Notice

DESCRIPTION CN219290659U

A separation device for extracting flavonoids from duckweed

一种从浮萍中提取黄酮类物质的分离设备

[0001]

Technical Field

技术领域

[n0001]

This utility model relates to the field of separation device technology, and in particular to a separation device for extracting flavonoids from duckweed.

本实用新型涉及分离装置技术领域，特别涉及一种从浮萍中提取黄酮类物质的分离设备。

[0003]

Background Technology

背景技术

[n0002]

Many flavonoids have medicinal value. These compounds are used to prevent and treat cardiovascular and cerebrovascular diseases, such as reducing vascular fragility, improving vascular permeability, lowering blood lipids and cholesterol, preventing and treating hypertension, cerebral hemorrhage, coronary heart disease, angina pectoris in the elderly, dilating coronary blood vessels, and increasing coronary blood flow.

黄酮类化合物中有药用价值的化合物很多，这些化合物用于防治心脑血管疾病，如能降低血管的脆性，改善血管的通透性、降低血脂和胆固醇，防治老年高血压、脑溢血、冠心病、心绞痛、扩张冠状血管，增加冠脉流量。

[n0003]

Duckweed is a general term for plants in the family Lemnaceae.

水生漂浮植物浮萍(Duckweed)是浮萍科(Lemnaceae)植物的统称。

Duckweed is rich in nutrients, including protein, starch, trace elements (iron, zinc, etc.), vitamins, dietary fiber, polyphenols, and other nutrients.

浮萍营养丰富，富含蛋白、淀粉、微量元素(铁、锌等)、维生素、膳食纤维、多酚等营养物质。

Duckweed cultivated in eutrophic waters can absorb nitrogen and phosphorus and grow rapidly, purifying wastewater while converting large amounts into its own biomass and accumulating starch, protein, etc.

培养于富营养化水体中的浮萍能吸收氮磷等物质而快速生长，净化污水的同时大量转化为自身生物量并积累淀粉、蛋白等。

In addition, duckweed also has high medicinal value. Its main component is apigenin, a flavonoid, which has significant pharmacological effects such as anti-tumor, antiviral, antibacterial, anti-inflammatory, and antioxidant properties.

此外，浮萍也具有较高的药用价值，主要成分为黄酮类物质的芹菜素，具有显著的抗肿瘤、抗病毒、抗菌、抗炎、抗氧化等药理作用。

Therefore, separation equipment is needed to extract flavonoids from duckweed for pharmaceutical use.

因此需要使用分离设备将浮萍中的黄酮类物质提取出来以备制药使用。

[n0004]

Existing separation equipment for extracting flavonoids from duckweed mainly includes a separation tank, a box-type condenser, an extraction separation device, and a heating plate. First, duckweed powder is added to the heating plate inside the separation tank through a filter screen. Then, alcohol and water are added and heated until the boiling point of the alcohol and water is reached. The temperature is maintained for distillation to separate the alcohol and water. The alcohol vapor enters the box-type condenser, is condensed, and recovered. After the liquid on the heating plate cools, the solution enters the lower part of the tank. At this point, chloroform liquid is introduced, and after thorough mixing, it flows out

from the outlet to the extraction separation device for extraction separation. However, when adding duckweed powder to the separation tank through the filter screen, larger duckweed powder particles tend to remain at the top of the filter screen, making it difficult for the duckweed powder to pass through and affecting the speed at which duckweed powder is added to the separation tank. Furthermore, the filter screen needs to be manually removed, and the larger duckweed powder particles need to be cleaned, increasing the operation steps and making it time-consuming and labor-intensive. Therefore, this application provides a separation device for extracting flavonoids from duckweed to meet this need.

现有的从浮萍中提取黄酮类物质的分离设备主要包含分离罐、箱式冷凝装置、萃取分离装置、加热板，首先将浮萍粉末通过过滤网加入至分离罐内的加热板上，然后加入醇水，并进行加热，到达醇水沸点后保持温度，进行蒸馏，使醇水分离，醇蒸汽进入箱式冷凝装置，冷凝后回收，加热板上液体冷却后，溶液进入罐体下部，此时，通入氯仿液体，充分混合后，从出料口流出至萃取分离装置进行萃取分离，然而在将浮萍粉末通过过滤网加入至分离罐时，较大的浮萍粉末颗粒容易停留在过滤网的顶部，使得浮萍粉末不容易穿过过滤网，影响向分离罐加入浮萍粉末的速度，同时，需要人工将过滤网取下，然后将较大颗粒的浮萍粉末清理，增加了操作步骤，费时费力，因此，本申请提供了一种从浮萍中提取黄酮类物质的分离设备来满足需求。

[0007]

Utility Model Content

实用新型内容

[n0005]

The technical problem this invention aims to solve is to provide a separation device for extracting flavonoids from duckweed, addressing the issue that existing duckweed flavonoid separation devices often suffer from larger duckweed powder particles easily remaining on top of the filter screen when duckweed powder is added to the separation tank through a filter screen. This prevents the duckweed powder from passing through the filter screen, affecting the speed at which duckweed powder is added to the separation tank. Furthermore, manual removal of the filter screen and cleaning of the larger duckweed powder particles are required, increasing the operational steps and causing time and labor costs.

本实用新型要解决的技术问题是提供一种从浮萍中提取黄酮类物质的分离设备以解决现有的浮萍黄酮物质分离设备，浮萍粉末通过过滤网加入至分离罐时，较大的浮萍粉末颗粒容易停留在过滤网的顶部，使得浮萍粉末不容易穿过过滤网，影响向分离罐加入浮萍粉末的速度，同时，需要人工将过滤网取下，然后将较大的浮萍粉末清理，增加了操作步骤，费时费力的问题。

[n0006]

To solve the above-mentioned technical problems, this utility model provides the following technical solution:

为解决上述技术问题，本实用新型提供如下技术方案：

[n0007]

A separation device for extracting flavonoids from duckweed includes a separation tank. A heating plate is fixedly connected to the inner wall of the separation tank. An alcohol-water feeding pipe and an exhaust valve are installed at the top of the separation tank. A condenser connecting pipe and a chloroform feeding pipe are installed on the side wall of the separation tank. A discharge pipe is fixedly connected to the bottom of the separation tank. A feeding hopper is installed on the side wall of the separation tank through a pipe. A collecting ring is fixedly connected to the inner wall of the feeding hopper. A filter screen is installed above the collecting ring. A sliding rod is slidably connected to the feeding hopper through a mounting frame. The bottom end of the sliding rod is fixedly connected to the filter screen. A discharge hopper communicating with the collecting ring is fixedly connected to the side wall of the feeding hopper. A vibration motor is installed on a mounting plate at the top of the sliding rod. A support spring is provided between the mounting frame and the mounting plate.

一种从浮萍中提取黄酮类物质的分离设备，包括分离罐，所述分离罐的内壁上固定连接有加热板，所述分离罐的顶部安装有醇水加料管和排气阀，所述分离罐的侧壁上安装有冷凝连接管和氯仿进料管，所述分离罐的底部固定连接有出料管，所述分离罐的侧壁上通过管道安装有加料斗，所述加料斗的内壁上固定连接有收集环，所述收集环的上方设置有过滤网，所述加料斗上通过安装架滑动连接有滑杆，所述滑杆的底端与所述过滤网固定连接，所述加料斗的侧壁上固定连接有与所述收集环相连通的排料斗，所述滑杆的顶端固定安装板安装有振动电机，所述安装架与所述安装板之间设置有支撑弹簧。

[n0008]

Preferably, the assembly further includes a stirring component for stirring the material. The stirring component includes a drive motor fixedly connected to the top of the separation tank. The output end of the drive motor is fixedly connected to a rotating shaft. The bottom end of the rotating shaft extends into the separation tank and is fixedly fitted with a stirring plate. The stirring plate is located above the heating plate.

优选地，还包括用于对物料搅拌的搅拌组件，所述搅拌组件包括固定连接于所述分离罐顶部上的驱动电机，所述驱动电机的输出端固定连接有转动轴，所述转动轴的底端延伸至所述分离罐内，并固定套接有搅拌板，所述搅拌板位于所述加热板的上方。

[n0009]

Preferably, the collecting ring has a circular structure and is inclined.

优选地，所述收集环呈圆环形结构，且倾斜设置。

[n0010]

Preferably, the pipe connected to the feeding hopper is inclined.

优选地，与所述加料斗相连接的所述管道呈倾斜设置。

[n0011]

Preferably, the filter screen has a conical structure, and the horizontal projection diameter of the filter screen is equal to the horizontal projection mid-diameter of the annular structure.

优选地，所述过滤网呈锥形结构，且所述过滤网的水平面投影直径等于所述圆环形结构的水平面投影中径。

[n0012]

Preferably, the mounting bracket is a triangular bracket, which is fixedly connected to the feeding hopper by bolts, and the sliding rod is slidably connected at the middle position of the triangular bracket.

优选地，所述安装架为三角支架，通过螺栓与所述加料斗固定连接，所述滑杆滑动连接在所述三角支架中部位置处。

[n0013]

Preferably, a conveying pipe is fixedly connected to the side wall of the separation tank, and the top and bottom ends of the conveying pipe are located on both sides of the heating plate, respectively.

优选地，所述分离罐的侧壁上固定连接有输送管道，所述输送管道的顶端和底端分别位于所述加热板的两侧。

[n0014]

Preferably, the condenser connection pipe is located above the heating plate.

优选地，所述冷凝连接管位于所述加热板的上方。

[n0015]

Preferably, the chloroform feed pipe is located below the heating plate.

优选地，所述氯仿进料管位于所述加热板的下方。

[n0016]

Compared with the prior art, this utility model has at least the following beneficial effects:

本实用新型与现有技术相比，至少具有如下有益效果：

[n0017]

In the above solution, a vibrating motor, a support spring, a feeding hopper, a filter screen, and a collecting ring are installed. The required amount of duckweed powder is added to the feeding hopper. The vibrating motor, in conjunction with the support spring, causes the filter screen to vibrate. Under the action of vibration, small particles of duckweed powder on the filter screen pass through the filter holes and enter the heating plate inside the separation tank through the pipe. Larger particles slide off the conical filter screen into the collecting ring. The collecting ring is tilted so that the large particles slide off onto the discharge hopper and are finally collected through the collection box. There is no need to manually disassemble

the filter screen to clean the large duckweed powder, reducing the number of operation steps, saving time and labor, and the structure is simple, easy to operate, and improves the production speed.

上述方案中，通过设置振动电机、支撑弹簧、加料斗、过滤网、收集环，在加料斗中加入所需量的浮萍粉末，振动电机配合支撑弹簧使得过滤网进行振动，位于过滤网上的浮萍粉末在振动的作用下，小的颗粒粉末穿过过滤孔，通过管道进入分离罐内部中的加热板上，大的颗粒粉末在锥形结构的过滤网上滑落至收集环中，收集环倾斜设置，使得大的颗粒粉末滑落至排料斗上，最后通过收集盒进行收集，不需要人工将过滤网拆卸清理大的浮萍粉末，减少的操作步骤，省时省力，且结构简单，操作便捷，提高了生产速度。

[0021]

Attached Figure Description

附图说明

[n0018]

The accompanying drawings, which are incorporated herein and form part of the specification, illustrate embodiments of the present disclosure and, together with the specification, further serve to explain the principles of the present disclosure and enable those skilled in the art to implement and use the present disclosure.

并入本文中并且构成说明书的部分的附图示出了本公开的实施例，并且与说明书一起进一步用来对本公开的原理进行解释，并且使相关领域技术人员能够实施和使用本公开。

[n0019]

Figure 1 is a three-dimensional structural diagram of the separation equipment for extracting flavonoids from duckweed;

图1为从浮萍中提取黄酮类物质的分离设备立体结构示意图；

[n0020]

Figure 2 is a partial cross-sectional three-dimensional structural diagram of the separation equipment for extracting flavonoids from duckweed;

图2为从浮萍中提取黄酮类物质的分离设备局部剖开立体结构示意图；

[n0021]

Figure 3 is a partial cross-sectional front view of the separation equipment for extracting flavonoids from duckweed;

图3为从浮萍中提取黄酮类物质的分离设备局部剖开正视结构示意图；

[n0022]

Figure 4 is a partially cut-out, enlarged three-dimensional structural diagram of the feeding hopper, vibrating motor, and filter screen.

图4为加料斗、振动电机、过滤网配合局部剖开立体放大结构示意图；

[n0023]

Figure 5 is a three-dimensional enlarged schematic diagram of the feeding hopper;

图5为加料斗立体放大结构示意图；

[n0024]

Figure 6 is a top-down enlarged schematic diagram of the structure of the feeding hopper, filter screen, and collection ring.

图6为加料斗、过滤网、收集环配合俯视放大结构示意图。

[n0025]

[Figure Labels]

[附图标记]

[n0026]

1. Separator; 2. Condenser connection pipe; 3. Alcohol-water feed pipe; 4. Chloroform feed pipe; 5. Conveying pipe; 6. Discharge pipe; 7. Feed hopper; 8. Vibrating motor; 9. Exhaust valve; 10. Stirring assembly; 11. Heating plate; 12. Drive motor; 13. Stirring plate; 14. Filter screen; 15. Collection ring; 16. Discharge hopper; 17. Slide bar; 18. Support spring.

1、分离罐；2、冷凝连接管；3、醇水加料管；4、氯仿进料管；5、输送管道；6、出料管；7、加料斗；8、振动电机；9、排气阀；10、搅拌组件；11、加热板；12、驱动电机；13、搅拌板；14、过滤网；15、收集环；16、排料斗；17、滑杆；18、支撑弹簧。

[n0027]

As shown in the figure, specific structures and devices are marked in the figure to clearly illustrate the structure of the embodiments of this utility model. However, this is only for illustrative purposes and is not intended to limit this utility model to the specific structure, device and environment. According to specific needs, those skilled in the art can adjust or modify these devices and environments, and such adjustments or modifications are still included in the scope of the appended claims.

如图所示，为了能明确实现本实用新型的实施例的结构，在图中标注了特定的结构和器件，但这仅为示意需要，并非意图将本实用新型限定在该特定结构、器件和环境中，根据具体需要，本领域的普通技术人员可以将这些器件和环境进行调整或者修改，所进行的调整或者修改仍然包括在后附的权利要求的范围中。

[0032]

Detailed Implementation

具体实施方式

[n0028]

The separation device for extracting flavonoids from duckweed provided by this utility model will be described in detail below with reference to the accompanying drawings and specific embodiments.

下面结合附图和具体实施例对本实用新型提供的一种从浮萍中提取黄酮类物质的分离设备进行详细描述。

It should also be noted here that, in order to make the embodiments more detailed, the following embodiments are the best and preferred embodiments. For some well-known technologies, those skilled in the art can also use other alternative methods to implement them. Moreover, the accompanying drawings are only for more specific description of the embodiments and are not intended to specifically limit the present invention.

同时在这里做以说明的是，为了使实施例更加详尽，下面的实施例为最佳、优选实施例，对于一些公知技术本领域技术人员也可采用其他替代方式而进行实施；而且附图部分仅是为了更具体的描述实施例，而并不旨在对本实用新型进行具体的限定。

[n0029]

It should be noted that the use of terms such as "an embodiment", "embodiment", "exemplary embodiment", and "some embodiments" in the specification indicates that the described embodiment may include a specific feature, structure, or characteristic, but not every embodiment necessarily includes that specific feature, structure, or characteristic.

需要指出的是，在说明书中提到“一个实施例”、“实施例”、“示例性实施例”、“一些实施例”等指示所述的实施例可以包括特定特征、结构或特性，但未必每个实施例都包括该特定特征、结构或特性。

Furthermore, when a particular feature, structure, or characteristic is described in connection with an embodiment, implementing such a feature, structure, or characteristic in conjunction with other embodiments (whether explicitly described or not) should be within the knowledge of those skilled in the art.

另外，在结合实施例描述特定特征、结构或特性时，结合其它实施例(无论是否明确描述)实现这种特征、结构或特性应在相关领域技术人员的知识范围内。

[n0030]

Typically, terms can be understood at least partially from their use in context.

通常，可以至少部分从上下文中的使用来理解术语。

For example, depending at least in part on the context, the term “one or more” as used herein may be used to describe any feature, structure or property in the singular sense, or may be used to describe a combination of features, structures or properties in the plural sense.

例如，至少部分取决于上下文，本文中使用的术语“一个或多个”可以用于描述单数意义的任何特征、结构或特性，或者可以用于描述复数意义的特征、结构或特性的组合。

In addition, the term “based on” can be understood as not necessarily intended to convey an exclusive set of factors, but rather, at least in part, depending on the context, allowing for the presence of other factors that are not necessarily explicitly described.

另外，术语“基于”可以被理解为不一定旨在传达一组排他性的因素，而是可以替代地，至少部分地取决于上下文，允许存在不一定明确描述的其他因素。

[n0031]

It is understood that the meanings of “on”, “above” and “above” in this disclosure should be interpreted in the broadest sense, such that “on” means not only “directly on”

something, but also includes something with an intermediary feature or layer, and that “above” or “above” means not only “on” something, but also includes something “above” or “above” without an intermediary feature or layer.

可以理解的是，本公开中的“在……上”、“在……之上”和“在……上方”的含义应当以最宽方式被解读，以使得“在……上”不仅表示“直接在”某物“上”而且还包括在某物“上”且其间有居间特征或层的含义，并且“在……之上”或“在……上方”不仅表示“在”某物“之上”或“上方”的含义，而且还可以包括其“在”某物“之上”或“上方”且其间没有居间特征或层的含义。

[n0032]

In addition, spatial terms such as “below,” “under,” “lower,” “above,” and “upper” may be used in this document for the convenience of description to describe the relationship between one element or feature and one or more other elements or features, as shown in the accompanying drawings.

此外，诸如“在…之下”、“在…下方”、“下部”、“在…之上”、“上部”等空间相关术语在本文中为了描述方便可以用于描述一个元件或特征与另一个或多个元件或特征的关系，如在附图中示出的。

Space-related terms are intended to cover different orientations in the use or operation of the equipment, other than those depicted in the accompanying drawings.

空间相关术语旨在涵盖除了在附图所描绘的取向之外的在设备使用或操作中的不同取向。

The device can be oriented in other ways, and the spatially relevant descriptive terms used in this paper can be interpreted similarly.

设备可以以另外的方式被定向，并且本文中使用的空间相关描述词可以类似地被相应解释。

[n0033]

As shown in Figures 1-6, an embodiment of this utility model provides a separation device for extracting flavonoids from duckweed, including a separation tank 1. A heating plate 11 is fixedly connected to the inner wall of the separation tank 1, which divides the separation tank 1 into an upper chamber and a lower chamber. An alcohol-water feeding pipe 3 and an exhaust valve 9 are installed on the top of the separation tank 1. A condenser connecting pipe 2 and a chloroform feeding pipe 4 are installed on the side wall of the separation tank 1. The condenser connecting pipe 2 is located above the heating plate 11, and the chloroform feeding pipe 4 is located below the heating plate 11. The condenser connecting pipe 2 is connected to a box-type condenser for condensing and recovering the evaporated alcohol vapor. A discharge pipe 6 is fixedly connected to the bottom of the separation tank 1. A conveying pipe 5 is fixedly connected to the side wall of the separation tank 1. The top and bottom ends of the conveying pipe 5 are located on both sides of the heating plate 11,

respectively. A feeding hopper 7 is installed on the side wall of the separation tank 1 through a pipe. The feeding hopper 7 is inclined, which allows the duckweed powder to slide more easily into the upper cavity and contact the heating plate 11. A collecting ring 15 is fixedly connected to the inner wall of the feeding hopper 7, and a filter screen 14 is installed above the collecting ring 15. A mounting bracket is fixedly installed on the top of the feeding hopper 7, and a sliding rod 17 is slidably connected to the feeding hopper 7 via the mounting bracket. The bottom end of the sliding rod 17 is fixedly connected to the filter screen 14. A discharge hopper 16, which communicates with the collecting ring 15, is fixedly connected to the side wall of the feeding hopper 7. The collecting ring 15 has a circular structure and is inclined. The filter screen 14 has a conical structure, and the horizontal projection diameter of the filter screen 14 is equal to the horizontal projection mid-diameter of the circular structure. It should be noted that, as shown in Figures 3 and 6, the edge of the filter screen 14 is located directly above the center of the collecting ring 15 (Note: the center of the ring refers to the point on the ring where the outer circumference and the inner circumference of the ring meet). The ring with equal vertical distances; the horizontal projection diameter of the annular structure refers to the diameter of the circle formed by the projection of the center of the ring onto the horizontal plane. This allows for better collection of larger powder particles. A vibration motor 8 is installed on the mounting plate fixed at the top of the slide rod 17. A support spring 18 is provided between the mounting frame and the mounting plate. In use, the required amount of duckweed powder is added to the feeding hopper 7. The vibration motor 8, in conjunction with the support spring 18, causes the filter screen 14 to vibrate. Under the action of vibration,

the small particles of duckweed powder on the filter screen 14 pass through the filter holes and enter the heating plate 11 inside the separation tank 1 through the pipe. The large particles of powder slide from the edge of the conical filter screen 14 into the collecting ring 15. The collecting ring 15 is tilted so that the large particles of powder slide onto the discharge hopper 16 and are finally collected through the collection box. The sieved powder is spread on the heating plate 11. Alcohol and water are added through the alcohol-water feeding pipe 3 to dissolve the powder completely. The heating plate 11 heats the solution until it reaches the boiling point of the alcohol and water, and then maintains the temperature for distillation to separate the alcohol and water. The alcohol vapor enters the box condenser through the condenser connecting pipe 2, is condensed and recovered. After the liquid on the heating plate 11 cools, the straight valve on the conveying pipe 5 is opened, and the solution enters the lower chamber of the separation tank 1. At this time, chloroform liquid is introduced through the chloroform feeding pipe 4. After thorough mixing, it flows out from the discharge pipe 6 and is then extracted and separated to complete the separation of duckweed flavonoids. The duckweed flavonoid separation device of this application can separate duckweed flavonoids and can also screen duckweed powder. Larger duckweed powder can automatically slide off the filter screen 14 and be collected without the need for manual disassembly and cleaning of the filter screen 14. This reduces the number of operation steps, saves time and labor, and has a simple structure and convenient operation, thus improving the production speed.

如图1-图6所示的，本实用新型的实施例提供一种从浮萍中提取黄酮类物质的分离设备，包括分离罐1，分离罐1的内壁上固定连接有加热板11，通过加热板11使得分离罐1分上腔体和下腔体，分离罐1的顶部安装有醇水加料管3和排气阀9，分离罐1的侧壁上安装有冷凝连接管2和氯仿进料管4，冷凝连接管2位于加热板11的上方，氯仿进料管4位于加热板11的下方，冷凝连接管2与箱式冷凝器相连接，用于对蒸发出来的醇蒸汽冷凝回收，分离罐1的底部固定连接有出料管6，分离罐1的侧壁上固定连接有输送管道5，输送管道5的顶端和底端分别位于加热板11的两侧，分离罐1的侧壁上通过管道安装有加料斗7，与加料斗7相连接的管道呈倾斜设置，这样设置的好处是，更好的使得浮萍粉末滑落至上腔体内，并与加热板11接触，加料斗7的内壁上固定连接有收集环15，收集环15的上方设置有过滤网14，加料斗7顶部固定安装有安装架，加料斗7上通过安装架滑动连接有滑杆17，滑杆17的底端与过滤网14固定连接，加料斗7的侧壁上固定连接有与收集环15相连通的排料斗16，收集环15呈圆环形结构，且倾斜设置，过滤网14呈锥形结构，且过滤网14的水平面投影直径等于圆环形结构的水平面投影中径，这里需要说明的是，如图3和图6所示，过滤网14的边缘位于收集环15的圆环中部的正上方位置(注：圆环中部是指在圆环上与圆环外圆周面和圆环内圆周面的垂直距离均相等的那一圈；圆环形结构的水平面投影中径是指圆环中部投影到水平面上所形成圆形的直径)，这样能够更好的对较大的粉末进行收集，位于滑杆17顶端固定的安装板上安装有振动电机8，安装架与安装板之间设置有支撑弹簧18，使用时，在加料斗7中加入所需量的浮萍粉末，振动电机8配合支撑弹簧18使得过滤网14进行振动，位于过滤网14上的浮萍粉末在振动的作用下，小的颗粒粉末穿过过滤孔，通过管道进入分离罐1内部中的加热板11上，大的颗粒粉末从锥形结构的过滤网14的边缘滑落至收集环15中，收集环15倾斜设置，使得大的颗粒粉末滑落至排料斗16上，最后通过收集盒进行收集；过筛后的粉末

铺在加热板11上，醇水加料管3加入醇水，使粉末全部溶解，加热板11此时加热，到达醇水沸点后保持温度，进行蒸馏，使醇水分离，醇蒸汽通过冷凝连接管2进入箱式冷凝器中，冷凝后回收，加热板11上的液体冷却后，输送管道5上的直通阀打开，溶液进入分离罐1下腔体，此时，氯仿进料管4通入氯仿液体，充分混合后，从出料管6流出，后进行萃取分离，完成浮萍黄酮物质分离，本申请的浮萍黄酮物质分离装置，能够对浮萍黄酮物质分离，并且能够实现对浮萍粉末进行筛分，较大的浮萍粉末能够自动从过滤网14上滑落，并且进行收集，不需要人工将过滤网14拆卸清理大的浮萍粉末，减少的操作步骤，省时省力，且结构简单，操作便捷，提高了生产速度。

[n0034]

As one embodiment of this invention, as shown in Figures 1 and 2, it further includes a stirring assembly 10 for stirring the materials. The stirring assembly 10 includes a drive motor 12 fixedly connected to the top of the separation tank 1. The output end of the drive motor 12 is fixedly connected to a rotating shaft. The bottom end of the rotating shaft extends into the separation tank 1 and is fixedly sleeved with a stirring plate 13. The stirring plate 13 is located above the heating plate 11. When the output end of the drive motor 12 rotates, it drives the rotating shaft to rotate, causing the stirring plate 13 to rotate, thereby stirring the powder and alcohol-water mixture on the heating plate 11 and accelerating the mixing speed of the powder and alcohol-water.

作为本实施例中的一种实施方式，如图1和图2所示，还包括用于对物料搅拌的搅拌组件10，搅拌组件10包括固定连接于分离罐1顶部上的驱动电机12，驱动电机12的输出端固定连接有转动轴，转动轴的底端延伸至分离罐1内，并固定套接有搅拌板13，搅拌板13位于加热板11的上方，驱动电机12输出端转动，带动转动轴转动，使得搅拌板13转动，从而对加热板11上的粉末和醇水混合物进行搅拌，加速粉末与醇水的混合速度。

[n0035]

As one embodiment of this example, as shown in Figure 4, the mounting bracket is a triangular bracket, which is made of sheet metal stamping and is made of high-strength plate. It is fixedly connected to the feeding hopper 7 by bolts, and the sliding rod 17 is slidably connected at the middle position of the triangular bracket.

作为本实施例中的一种实施方式，如图4所示，安装架为三角支架，三角支架为钣金冲压而成，且为高强度板，通过螺栓与加料斗7固定连接，滑杆17滑动连接在三角支架中部位置处。

[n0036]

The working principle of this utility model is as follows: When in use, the required amount of duckweed powder is added to the feeding hopper 7. The vibration motor 8, together with the support spring 18, causes the filter screen 14 to vibrate. Under the action of vibration, the small particles of duckweed powder on the filter screen 14 pass through the filter holes and

enter the heating plate 11 inside the separation tank 1 through the pipe. The large particles slide down the conical filter screen 14 into the collection ring 15. The collection ring 15 is set at an inclination so that the large particles slide down onto the discharge hopper 16 and are finally collected through the collection box.

本实用新型的工作原理，使用时，在加料斗7中加入所需量的浮萍粉末，振动电机8配合支撑弹簧18使得过滤网14进行振动，位于过滤网14上的浮萍粉末在振动的作用下，小的颗粒粉末穿过过滤孔，通过管道进入分离罐1内部中的加热板11上，大的颗粒粉末在锥形结构的过滤网14上滑落至收集环15中，收集环15倾斜设置，使得大的颗粒粉末滑落至排料斗16上，最后通过收集盒进行收集。

[n0037]

The sieved powder is spread on heating plate 11, and alcohol-water is added through alcohol-water feeding pipe 3. The output end of drive motor 12 rotates, driving the rotating shaft to rotate, which in turn rotates stirring plate 13, thereby stirring the powder and alcohol-water mixture on heating plate 11, accelerating the mixing speed of powder and alcohol-water, and ensuring complete dissolution of the powder. Heating plate 11 is then heated, and after reaching the boiling point of alcohol-water, the temperature is maintained for distillation to separate alcohol and water. Alcohol vapor enters the box condenser through condenser connecting pipe 2, is condensed and recovered, and after the liquid on heating plate 11 cools, the straight valve on conveying pipe 5 is opened, allowing the dissolved liquid to dissolve. The

liquid enters the lower chamber of the separator 1. At this time, chloroform liquid is introduced through the chloroform feed pipe 4. After thorough mixing, it flows out from the discharge pipe 6 and is then extracted and separated to complete the separation of duckweed flavonoids. The duckweed flavonoid separation device of this application can separate duckweed flavonoids and can also screen duckweed powder. Larger duckweed powder can automatically slide off the edge of the filter screen 14 and be collected. There is no need to manually disassemble the filter screen 14 to clean the large duckweed powder, which reduces the number of operation steps, saves time and labor, and has a simple structure and convenient operation, thus improving the production speed.

过筛后的粉末铺在加热板11上，醇水加料管3加入醇水，驱动电机12输出端转动，带动转动轴转动，使得搅拌板13转动，从而对加热板11上的粉末和醇水混合物进行搅拌，加速粉末与醇水的混合速度，使粉末全部溶解，加热板11此时加热，到达醇水沸点后保持温度，进行蒸馏，使醇水分离，醇蒸汽通过冷凝连接管2进入箱式冷凝器中，冷凝后回收，加热板11上的液体冷却后，输送管道5上的直通阀打开，溶液进入分离罐1下腔体，此时，氯仿进料管4通入氯仿液体，充分混合后，从出料管6流出，后进行萃取分离，完成浮萍黄酮物质分离，本申请的浮萍黄酮物质分离装置，能够对浮萍黄酮物质分离，并且能够实现对浮萍粉末进行筛分，较大的浮萍粉末能够自动从过滤网14的边缘滑落，并且进行收集，不需要人工将过滤网14拆卸清理大的浮萍粉末，减少的操作步骤，省时省力，且结构简单，操作便捷，提高了生产速度。

[n0038]

This utility model covers any substitutions, modifications, equivalent methods and solutions made within the spirit and scope of this utility model.

本实用新型涵盖任何在本实用新型的精髓和范围上做的替代、修改、等效方法以及方案。

In order to enable the public to have a thorough understanding of the present invention, specific details are described in detail in the following preferred embodiments of the present invention, but those skilled in the art can fully understand the present invention without these details.

为了使公众对本实用新型有彻底的了解，在以下本实用新型优选实施例中详细说明了具体的细节，而对本领域技术人员来说没有这些细节的描述也可以完全理解本实用新型。

In addition, to avoid unnecessary confusion regarding the nature of this utility model, well-known methods, processes, procedures, components, and circuits are not described in detail.

另外，为了避免对本实用新型的实质造成不必要的混淆，并没有详细说明众所周知的方法、过程、流程、元件和电路等。

[n0039]

Those skilled in the art will understand that all or part of the steps in the methods of the above embodiments can be implemented by a program instructing related hardware. The program can be stored in a computer-readable storage medium, such as ROM/RAM, magnetic disk, optical disk, etc.

本领域普通技术人员可以理解实现上述实施例方法中的全部或部分步骤是可以通过程序来指令相关的硬件来完成，该程序可以存储于计算机可读取存储介质中，如：ROM/RAM、磁碟、光盘等。

[n0040]

The above description is only a preferred embodiment of the present utility model. It should be noted that for those skilled in the art, several improvements and modifications can be made without departing from the principle of the present utility model, and these improvements and modifications should also be considered within the protection scope of the present utility model.

以上所述仅是本实用新型的优选实施方式，应当指出，对于本技术领域的普通技术人员来说，在不脱离本实用新型原理的前提下，还可以作出若干改进和润饰，这些改进和润饰也应视为本实用新型的保护范围。