧配备有控制台4，浮萍养殖池39的边缘开设有排出口5且内部垂直设置有引导管6，引导管6的下端通过管道连接有泵体7，泵体7连接有排出管8，浮动式养殖盘套嵌于引导管6上，浮动式养殖盘包括种植盘9、环形浮漂10和纵向调节器11，种植盘9的表面均匀开设有若干组种植口12，种植口12的底部安装有种植管13，环形浮漂10套嵌于种植盘9的外围，纵向调节器11安装于引导管6的顶部且配合种植盘9使用，检测组件安装于纵向调节器11的一侧且包括抽吸管14、滚轮15、摄像头16、补光灯17、抽吸罩18和调节组件19，抽吸管14水平设置且外端与滚轮15相连接，滚轮15与浮萍养殖池39的内壁相接触，摄像头16分设有若干组且均匀安装于抽吸管14的下方，补光灯17安装于摄像头16的一侧，抽吸罩18于摄像头16上下对称分布，抽吸管14的末端与调节组件19相连接，调节组件19安装于纵向调节器11上。

[n0025]

As a further improvement, as shown in Figure 1, a guide plate 20 is installed on the lower edge of the outlet 5 and a sealing plate 21 is inserted longitudinally above it. The specifications of the sealing plate 21 are the same as those of the outlet 5. The outlet 5 can be blocked and opened by the sealing plate 21.

进一步改进地，如图1所示，排出口5的下沿安装有引导板20且上方纵向穿插有封堵板21，封堵板21的规格与排出口5的规格相同，通过封堵板21可以将排出口5封堵和打开。

[n0026]

As further improved, as shown in Figure 1, several groups of planting openings 12 are evenly distributed in a ring shape, and the diameter of the planting opening 12 is the same as the upper diameter of the planting tube 13. This design facilitates the even planting of duckweed and makes it convenient for the detection components to perform detection.

进一步改进地，如图1所示，若干组种植口12呈环状均匀分布，种植口12的直径与种植管13的上端直径相同，这样的设计方式便于将浮萍均匀种植，并且方便检测组件进行检测。

[n0027]

Further improvements, as shown in Figure 2, include a two-section structure of a funnel tube 22 and several sets of clamping rods 23 fixed to the lower end of the funnel tube 22. The upper diameter of the funnel tube 22 is larger than the lower diameter. The clamping rods 23 are inclined and made of elastic material. The distance between the upper ends of two adjacent sets of clamping rods 23 is larger than the distance between the lower ends. The clamping rods 23 can limit the roots of the cultivated duckweed.

进一步改进地，如图2所示，种植管13为两段式结构且包括漏斗管22和固定于漏斗管22下端的若干组夹持杆23，漏斗管22的上端直径大于下端直径，夹持杆23呈倾斜状设置且采用弹性材料，相邻两组夹持杆23的上端间距大于下端间距，通过夹持杆23可以对培育的浮萍根部进行限位。

[n0028]

Further improvements, as shown in Figure 3, include a sleeve 24, a cover 25, a riser 26, a motor 27, a drive gear 28, and a lifter 29. The sleeve 24 is fitted onto the top of the guide tube 6, the cover 25 is installed on the top of the sleeve 24, the riser 26 is rotatably mounted on the top of the cover 25 and has several sets of locking teeth 30 on its surface. The locking teeth 30 mesh with the drive gear 28, the middle of the drive gear 28 is connected to the power output end of the motor 27, the motor 27 is installed on the cover 25, and the sleeve 24, cover 25, and riser 26 are connected. The lifter 29 is installed on the cover 25. The motor 27 drives the drive gear 28 to rotate, and the drive gear 28 drives the riser 26 to rotate, thereby adjusting the rotation of the detection component.

进一步改进地，如图3所示，纵向调节器11包括套管24、罩体25、立管26、马达27、驱动齿轮28和升降器29，套管24套嵌于引导管6的顶部，罩体25安装于套管24的顶部，立管26转动设置于罩体25的顶部且表面开设有若干组卡齿30，卡齿30与驱动齿轮28啮合，驱动齿轮28的中部与马达27的动力

输出端相连接，马达27安装于罩体25上，套管24、罩体25和立管26三者相连通，升降器29安装于罩体25上，通过马达27带动驱动齿轮28转动，驱动齿轮28带动立管26转动进而对检测组件进行转动调节。

[n0029]

Further improvements, as shown in Figure 3, include a motor 31 and a rotating disk 32 installed at the power output end of the motor 31. A toggle block 33 is fixed to the edge of the rotating disk 32. The toggle block 33 has a fan-shaped structure and one end is narrower than the other end. The toggle block 33 is located above the planting tray 9. The rotating disk 32 is driven to rotate by the motor 31. During the rotation of the rotating disk 32, the toggle block 33 rotates synchronously. The toggle block 33 acts on the planting tray 9 to achieve the purpose of settling.

进一步改进地，如图3所示，升降器29包括电机一31和安装于电机一31动力输出端的转动盘32，转动盘32的边缘固定有拨动块33，拨动块33呈扇形结构且一端宽度小于另一端宽度，拨动块33位于种植盘9的上方，通过电机一31带动转动盘32转动，转动盘32在转动的过程中带动拨动块33同步转动，利用拨动块33作用于种植盘9可以达到沉降的目的。

[n0030]

Further improvements, as shown in Figures 4 and 5, include a funnel-shaped suction hood 18 with a valve 34 connected to its inner end. The outer diameter of the suction hood 18 is the same as the diameter of the planting opening 12. The suction hood 18 facilitates the suction and discharge of duckweed containing pests and diseases from the planting opening 12.

进一步改进地，如图4和5所示，抽吸罩18呈漏斗状结构且内端连接有阀门34，抽吸罩18的外端直径与种植口12的直径相同，通过抽吸罩18便于将种植口12内存在病虫害的浮萍进行抽吸外排处理。

[n0031]

Further improvements, as shown in Figure 4, include a branch pipe 35, a mounting bracket 36, a second motor 37, and a transmission gear 38. One end of the branch pipe 35 is fixedly connected to the riser 26, and the other end is rotatably connected to the suction pipe 14. The mounting bracket 36 is fixed to the branch pipe 35, and its outer end is connected to the second motor 37. The power output end of the second motor 37 is connected to the transmission gear 38. The inner end of the suction pipe 14 is machined into a toothed structure and meshes with the transmission gear 38. The second motor 37 drives the transmission gear 38 to rotate, and the transmission gear 38 drives the branch pipe 35 to rotate during the rotation process, which can achieve the purpose of flipping and exchanging the positions of the suction cover 18 and the camera 16.

进一步改进地，如图4所示，调节组件19包括支管35、安装架36、电机二37和传动齿轮38，支管35的一端与立管26固定连接且另一端与抽吸管14转动连接，安装架36固定于支管35上且外端与电机二37相连接，电机二37的动力输出端与传动齿轮38相连接，抽吸管14的内端加工成型为齿状结构且与传动齿轮38啮合，通过电机二37带动传动齿轮38转动，传动齿轮38在转动的过程中带动支管35转动，可以达到对抽吸罩18以及摄像头16翻转位置互换的目的。

[n0032]

Specifically, the light and temperature control component includes a support frame 40, a top plate 41, a temperature sensor 42, electric heating rods 43, a cooling component, and a full-spectrum spotlight 44. The support frame 40 is fixed to one side of the duckweed culture pond 39 and its top is connected to the top plate 41. The temperature sensor 42 is built into the duckweed culture pond 39 and connected to the control console 4 via wiring. The control console 4 is connected to two sets of electric heating rods 43 via wiring. The two sets of electric heating rods 43 are symmetrically installed on the top plate 41. The cooling component includes a water pumping pipe 45, a heat exchange pipe 46, a water-cooled fan 47, and a return pipe 48. The lower end of the water pumping pipe 45 is connected to the duckweed culture pond 39 and is equipped with a pump body. The upper end of the water pumping pipe 45 is connected to the heat exchange pipe 46. The water-cooled fan 47 is located on the heat exchange pipe 46. The outlet of the heat exchanger is directly above the heat exchanger 46. One end of the return pipe 48 is connected to the heat exchanger 46 and the other end is connected to the duckweed culture pond 39. The full-spectrum spotlight 44 is

installed at the bottom of the top plate 41. The temperature sensor 42 senses the water temperature of the duckweed culture pond 39. When the water temperature is too low and not conducive to duckweed growth, the electric heating rod 43 can be turned on for temperature compensation. When the water temperature is too high, the water in the duckweed culture pond 39 is pumped out through the water pumping pipe 45 and into the heat exchanger 46. The heat exchanger 46 is cooled by the water-cooled fan 47. The cooled water enters the duckweed culture pond 39 through the return pipe 48, thereby achieving the purpose of cooling. The full-spectrum spotlight 44 simulates sunlight to improve the growth rate of duckweed.

具体地，光温控制组件包括支撑架40、顶盘41、温度传感器42、电加热棒43、降温组件和全光谱射灯44，支撑架40固定于浮萍养殖池39的一侧且顶部与顶盘41相连接，温度传感器42内置于浮萍养殖池39内且通过线路与控制台4，控制台4通过线路与两组电加热棒43相连接，两组电加热棒43对称安装于顶盘41上，降温组件包括抽水管45、换热管46、水冷风机47和回流管48，抽水管45的下端与浮萍养殖池39相连接且配备有泵体，抽水管45的上端与换热管46相连接，水冷风机47位于换热管46的正上方且出气端正对换热管46，回流管48的一端与换热管46相连接且另一端与浮萍养殖池39，全光谱射灯44安装于顶盘41的底部，通过温度传感器42感知浮萍养殖池39水温，当水温较低不利于浮萍生长时，可以打开电加热棒43进行温度补偿，当水温较高时，利用抽水管45将浮萍养殖池39内的水

进行外抽并达到换热管46内，通过水冷风机47对换热管46进行冷却降温处理，冷却后的水通过回流管48进入到浮萍养殖池39内，从而达到降温的目的，并通过全光谱射灯44模拟阳光，提高浮萍的生长速度。

[n0033]

In use: When high-quality intensive cultivation of duckweed is required, staff can evenly place duckweed seedlings into the planting opening 12 of the planting tray 9, ensuring the duckweed roots penetrate into the planting tube 13 for containment. If the density of duckweed becomes too high during cultivation, affecting growth space, staff can turn on motor 31 to rotate the rotating disc 32. The rotating disc 32, in turn, drives the actuating block 33 to rotate synchronously. The actuating block 33 acts on the planting tray 9, submerging it in water. Excess duckweed floats on the surface. At this time, the sealing plate 21 is opened, and the floating duckweed is guided from the outlet 5 into the storage container 3 along the water flow. After one set of storage containers 3 is filled, the next set of storage containers 3 can be rotated below the outlet 5 by rotating the rotating ring 2. During the daily growth of the duckweed, motor 27 drives the drive gear 28 to rotate, driving... Gear 28 drives riser 26 to rotate, thereby adjusting the rotation of the detection component. The detection component checks whether there are pests or diseases on the duckweed below. The camera 16 acquires and transmits images of the duckweed leaves and compares them with images of healthy duckweed leaves. If pests or diseases are found, motor 2 37 drives transmission gear 38 to rotate. During the rotation of transmission gear 38, branch pipe 35 is rotated, which can

achieve the purpose of flipping and exchanging the positions of suction hood 18 and camera 16. Suction hood 18 faces downward and connects with the duckweed in the planting port 12 where there are pests or diseases. Suction hood 18 is in contact with the water surface. At this time, pump body 7 sucks the pest-infested duckweed along suction hood 18 and sequentially guides it into suction pipe 14, riser 26, hood body 25, sleeve 24, guide pipe 6, and finally discharges it through discharge pipe 8, ensuring the normal growth of duckweed.

在使用时：当需要对浮萍进行高品质集约化养殖时，工作人员可以浮萍幼苗均匀置于种植盘9的种植口12内并使得浮萍的根茎穿入种植管13内进行限位，在浮萍在养殖的过程中密度过大影响生长空间时，工作人员可以打开电机一31带动转动盘32转动，转动盘32在转动的过程中带动拨动块33同步转动，利用拨动块33作用于种植盘9，将种植盘9沉入水中，多余的浮萍漂浮漂浮于水面，此时打开封堵板21，漂浮的浮萍顺着水流从排出口5导入至存储容器3内，当一组存储容器3盛放完毕后，可以通过转动转动环2将下一组存储容器3转动至排出口5下方，在浮萍日常生长的过程中，通过马达27带动驱动齿轮28转动，驱动齿轮28带动立管26转动进而对检测组件进行转动调节，检测组件对下方的浮萍是否存在病虫害进行检查，通过摄像头16对浮萍叶片的情况进行图像获取并传输与健康状态下的浮萍叶片图像进行对比，如果发现浮萍存在病虫害，此时通过电机二37带动传动齿轮38转动，传动齿轮38在转动的过程中带动支管35转动，可以达到对抽吸罩18以及摄像头16翻转位置互换的目的，抽吸罩18朝下并与存在病虫害的种植口12内的浮萍对接，抽吸罩18与水面接触，此时通过泵体7进行抽吸将病虫害浮萍顺着抽吸罩18依次导入至抽吸管14、立管26、罩体25、套管24、引导管6，最终通过排出管8排出，保证浮萍的正常生长。

[n0034]

In the description of this invention, it should be understood that the terms "coaxial," "bottom," "one end," "top," "middle," "other end," "upper," "side," "top," "inner," "front," "center," "both ends," etc., indicate the orientation or positional relationship based on the orientation or positional relationship shown in the accompanying drawings. They are only for the convenience of describing this invention and simplifying the description, and do not indicate or imply that the device or element referred to must have a specific orientation, or be constructed and operated in a specific orientation. Therefore, they should not be construed as limiting this invention.

在本发明的描述中，需要理解的是，术语“同轴”、“底部”、“一端”、“顶部”、“中部”、“另一端”、“上”、“一侧”、“顶部”、“内”、“前部”、“中央”、“两端”等指示的方位或位置关系为基于附图所示的方位或位置关系，仅是为了便于描述本发明和简化描述，而不是指示或暗示所指的装置或元件必须具有特定的方位、以特定的方位构造和操作，因此不能理解为对本发明的限制。

[n0035]

Furthermore, the terms "first," "second," "third," and "fourth" are used for descriptive purposes only and should not be construed as indicating or implying relative importance or implicitly specifying the number of technical features indicated. Thus, a feature defined as

"first," "second," "third," or "fourth" may explicitly or implicitly include at least one of those features.

此外，术语“第一”、“第二”、“第三”、“第四”仅用于描述目的，而不能理解为指示或暗示相对重要性或者隐含指明所指示的技术特征的数量，由此，限定有“第一”、“第二”、“第三”、“第四”的特征可以明示或者隐含地包括至少一个该特征。

[n0036]

In this invention, unless otherwise explicitly specified and limited, the terms "installation," "setting," "connection," "fixing," "screw connection," etc., should be interpreted broadly. For example, they can refer to a fixed connection, a detachable connection, or an integral part; they can refer to a mechanical connection or an electrical connection; they can refer to a direct connection or an indirect connection through an intermediate medium; they can refer to the internal connection of two components or the interaction between two components. Unless otherwise explicitly limited, those skilled in the art can understand the specific meaning of the above terms in this invention according to the specific circumstances.

在本发明中，除非另有明确的规定和限定，术语“安装”、“设置”、“连接”、“固定”、“旋接”等术语应做广义理解，例如，可以是固定连接，也可以是可拆卸连接，或成一体；可以是机械连接，也可以是电连接；可以是直接相连，也可以通过中间媒介间接相连，可以是两个元件内部的连通

或两个元件的相互作用关系，除非另有明确的限定，对于本领域的普通技术人员而言，可以根据具体情况理解上述术语在本发明中的具体含义。

[n0037]

Finally, it should be noted that the above description is only a preferred embodiment of the present invention and is not intended to limit the present invention. Although the present invention has been described in detail with reference to the foregoing embodiments, those skilled in the art can still modify the technical solutions described in the foregoing embodiments or make equivalent substitutions for some of the technical features.

最后应说明的是：以上所述仅为本发明的优选实施例而已，并不用于限制本发明，尽管参照前述实施例对本发明进行了详细的说明，对于本领域的技术人员来说，其依然可以对前述各实施例所记载的技术方案进行修改，或者对其中部分技术特征进行等同替换。

Any modifications, equivalent substitutions, or improvements made within the spirit and principles of this invention shall be included within the scope of protection of this invention.

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