SEDIMENTATION SEPARATION DEVICE FOR SEWAGE TREATMENT

Field of the Invention

The present invention relates to the field of sewage treatment technology, particularly to a sedimentation separation device for sewage treatment.

Background to the Invention

Wastewater refers to the wastewater, sewage, and waste liquid generated in the industrial production process, which contains industrial production materials, intermediate products, and products that are lost with water, as well as pollutants generated during the production process. With the rapid development of industry, the types and quantities of wastewater have increased rapidly, and the pollution to water has become increasingly widespread and serious, threatening human health and safety. Wastewater refers to the wastewater, sewage, and waste liquid generated in the industrial production process, which contains industrial production materials, intermediate products, and products that are lost with water, as well as pollutants generated during the production process.

After searching, the invention patent with the Chinese patent number CN118771651B discloses a sedimentation separation device for sewage treatment. Compared with the prior art, the invention patent with the Chinese patent number CN118771651B continuously rotates the stirring plate and uniformly sets the air holes at the bottom of the stirring plate. As air continuously enters the sewage through the air holes, the continuous rotation of the stirring plate drives the air to continuously change its outlet position in the sewage, making the range of bubbles in the sewage wider and further expanding the aeration range, thereby improving the probability of impurity contact in the sewage and

increasing the sedimentation speed.

However, in the actual use of the above device, simple physical stirring may not achieve the expected effect for wastewater containing a large number of colloidal particles, dissolved organic matter, or tiny suspended solids. The pollutants in such wastewater are often relatively stable and difficult to form large flocs and quickly precipitate through simple physical stirring. Moreover, during the use of the above device, sediment accumulates on the inside of the device, and excessive sediment can block the bottom of the device, thereby affecting its normal use. Therefore, it is necessary to propose a sedimentation separation device for wastewater treatment.

Statement of Invention

The purpose of the present invention is to propose a sedimentation separation device for wastewater treatment in order to solve the shortcomings of the prior art in which no catalyst is introduced to accelerate the wastewater sedimentation separation process, and the catalyst can significantly reduce the energy and time required for impurity aggregation, further improving the sedimentation efficiency.

In order to achieve the above objectives, the present invention adopts the following technical solution:

A sedimentation separation device for sewage treatment comprises a bottom plate, the upper part of the bottom plate is connected with a U-shaped plate, and a separation tank is fixedly connected between two sets of U-shaped plates, the separation tank is equipped with a promoting sedimentation separation component, the promoting sedimentation separation component comprises a first servo motor, a dispensing cylinder, a first catalytic pipe, a second catalytic pipe, and a first electric telescopic rod that are connected to the

separation tank, the start of the first servo motor can drive the dispensing cylinder to rotate, and the rotation of the dispensing cylinder can drive the first catalytic pipe and the second catalytic pipe to rotate, the first catalytic pipe and the second catalytic pipe will stir the sewage while dispensing catalytic substances, the separation tank is equipped with a sedimentation separation component, the sedimentation separation component comprises an upper sealing plate, a lower sealing plate, a second electric telescopic rod, a second servo motor, a limit rod, and a sedimentation tank that are connected to the separation tank, the start of the second servo motor will drive the upper sealing plate to rotate, and the rotation of the upper sealing plate will mesh with the lower sealing plate, the start of the second electric telescopic rod will drive the upper sealing plate and the lower sealing plate to move downward in the vertical direction, the downward movement of the lower sealing plate will drive the limit rod to move towards the side closer to the bottom plate, and the downward movement of the second electric telescopic rod will drive the sedimentation tank to detach from the inside of the separation tank.

The above technical solution further comprises:

A support column is symmetrically fixedly connected to one side of the bottom plate near the U-shaped plate, and the end of the support column away from the bottom plate is fixedly connected to the U-shaped plate. The function of the U-shaped plate is to connect the support column and the separation tank, and the U-shaped plate can keep the separation tank in a stable state.

The end of the separation tank away from the bottom plate is fixedly connected to the first servo motor, and the output shaft end of the first servo motor is fixedly connected to the first gear plate, the outer side of the separation tank is rotatably connected to the dispensing cylinder, and the outer side of the dispensing cylinder is fixedly connected to

the second gear plate, the second gear plate meshes with the first gear plate. The catalyst will be dispensed through the dispensing cylinder, and the start of the first servo motor will drive the first gear plate to rotate when the output shaft end of the first servo motor rotates.

The dispensing cylinder is fixedly connected between one end near the bottom plate and the first electric telescopic rod, the outer side of the first electric telescopic rod is fixedly connected with a first catalytic pipe and a second catalytic pipe, and a through rod is symmetrically fixedly connected between the first catalytic pipe and the second catalytic pipe. The catalyst can be sprayed out through the nozzles on the outside of the first catalytic pipe and second catalytic pipe and react with the sewage.

The first electric telescopic rod is fixedly connected to a connecting pipe at one end away from the dispensing pipe, and a push rod is fixedly connected to the outer side of the connecting pipe. The rotation of the connecting pipe will drive the push rod to rotate.

The inner side of the separation tank is fixedly connected to a middle sedimentation plate, the middle sedimentation plate is provided with multiple flow holes arranged uniformly along the circumference of the middle sedimentation plate. Wastewater can pass through the inner side of the flow hole.

The middle sedimentation plate is in contact with the push rod on the side away from the bottom plate, and an outflow groove is opened on the middle sedimentation plate. The substances adsorbed on the outer side of the middle sedimentation plate will accumulate and fall from the inner side of the outflow groove, eventually falling into the upper part of the flow hole.

The inner side of the separation tank is slidably connected to the upper sealing plate, and the inner side of the separation tank is slidably connected to the lower sealing plate, the side of the upper sealing plate near the bottom plate is fixedly connected to the second

electric telescopic rod, and the second electric telescopic rod is rotatably connected to the lower sealing plate. The second electric telescopic rod will drive the upper sealing plate to move downward in the vertical direction. When it reaches the appropriate position, the lower sealing plate will adhere to the sediment.

The side of the lower sealing plate near the bottom plate is fixedly connected with the limit rod, there are two sets of limit rods, and a spring is fixedly connected to the side of the limit rod near the bottom plate, the spring is fixedly connected between one end away from the limit rod and the sedimentation tank. The downward movement of the lower sealing plate will drive the limit rod to move downward, and when the limit rod moves downward, it will compress the spring.

The side of the bottom plate near the support column is fixedly connected with the second servo motor, the output shaft end of the second servo motor is fixedly connected to the second electric telescopic rod, and the outer side of the second electric telescopic rod is rotatably connected to the sedimentation tank. The activation of the second electric telescopic rod can drive the sedimentation tank to separate from the inside of the separation tank.

The present invention has the following beneficial effects:

1. In the present invention, by setting the sedimentation separation component, the start of the first servo motor can drive the dispensing cylinder to rotate, and the rotation of the dispensing cylinder can drive the rotation of the first catalytic pipe and the second catalytic pipe. The first catalytic pipe and the second catalytic pipe will stir the sewage up and down while dispensing catalytic substances. The catalytic substances will be dispensed back and forth on the inside of the separation tank, so that the catalytic substances can fully fuse the sewage containing a large number of colloidal particles, dissolved organic matter or

tiny suspended solids, thereby further improving the rate of sewage sedimentation.

2. In the present invention, further, by setting the sedimentation separation component, the start of the second servo motor will drive the upper sealing plate to rotate, and the rotation of the upper sealing plate will mesh with the lower sealing plate. The start of the second electric telescopic rod will drive the upper and lower sealing plates to move vertically downwards, and the downward movement of the lower sealing plate will drive the limit rod to move towards the side closer to the bottom plate. The downward movement of the second electric telescopic rod will drive the sedimentation tank to directly detach from the inside of the separation tank, thereby avoiding the accumulation of sediment on the inside of the device. Excessive sediment will block the bottom of the device, which will affect the normal use of the device.

Brief Description of the Drawings

FIG. 1 is a schematic diagram of the overall structure of a sedimentation separation device for sewage treatment proposed by the present invention;

FIG. 2 is a schematic diagram of the overall cross-sectional structure of a sedimentation separation device for sewage treatment proposed by the present invention;

FIG. 3 is a schematic diagram of the overall cross-sectional bottom structure of a sedimentation separation device for sewage treatment proposed by the present invention;

FIG. 4 is an enlarged schematic diagram of the structure at point A in FIG. 1;

FIG. 5 is an enlarged schematic diagram of the structure at point B in FIG. 2;

FIG. 6 is an enlarged schematic diagram of the structure at point C in FIG. 3;

FIG. 7 is an enlarged schematic diagram of the structure at point D in FIG. 2.

In the figure: 1. Bottom plate; 2. Support column; 3. U-shaped plate; 4. Separation tank; 5. First servo motor; 6. First gear plate; 7. Dispensing cylinder; 8. Second gear plate; 9. Inlet pipe; 10. First catalytic pipe; 11. Connecting rod; 12. Second catalytic pipe; 13. First electric telescopic rod; 14. Connecting pipe; 15. Middle sedimentation plate; 16. Flow hole; 17. Outflow groove; 18. Push rod; 19. Outlet pipe; 20. Upper sealing plate; 21. Lower sealing plate; 22. Second electric telescopic rod; 23. Second servo motor; 24. Limit rod; 25. Spring; 26. Sedimentation tank.

Detailed Description

Below, the technical solutions in the embodiments of the present invention will be clearly and completely described in conjunction with the accompanying drawings. Obviously, the described embodiments are only a part of the embodiments of the present invention, not all of them. Based on the embodiments of the present invention, all other embodiments obtained by ordinary skilled persons in the art without creative labor are within the scope of protection of the present invention.

Embodiment 1

As shown in Figures 1-7, The present invention proposes a sedimentation separation device for sewage treatment, comprising a bottom plate 1, the upper part of the bottom plate 1 is connected with a U-shaped plate 3, and a separation tank 4 is fixedly connected between two sets of U-shaped plates 3, the separation tank 4 is equipped with a promoting sedimentation separation component, the promoting sedimentation separation component comprises a first servo motor 5, a dispensing cylinder 7, a first catalytic pipe 10, a second catalytic pipe 12, and a first electric telescopic rod 13 that are connected to the separation tank 4, the start of the first servo motor 5 can drive the dispensing cylinder 7 to rotate, and

the rotation of the dispensing cylinder 7 can drive the first catalytic pipe 10 and the second catalytic pipe 12 to rotate, the first catalytic pipe 10 and the second catalytic pipe 12 will stir the sewage while dispensing catalytic substances, the separation tank 4 is equipped with a sedimentation separation component, the sedimentation separation component comprises an upper sealing plate 20, a lower sealing plate 21, a second electric telescopic rod 22, a second servo motor 23, a limit rod 24, and a sedimentation tank 26 that are connected to the separation tank 4, the start of the second servo motor 23 will drive the upper sealing plate 20 to rotate, and the rotation of the upper sealing plate 20 will mesh with the lower sealing plate 21, the start of the second electric telescopic rod 22 will drive the upper sealing plate 20 and the lower sealing plate 21 to move downward in the vertical direction, the downward movement of the lower sealing plate 21 will drive the limit rod 24 to move towards the side closer to the bottom plate 1, and the downward movement of the second electric telescopic rod 22 will drive the sedimentation tank 26 to detach from the inside of the separation tank 4.

A support column 2 is symmetrically fixedly connected to one side of the bottom plate 1 near the U-shaped plate 3, and the end of the support column 2 away from the bottom plate 1 is fixedly connected to the U-shaped plate 3. The function of U-shaped plate 3 is to connect support column 2 and separation tank 4, and U-shaped plate 3 can keep separation tank 4 in a stable state.

The end of the separation tank 4 away from the bottom plate 1 is fixedly connected to the first servo motor 5, and the output shaft end of the first servo motor 5 is fixedly connected to the first gear plate 6, the outer side of the separation tank 4 is rotatably connected to the dispensing cylinder 7, and the outer side of the dispensing cylinder 7 is fixedly connected to the second gear plate 8, the second gear plate 8 meshes with the first gear plate 6. The catalytic substance will be dispensed through the dispensing cylinder 7. When the first

servo motor 5 is started, the rotation of the output shaft end of the first servo motor 5 will drive the rotation of the first gear plate 6.

The dispensing cylinder 7 is fixedly connected between one end near the bottom plate 1 and the first electric telescopic rod 13, the outer side of the first electric telescopic rod 13 is fixedly connected with a first catalytic pipe 10 and a second catalytic pipe 12, and a through rod 11 is symmetrically fixedly connected between the first catalytic pipe 10 and the second catalytic pipe 12. The catalyst can be sprayed out through the nozzles on the outside of the first catalytic pipe 10 and the second catalytic pipe 12 and react with the sewage.

The first electric telescopic rod 13 is fixedly connected to a connecting pipe 14 at one end away from the dispensing pipe 7, and a push rod 18 is fixedly connected to the outer side of the connecting pipe 14. The rotation of connecting pipe 14 will drive the push rod 18 to rotate.

In this embodiment, the start of the first servo motor 5 can drive the dispensing cylinder 7 to rotate, and the rotation of the dispensing cylinder 7 can drive the rotation of the first catalytic pipe 10 and the second catalytic pipe 12. The first catalytic pipe 10 and the second catalytic pipe 12 will mix the sewage while dispensing catalytic substances. By dispensing catalytic substances, the energy and time required for impurity aggregation can be significantly reduced. The specific implementation method is that the support column 2 is used to connect the bottom plate 1 and the U-shaped plate 3. The bottom plate 1 is mainly used to support the overall device, and the U-shaped plate 3 is used to connect the support column 2 and the separation tank 4. The U-shaped plate 3 can keep the separation tank 4 in a stable state. When the device is in use, the sewage enters the inner side of the separation tank 4 through the inlet pipe 9, and the catalytic substance is

dispensed through the dispensing cylinder 7. The first servo motor 5 is started, the rotation of the output shaft end of the first servo motor 5 will drive the rotation of the first gear plate 6, the rotation of the first gear plate 6 will drive the rotation of the second gear plate 8, and the rotation of the second gear plate 8 will drive the rotation of the dispensing cylinder 7. The rotation of the dispensing cylinder 7 will drive the rotation of the first electric telescopic rod 13. The start of the first electric telescopic rod 13 can adjust the position relationship between the first catalytic pipe 10 and the second catalytic pipe 12 inside the separation tank 4. The dispensing cylinder 7, the first catalytic pipe 10, the connecting rod 11, the second catalytic pipe 12, and the first electric telescopic rod 13 are all interconnected. The catalytic material can be sprayed out through the nozzles on the outside of the first catalytic pipe 10 and the second catalytic pipe 12 and react with the sewage. The first catalytic pipe 10 and the second catalytic pipe 12 will rotate while spraying the catalytic material, stirring the sewage and increasing the reaction rate between the catalytic material and the sewage.

Embodiment 2

As shown in Figures 1-7, based on the first embodiment, the inner side of the separation tank 4 is fixedly connected to a middle sedimentation plate 15, the middle sedimentation plate 15 is provided with multiple flow holes 16 arranged uniformly along the circumference of the middle sedimentation plate 15. Wastewater can pass through the inner side of flow hole 16.

The middle sedimentation plate 15 is in contact with the push rod 18 on the side away from the bottom plate 1, and an outflow groove 17 is opened on the middle sedimentation plate 15. The substances adsorbed on the outer side of the middle sedimentation plate 15 will accumulate and fall from the inner side of the outflow groove 17, eventually falling into the

upper part of the flow hole 16.

The inner side of the separation tank 4 is slidably connected to the upper sealing plate 20, and the inner side of the separation tank 4 is slidably connected to the lower sealing plate 21, the side of the upper sealing plate 20 near the bottom plate 1 is fixedly connected to the second electric telescopic rod 22, and the second electric telescopic rod 22 is rotatably connected to the lower sealing plate 21. The second electric telescopic rod 22 will drive the upper sealing plate 20 to move downward in the vertical direction. When it reaches the appropriate position, the lower sealing plate 21 will adhere to the sediment.

The side of the lower sealing plate 21 near the bottom plate 1 is fixedly connected with the limit rod 24, there are two sets of limit rods 24, and a spring 25 is fixedly connected to the side of the limit rod 24 near the bottom plate 1, the spring 25 is fixedly connected between one end away from the limit rod 24 and the sedimentation tank 26. The downward movement of the lower sealing plate 21 will drive the limit rod 24 to move downward, and when the limit rod 24 moves downward, it will compress the spring 25.

The side of the bottom plate 1 near the support column 2 is fixedly connected with the second servo motor 23, the output shaft end of the second servo motor 23 is fixedly connected to the second electric telescopic rod 22, and the outer side of the second electric telescopic rod 22 is rotatably connected to the sedimentation tank 26. The activation of the second electric telescopic rod 22 can drive the sedimentation tank 26 to separate from the inside of the separation tank 4.

In this embodiment, the start of the second servo motor 23 will drive the upper sealing plate 20 to rotate, and the rotation of the upper sealing plate 20 will mesh with the lower sealing plate 21. The start of the second electric telescopic rod 22 will drive the upper sealing plate 20 and the lower sealing plate 21 to move downward in the vertical direction, and the

downward movement of the lower sealing plate 21 will drive the limit rod 24 to move towards the side closer to the bottom plate 1. The downward movement of the second electric telescopic rod 22 will drive the sedimentation tank 26 to detach from the inside of the separation tank 4. The specific implementation method is that after being catalyzed by the catalyst, the sewage will be stratified, and the middle sedimentation plate 15 will adsorb the material in the middle layer. With the rotation of the first electric telescopic rod 13, the rotation of the first electric telescopic rod 13 will drive the connecting pipe 14 to rotate, and the rotation of the connecting pipe 14 will drive the push rod 18 to rotate. When the push rod 18 rotates, it will push the substance adsorbed on the outer side of the middle sedimentation plate 15. During the pushing process, the substances adsorbed on the outer side of the middle sedimentation plate 15 will accumulate and fall from the inner side of the outflow groove 17, eventually falling into the upper part of the flow hole 16. After being catalyzed by the catalyst, the sediment at the bottom will settle in the upper part of the sedimentation tank 26. At this time, the second electric telescopic rod 22 will drive the upper sealing plate 20 to move downward in the vertical direction. When it moves to the appropriate position, the lower sealing plate 21 will be in contact with the sediment. At this point, the second servo motor 23 will start, and the rotation of the output shaft end of the second servo motor 23 will drive the upper sealing plate 20 to rotate. When the rotation of the upper sealing plate 20 meshes with the lower sealing plate 21, the sewage on the upper side of the upper sealing plate 20 is discharged through the outlet pipe 19. The downward movement of the lower sealing plate 21 will drive the limit rod 24 to move downward. When the limit rod 24 moves downward, it will compress the spring 25. The upper sealing plate 20, lower sealing plate 21, and sedimentation tank 26 will seal the sediment inside the sedimentation tank 26. With the start of the second electric telescopic rod 22, the second electric telescopic rod 22 can drive the sedimentation tank 26 to

separate from the inside of the separation tank 4, thereby achieving the purpose of sedimentation and separation of sewage.

Although the embodiments of the present invention have been shown and described, it will be understood by those skilled in the art that various changes, modifications, substitutions, and variations can be made to these embodiments without departing from the principles and spirit of the present invention. The scope of the present invention is limited by the appended claims and their equivalents.