

DESCRIPTION

DISCHARGE WATER TREATMENT SYSTEM

Technical Field

[0001] The present disclosure relates to a discharge water treatment system.

Background Art

[0002] In a large scale building, there is a long transport distance for transporting food scraps generated in a kitchen from the kitchen to the garbage collection area, and it takes effort such as bins and the like to transport such garbage. To address this issue there is a system (see, for example, Japanese Patent Application Laid-Open (JP-A) No. 2009-202095 for crushing such food scraps in a disposer, and transporting the food scraps as disposer discharge water by pipe using a pump.

SUMMARY OF INVENTION

Technical Problem

[0003] However, in a system in which the disposer discharge water is transported by transport apparatus including pipes and pumps, there is a concern that foreign matter such as vinyl and plastic mixed in with the disposer discharge water and fibrous material contained in food might settle in the pipes and block the pipes, or become stuck in the pumps and cause trouble with the pumps.

[0004] In consideration of the above circumstances, an object of the present disclosure is to provide a discharge water treatment system capable of suppressing malfunctions from occurring in transport apparatus.

Solution to Problem

[0005] A discharge water treatment system according to a first aspect includes a disposer into which kitchen waste is loaded and crushed, and from which the kitchen waste is dispatched as disposer discharge water, a foreign matter removal device configured to remove cleaning-process untreatable foreign matter or fibrous material from the disposer discharge water, and a transport apparatus configured to transport the disposer discharge water from which the cleaning-process untreatable foreign matter or fibrous material has been removed by the foreign matter removal device.

[0006] In the discharge water treatment system according to the first aspect, the cleaning-process untreatable foreign matter or fibrous material is removed from the disposer discharge water by the foreign matter removal device. This thereby enables trouble to be suppressed from occurring in the transport apparatus.

[0007] A discharge water treatment system according to a second aspect is the discharge water treatment system of the first aspect, wherein a solid-liquid separator device configured to separate and extract organic matter from the disposer discharge water from which the cleaning-process untreatable foreign matter or fibrous material has been removed by the foreign matter removal device, and a cleaning-process treatment device configured to perform cleaning-process treatment on the organic matter extracted by the solid-liquid separator device.

[0008] In the discharge water treatment system according to the second aspect, the cleaning-process untreatable foreign matter or fibrous material is removed from the disposer discharge water by the foreign matter removal device. This enables organic matter to be effectively cleaning-process treated using the cleaning-process treatment device.

[0009] A discharge water treatment system according to a third aspect is the discharge water treatment system according to the second aspect, wherein the cleaning-process treatment device comprises a fermentation tank configured to decompose the organic matter using methane fermentation.

[0010] In the discharge water treatment system according to the third aspect, in addition to removing the cleaning-process untreatable foreign matter or fibrous material from the disposer discharge water using the foreign matter removal device, the organic matter is also decomposed by methane fermentation in the fermentation tank. The fermentation tank is able to decompose organic matter by loading a carrier. The volumetric loading of the fermentation tank is raised thereby, enabling the fermentation tank to be made more compact. Moreover, due to the rate of decomposition of the organic matter being raised by methane fermentation, the load on the discharge water processing equipment installed downstream of the fermentation tank can be decreased.

[0011] The present disclosure is configured as described above, and so is able to provide a discharge water treatment system capable of suppressing malfunctions from occurring in transport apparatus.

BRIEF DESCRIPTION OF DRAWINGS

[0012] Fig. 1 is a system configuration diagram illustrating a water and other waste treatment system according to an exemplary embodiment.

Fig. 2 is a front view illustrating a foreign matter removal device according to an exemplary embodiment.

Fig. 3 is a system configuration diagram illustrating a water and other waste treatment system configured as hitherto.

DESCRIPTION OF EMBODIMENTS

[0013] Description follows regarding a water and other waste treatment system serving as a discharge water treatment system according to an exemplary embodiment, with reference to the drawings.

[0014] Water And Other Waste Treatment System

Fig. 1 illustrates a system configuration diagram of a water and other waste treatment system 10 serving as a discharge water treatment system according to the present exemplary embodiment.

[0015] The water and other waste treatment system 10 is configured including a disposer 12, a foreign matter removal device 14, a relay tank 16, a solid-liquid separator 18 serving as a solid-liquid separator device, a raw material tank 20, a pressure float device 22, a fermentation tank 24 serving as a cleaning-process treatment device, a solid-liquid separator 26, discharge water processing equipment 28, and transport apparatus 30A to 30H.

[0016] The transport apparatus 30A is configured including a pipe 32A and a pump 34A. The transport apparatus 30B is configured including a pipe 32B and a pump 34B. The transport apparatus 30C is configured including a pipe 32C and a pump 34C. The transport apparatus 30D is configured including a pipe 32D and a pump 34D. The transport apparatus 30E is configured including a pipe 32E and a pump 34E. The transport apparatus 30F is configured including a pipe 32F and a pump 34F. The transport apparatus 30G is configured including a pipe 32G and a pump 34G. The transport apparatus 30H is configured including a pipe 32H and a pump 34H.

[0017] As illustrated in Fig. 1, the kitchen waste loaded into the disposer 12 and pulverized is dispatched from the disposer 12 as disposer discharge water, and then transported under pressure through the pipe 32A by the pump 34A to the foreign matter removal device 14.

[0018] In the foreign matter removal device 14, cleaning-process untreatable foreign matter and fibrous material is removed from the disposer discharge water that was transported in from the disposer 12. Then the disposer discharge water from which the cleaning-process untreatable foreign matter and fibrous material has been removed is transported under pressure through the pipe 32B by the pump 34B and into the relay tank 16. The disposer discharge water in the relay tank 16 is transported under pressure through the pipe 32C by the pump 34C and into the solid-liquid separator 18. Examples of the cleaning-process untreatable foreign matter include plastic films, plastic containers, plastic foam products, plastic sheets, binding tapes, plastic products for binding, toothpicks, disposable chopsticks, wrapping paper, paper containers, and the like.

[0019] The disposer discharge water transported under pressure into the solid-liquid separator 18 is subjected to separation processing by the solid-liquid separator 18. The solid matter (organic matter) separated and extracted is then transported under pressure through the pipe 32D using the pump 34D configured by a slurry pump and transported into the raw material tank 20. The liquid separated and extracted is mixed with kitchen discharge water, and then processed in the pressure float device 22 and fine solid components (organic matter) is recovered.

[0020] The recovered fine solid components are fed into the raw material tank 20. Further, the liquid from which the fine solid components have been recovered is transported to the discharge water processing equipment 28.

[0021] The organic matter accumulated in the raw material tank 20 (namely, the solid matter separated and extracted by the solid-liquid separator 18 and the fine solid components recovered by the pressure float device 22) is transported under pressure through the pipe 32E by the pump 34E, configured by a crushing pump and a slurry pump, and is supplied to the fermentation tank 24 serving as a cleaning-process treatment device.

[0022] The organic matter supplied from the raw material tank 20 is decomposed in the fermentation tank 24 by methane fermentation serving as a cleaning-process treatment. The solid components that are unable to be decomposed are transported by being fed under pressure through the pipe 32G by the pump 34G to the solid-liquid separator 26, and are processed as recovered waste matter in the solid-liquid separator 26. Moreover, the liquid is transported under pressure through the pipe 32H by the pump 34H to the discharge water processing equipment 28.

[0023] Foreign Matter Removal Device

As illustrated in the face-on view of Fig. 2, the foreign matter removal device 14 is configured including a loading port 36, a foreign matter removal section 38, four impellers 40 disposed in the foreign matter removal section 38, a punched metal sheet 42 provided at a lower portion of the foreign matter removal section 38 so as to surround the impellers 40, a discharge port 44, and a container 46.

[0024] Kitchen waste crushed and dispatched by the disposer 12 is loaded in as disposer discharge water through the loading port 36 of the foreign matter removal device 14. The food scraps and the like in the kitchen waste crushed by the disposer 12 are further crushed by the centrifugal force of the impellers 40 rotating at high speed and discharged through holes in the punched metal sheet 42 into the container 46. Further, plastic, vinyl, and the like and fibrous material in the crushed kitchen waste has a lighter specific gravity and so is moved by

a blower through the foreign matter removal section 38 and is discharged from the discharge port 44. Foreign matter or fibrous material is removed from the disposer discharge water in this manner.

[0025] Advantageous Effects

Description follows regarding the advantageous effects of the present exemplary embodiment.

[0026] As illustrated in Fig. 1, the water and other waste treatment system 10 of the present exemplary embodiment removes cleaning-process untreatable foreign matter or fibrous material from disposer discharge water by the foreign matter removal device 14. The cleaning-process untreatable foreign matter or fibrous material can accordingly be suppressed from settling in the pipes 32B, 32C, 32D, 32E, 32G and from blocking the pipes 32B, 32C, 32D, 32E, 32G. Moreover, the cleaning-process untreatable foreign matter or fibrous material can be suppressed from becoming stuck in the pumps 34B, 34C, 34D, 34E, 34G and from causing trouble in the pumps 34B, 34C, 34D, 34E, 34G. Namely, malfunctions can be suppressed from occurring in the transport apparatus 30B, 30C, 30D, 30E, 30G.

[0027] Fig. 3 illustrates a system configuration diagram of a water and other waste treatment system 48 configured as hitherto. System configuration of a disposer 12 and of configuration downstream from a relay tank 16 is configured the same as in the water and other waste treatment system 10 and so the same reference numerals will be appended and explanation thereof will be omitted.

[0028] The crushed kitchen waste loaded into the disposer 12 is dispatched from the disposer 12 as disposer discharge water, and transported under pressure through the pipe 32B by the pump 34B to the relay tank 16.

[0029] In this water and other waste treatment system 48 there is a concern that cleaning-process untreatable foreign matter and fibrous material that was dispatched from the disposer 12 might be mixed into the disposer discharge water, and that the cleaning-process untreatable foreign matter and fibrous material might settle in the pipes 32B, 32C, 32D, 32E, 32G and block the pipes 32B, 32C, 32D, 32E, 32G. Moreover, there is a concern that the cleaning-process untreatable foreign matter and fibrous material might get stuck in the pumps 34B, 34C, 34D, 34E, 34G, and cause trouble in the pumps 34B, 34C, 34D, 34E, 34G. Furthermore, the cleaning-process untreatable foreign matter and fibrous material is also not decomposed in the discharge water processing equipment 28, and so must be separated and recovered in the solid-liquid separator 26, and transported off-site.

[0030] In contrast thereto, in the water and other waste treatment system 10 of the present exemplary embodiment the cleaning-process untreatable foreign matter or fibrous material is removed from the disposer discharge water by the foreign matter removal device 14. This enables such trouble to be suppressed from occurring in the pipes 32B, 32C, 32D, 32E, 32G and in the pumps 34B, 34C, 34D, 34E, 34G.

[0031] Moreover, the water and other waste treatment system 10 of the present exemplary embodiment removes the cleaning-process untreatable foreign matter or fibrous material from the disposer discharge water by the foreign matter removal device 14. This enables organic matter to be effectively cleaning-process treated (by methane fermentation) using the fermentation tank 24 serving as a cleaning-process treatment device.

[0032] Furthermore, the water and other waste treatment system 10 of the present exemplary embodiment, in addition to removing the cleaning-process untreatable foreign matter or fibrous material from the disposer discharge water by the foreign matter removal device 14, also decomposes the organic matter using the methane fermentation in the fermentation tank 24. This thereby enables a carrier to be loaded into the fermentation tank 24 and fluid bed methane fermentation to be performed.

[0033] Generally, in fluid bed methane fermentation, a carrier is loaded into a fermentation tank, and decomposition treatment is efficiently performed on a methane fermentation raw material by attaching methanogens to the carrier and raising the concentration of the methanogens. However, in fluid bed methane fermentation, foreign matter and fibrous material is sometimes included in the methane fermentation raw material. Such cases make it difficult to separate the foreign matter and fibrous material from the carrier, with the methanogens no longer able to be sufficiently attached to the carrier. This is thought to be a reason that efficient decomposition treatment of methane fermentation raw material is no longer able to be performed. Moreover, there is a consideration that the foreign matter and fibrous material might block an overflow discharge port provided to the fermentation tank such that the fermentation tank is no longer able to function.

[0034] In contrast thereto, in the water and other waste treatment system 10 of the present exemplary embodiment the cleaning-process untreatable foreign matter or fibrous material is removed from the disposer discharge water by the foreign matter removal device 14. This thereby enables a carrier to be loaded into the fermentation tank 24 and fluid bed methane fermentation to be performed.

[0035] The volumetric loading of the fermentation tank 24 is raised thereby, enabling the fermentation tank 24 to be made more compact. Moreover, due to the rate of decomposition

of the organic matter being raised by methane fermentation, the load on the discharge water processing equipment 28 installed at the downstream side of the fermentation tank 24 can be decreased.

[0036] Furthermore, in the water and other waste treatment system 10 of the present exemplary embodiment, the foreign matter and fibrous material removed by the foreign matter removal device 14 are both things that are not able to be methane fermented in the fermentation tank 24. This means that there is no reduction in the amount of biogas generated in the fermentation tank 24.

[0037] Modified Example

Description follows regarding modified examples of the above exemplary embodiment.

[0038] In the above exemplary embodiment the water and other waste treatment system 10 illustrated in Fig. 1 is an example of a configuration including the fermentation tank 24 as a cleaning-process treatment device. However, the water and other waste treatment system of the present disclosure may be a discharge water treatment system not provided with a cleaning-process treatment device. Namely, a discharge water treatment system may be adopted in which the disposer discharge water from which the cleaning-process untreatable foreign matter and fibrous material have been removed is discharged as is.

[0039] Moreover, as illustrated in Fig. 1 the water and other waste treatment system 10 in the above exemplary embodiment is an example of a configuration including the solid-liquid separator 26. However, the solid-liquid separator 26 may be omitted in the water and other waste treatment system of the present disclosure if the cleaning-process untreatable foreign matter and fibrous material are completely removed in the foreign matter removal device 14, and there is no need to transport the foreign matter and fibrous material from the fermentation tank 24 to the solid-liquid separator 26.

[0040] Furthermore as illustrated in Fig. 2, the above exemplary embodiment illustrates an example of the foreign matter removal device 14 in which the foreign matter and fibrous material is removed from the disposer discharge water by rotating the impellers 40 at high speed. However, the foreign matter removal device 14 may have any other configuration capable of removing the foreign matter and fibrous material from the disposer discharge water.

[0041] This completes the description of the exemplary embodiment of the present disclosure, however the present disclosure is not limited to such an exemplary embodiment, and obviously an appropriate combination of the exemplary embodiment and the various

modified examples may be employed, and various other modifications may be implemented within a range not departing from the spirit of the present disclosure.

[0042] The entire disclosure of Japanese Patent Application No. 2020-135805 filed on November 8, 2020 is incorporated by reference in the present specification. All publications, patent applications and technical standards mentioned in the present specification are incorporated by reference in the present specification to the same extent as if each individual publication, patent application, or technical standard was specifically and individually indicated to be incorporated by reference.

CLAIMS

1. A discharge water treatment system, comprising:

a disposer into which kitchen waste is loaded and crushed, and from which the kitchen waste is dispatched as disposer discharge water;

a foreign matter removal device configured to remove cleaning-process untreatable foreign matter or fibrous material from the disposer discharge water; and

a transport apparatus configured to transport the disposer discharge water, from which the cleaning-process untreatable foreign matter or fibrous material has been removed by the foreign matter removal device.

2. The discharge water treatment system of claim 1, further comprising:

a solid-liquid separator device configured to separate and extract organic matter from the disposer discharge water, from which the cleaning-process untreatable foreign matter or fibrous material has been removed by the foreign matter removal device; and

a cleaning-process treatment device configured to perform cleaning-process treatment on the organic matter extracted by the solid-liquid separator device.

3. The discharge water treatment system of claim 2, wherein the cleaning-process treatment device comprises a fermentation tank configured to decompose organic matter using methane fermentation.