

Garbage Storage Apparatus, Garbage Collection System, and Method For Operating the System

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a garbage storage apparatus, a garbage collection system, and a method for operating the system.

2. Description of the Related Art

A conventional garbage collection system for collecting the garbage caused in a building for example has been suggested (see Japanese Laid-Open Publication No. 5-132105). This system has a garbage storage apparatus under a building that includes a rotation drum (5) for collecting garbage and a discharge chute (6) that is connected to the rotation drum and that has an inlet.

The rotation drum is connected to an input chute (4) extending from each floor of the building while the discharge chute is connected to a transport tube (8) extending to the exterior of the building. A tip end of the transport tube is connected to a docking station that is connected to a garbage collection vehicle at the outside, for example.

In the case of such a garbage storage apparatus, garbage received via the input chute is sent via by the operation of the rotation drum to the discharge chute. Then, the garbage in the discharge chute is sucked and collected, via the transport tube, by the garbage collection vehicle or the like.

By the way, an amount of discharged garbage has been recently increased due to the increase in the number of tall buildings. Thus, garbage storage apparatuses have been required to have an improved capability to process garbage.

However, when the conventional garbage storage apparatus has a rotation drum having an increased capacity for example, the garbage

storage apparatus must grow in size. Generally, such a garbage storage apparatus having a larger size is not preferable in consideration of works and cost required for the deployment of the garbage storage apparatus because the garbage storage apparatus is provided under the building.

When the discharge chute has an increased capacity for example, a problem is caused in which the garbage storage apparatus must have a larger size as described above and a power for sucking garbage is reduced, thus causing a difficulty in the collection of garbage.

SUMMARY OF THE INVENTION

Example embodiments may provide a garbage storage apparatus, and a garbage collection system that are prevented from having a larger size and that can store and collect a large amount of garbage. Example embodiments may provide a method for operating the system.

In accordance with a first aspect of the present invention, there is provided a garbage storage apparatus, comprising: a garbage storage bath having a cylindrical shape in which both ends are closed; an input opening through which garbage is inputted into the garbage storage bath and that is provided at one end portion of the garbage storage bath; a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath; an air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet; and a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and a driving portion configured to drive the transport means.

The garbage collection system in example embodiments may be structured to have: the garbage storage apparatus; an input tube connected to the input opening; an air flow block means for blocking or not blocking air flow coming via the input opening; and a

transport tube that is connected to the discharge outlet for transporting the garbage (9 and 10).

In accordance with a second aspect of the present invention, there is provided a garbage collection system, comprising: a garbage storage apparatus including: a garbage storage bath having a cylindrical shape in which both ends are closed; an input opening through which garbage is inputted into the garbage storage bath and that is provided at one end portion of the garbage storage bath; a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath; an air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet; a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and a driving portion configured to drive the transport means; an input tube connected to the input opening; an air flow block means for blocking or not blocking air flow coming via the input opening; and a transport tube that is connected to the discharge outlet for transporting the garbage.

In accordance with a third aspect of the present invention, there is provided a method for operating a garbage collection system, the garbage collection system comprising: a garbage storage apparatus including: a garbage storage bath having a cylindrical shape in which both ends are closed; an input opening through which garbage is inputted into the garbage storage bath and that is provided at one end portion of the garbage storage bath; a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath; an air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet; a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and a driving portion

configured to drive the transport means; an input tube connected to the input opening; an air flow block means for blocking or not blocking air flow coming via the input opening; and a transport tube that is connected to the discharge outlet for transporting the garbage, wherein the method for operating the garbage collection system is characterized in comprising a step for storing the garbage and a step for collecting the garbage, wherein the step for storing the garbage includes: a step for allowing the air flow block means to be in "non-blocked" status; and a step for transporting by the transport means the garbage inputted via the input opening to the other end of the garbage storage bath, wherein the a step for collecting the garbage includes: a step for allowing the air flow block means to be in blocked" status; and a step for allowing the transport tube to have therein negative pressure to suck the garbage. The structure in example embodiments can allow the garbage storage bath to use the space therein in an effective manner to store a large amount of garbage. The structure also allows, when a certain amount of garbage is accumulated in the bath, the accumulated garbage to be sucked via the transport tube in an appropriate manner. As a result, the garbage storage bath can provide an improved capability to process the garbage while being inhibited from having a larger size and collecting the garbage effectively.

The garbage storage apparatus also may comprise a filling status detection means for detecting the filling status of the garbage in the garbage storage bath (4). In this case, the garbage salvage system also may comprise a filling information output means for outputting the information detected by the filling status detection means (8 and 11). A method for operating the garbage salvage system may comprise a step for determining, based on the information outputted by the filling status output means regarding the filling status of the garbage in the garbage storage bath, whether the step for collecting the garbage is performed or not (13).

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The structure in example embodiments can provide the information regarding the filling status of the garbage in the garbage storage bath, thus

collecting the garbage via the transport tube with an appropriate timing.

The transport means also may serve as a means for compressing, at the other end of the garbage storage bath, the garbage inputted from the input opening (2). For example, the garbage in the garbage storage bath may be compressed by increasing the power of the transport means for transporting the garbage. In this case, the space in the garbage storage bath can be further effectively used and thus a large amount of garbage can be stored.

The transport means may be any one of a belt conveyor, a push plate, and a screw feeder (3).

The filling status detection means also may be a means for detecting the occupation status of the garbage in the garbage storage bath (5). In this case, the occupation status of the garbage can be detected by a microwave type sensor for example and the detection result can be used to detect the filling status of the garbage in the garbage storage bath. Alternatively, a photoelectric switch or a proximity switch can be used, for example.

The filling status detection means also may be a means for detecting a load caused to the transport means (6). In this case, a load to an actuator for moving the push plate can be detected by a torque sensor for example to detect, based on the value of the detected load, the filling status of the garbage.

The filling status detection means also may be a means for detecting the weight of the garbage in the storage bath (7). In this case, the weight of the garbage storage bath can be detected by a pressure sensor for example to detect, based on the value of the detected pressure, the filling status of the garbage.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a schematic diagram illustrating the structure of the garbage collection system using the garbage storage apparatus according

to an embodiment of the present invention.

FIG.2 is a partial cross sectional side view illustrating the structure of the garbage storage apparatus shown in FIG.1.

FIG.3 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.2 is operated.

FIG.4 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.2 is operated.

FIG.5 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.2 is operated.

FIG.6 is a partial cross sectional side view illustrating a garbage storage apparatus having another structure.

FIG.7 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.6 is operated.

FIG.8 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.6 is operated.

FIG.9 shows the operation of the garbage storage apparatus when the garbage collection system using the garbage storage apparatus shown in FIG.6 is operated.

FIG.10 is a partial cross sectional side view illustrating a garbage storage apparatus having still another structure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, an embodiment of the present invention will be described with reference to the drawings. FIG.1 is a schematic diagram illustrating the structure of a garbage collection system using a garbage storage apparatus according to an embodiment of the present invention.

As shown in FIG.1, the garbage collection system 1 according to this embodiment is used for the building 2 (e.g., high-rise apartment building) under which the underground floor 3 including the garbage storage apparatus 4 is provided. The garbage storage apparatus 4 is connected to the downstream end portion of the garbage chute (input tube) 5 while the upstream end portion of the garbage chute 5 extends to each floor of the building 2 (not shown).

The garbage storage apparatus 4 is also connected to the upstream end portion of the transport tube 6 while the transport tube 6 extends through underground to the docking station 7 provided outside of the building 2. The docking station 7 is formed to detachably connected to the sucking tube 9 provided to the garbage collection vehicle 8.

The garbage collection vehicle 8 includes the pump 10 for sucking air via the sucking tube 9 and the salvage room 11 for receiving and salvaging the garbage that is sucked with air by the pump 10.

Although this embodiment describes a system in which the garbage collection vehicle 8 collects garbage via the docking station 7, the present invention also may be applied to a system in which the garbage storage apparatus 4 is directly connected via the transport tube 6 to a garbage disposal facility (not shown).

FIG.2 is a partial cross sectional side view illustrating the structure of the garbage storage apparatus 4. As shown in FIG.2, the garbage storage apparatus 4 includes the storage bath 20 having a cylindrical shape in which both ends are closed. The storage bath 20 has, at the upper part of the circumference at the upstream side, the garbage input opening 21 that is connected to the downstream end portion of the garbage chute 5. The storage bath 20 also has, at the lower part of a downstream end face, the discharge outlet 22 that is connected to the upstream end portion of the transport tube 6 (see FIG. 1).

The input opening 21 includes the first air flow block valve 25 consisting of the air cylinder 23 and the shutter 24. When the first air

flow block valve 25 is driven, the input opening 21 is in a "blocked" status or in a "non-blocked" status to control air flow. Similarly, the discharge outlet 22 has at the downstream side the second air flow block valve 26 that is driven by an air cylinder to control the air flow in the discharge outlet 22.

The garbage storage bath 20 also has, at the lower part of the circumference at the downstream side and in the vicinity of the discharge outlet 22, the air introduction opening 27. The air introduction opening 27 includes the butterfly valve 28 that controls the introduction of air into the garbage storage bath 20 and that is driven by an air cylinder. The air introduction opening 27 is opened in the direction of a circumference of the garbage storage bath 20. This allows air introduced via the air introduction opening 27 to flow while moving along the inner circumference of the garbage storage bath 20.

The garbage storage apparatus 4 is the push plate type one and a push plate 30 is provided in the garbage storage bath 20. The push plate 30 is inclined so that the lower part is closer to the downstream than the upper part. As a result, the upstream side of the push plate 30 in the garbage storage bath 20 has the small space 31.

The garbage storage bath 20 has at the axial center the guide pole 32 that extends from the downstream side end to the upstream side end and that penetrates the center of the push plate 30. The guide pole 32 also includes the hydraulic cylinder 33 serving as an actuator for moving the push plate 30. The hydraulic cylinder 33 is fixed to the push plate 30 and can move along the guide pole 32.

By the above structure, the operation of the hydraulic cylinder 33 allows the push plate 30 to move along the guide pole 32 to the upstream side or to the downstream side. As shown in FIG.2, the hydraulic cylinder 33 moves in a range from a position at which the upper end of the push plate 30 reaches the upstream end of the garbage storage bath 20 to a position at which the lower end of the push plate 30 reaches the

neighborhood of the upstream of the air introduction valve 27.

The garbage storage bath 20 also has, at the upper part of the circumference at the downstream side, the noncontact microwave type sensor (hereinafter simply referred to as sensor) 29. The sensor 29 may be the known one including a projector and a light receiving device. The sensor 29 can detect the existence of an object blocking the space between the projector and the light receiving device by determining whether microwave generated by the projector is received by the light receiving device or not.

The garbage storage bath 20 has at the exterior the control apparatus 40. The control apparatus 40 is connected via the signal line 41 to the outdoor docking station 7 (see FIG.1). When the docking station 7 is connected to the garbage collection vehicle 8, then the control apparatus 40 is also connected via a signal line (not shown) to the garbage collection vehicle 8. The control apparatus 40 is also connected via the signal line 43 to the sensor 29.

The control apparatus 40 receives a signal detected by the sensor 29 to provide a required processing to the signal and then outputs the processed signal via the output section 44 included therein. The output section 44 outputs the information regarding the filling status of the garbage in the garbage storage bath 20 detected by the sensor 29 via the signal line 41 to the garbage collection vehicle 8. Alternatively, the output section 44 also displays such information on a display device provided in the garbage collection vehicle 8. The output section 44 also sends the information regarding the filling status of the garbage to a garbage disposal facility (not shown) via a wireless connection or a wired connection. The garbage collection vehicle 8 also transmits a required control signal via the signal line 41 to the control apparatus 40.

The control apparatus 40 is also connected via the air pipe 50 to the outdoor docking station 7. When the docking station 7 is connected to the garbage collection vehicle 8, then the control apparatus 40 is also

connected via an air pipe (not shown) to the garbage collection vehicle 8. The control apparatus 40 is also connected, via the air pipes 51 to 53, to the first air flow block valve 25 for controlling the air flow into the input opening 21, the second air flow block valve 26 for controlling the air flow into the discharge outlet 22, and the air cylinder for driving the butterfly valve 28 for controlling the air flow into the air introduction opening 27, respectively.

By the above structure, when air is pressure-fed from the garbage collection vehicle 8 connected to the docking station 7 to a compressor (not shown) included in the garbage collection vehicle 8, then the pressure-fed air is sent via the air pipe 50 to the control apparatus 40. Then, the control apparatus 40 operates, based on the control signal sent from the garbage collection vehicle 8 via the signal line 41, to supply the air to any of the air pipes 51 to 53. As a result, any one or a plurality of the first air flow block valve 25, the second air flow block valve 26, and the butterfly valve 28 is/are driven.

The control apparatus 40 is also connected to the hydraulic pressure generation apparatus 46 that is provided via the signal line 45 for each garbage storage bath 20. The hydraulic pressure generation apparatus 46 is connected via the hydraulic pipe 54 to the hydraulic cylinder 33. Thus, the hydraulic pressure generation apparatus 46 supplies, based on the control signal sent from the control apparatus 40 via the signal line 45, pressurized oil to the hydraulic cylinder 33, thereby providing a driving force to the push plate 30.

Although this embodiment described a structure in which the air pressure-fed from the garbage collection vehicle 8 is used to drive the first air flow block valve 25, the second air flow block valve 26, and the butterfly valve 28, another structure also may be provided in which compressors are individually provided to the valves and the cylinder so that the air supplied from the compressors is used to drive the valves and the cylinder, respectively.

Alternatively, the two functions of the control apparatus 40 (i.e., a function for controlling the air pressure-fed from the garbage collection vehicle 8 and a function for processing the detection signal from the sensor 29 or the control signal from the garbage collection vehicle 8) also may be independently provided in the apparatus.

Next, the operation of the garbage collection system 1 having the structure as described above (i.e., a method for operating the system to collect garbage) will be described.

FIG.3 to FIG.5 show the operation of the garbage storage apparatus 4 when the garbage collection system 1 is operated. First, when garbage is stored, the first air flow block valve 25 is in "non-blocked" status, the second air flow block valve 26 is in "blocked" status, and the butterfly valve 28 is in "closed" status while the push plate 30 is located at the uppermost stream position of the garbage storage bath 20 (Status 1).

The garbage inputted from the input opening 21 via the garbage chute 5 (FIG.1) is stored in the garbage storage bath 20. Then, the garbage inputted from the input opening 21 bounds against the inclined plane of the push plate 30 to move to the downstream of the garbage storage bath 20. In this way, the inputted garbage is inhibited from collecting just beneath the input opening 21.

When a large amount of garbage is accumulated at the lower part of the input opening 21 (Status 2), then the push plate 30 is driven to transport the accumulated garbage to the downstream (Status 3). Thereafter the push plate 30 is driven to be located at the uppermost stream position of the garbage storage bath 20. As a result, the lower part of the input opening 21 has a sufficient space for receiving garbage.

By repeating the reception of garbage and the transportation of the garbage to the downstream as described above, a large amount of garbage can be accumulated in the garbage storage bath 20. Furthermore, the stored garbage can be transported by the push plate 30 to the downstream

while being pressurized and compressed and thus the space in the garbage storage bath 20 can be used to the maximum, thus storing a larger amount of garbage (Status 4).

The push plate 30 may be driven at a predetermined timing by using a timer. The push plate 30 also may be driven with a timing at which a microwave type sensor attached to an appropriate position at the lower part of the input opening 21 detects accumulated garbage. Alternatively, the push plate 30 also may be driven with a timing at which a pressure sensor attached to the push plate 30 detects a load to the push plate 30 that is equal to or higher than a predetermined load.

When a large amount of garbage is accumulated in the storage bath 20 and the accumulated garbage is detected by the sensor 29 (Status 5), then the storage of garbage is temporarily stopped and each floor in the building 2 has an indication or display of "GARBAGE CHUTE IS TEMPORARILY UNAVAILABLE", for example. Thereafter, the garbage collection vehicle 8 is connected to the docking station 7 (see FIG. 1) to start an operation for collecting garbage.

In the operation, the push plate 30 is provided at the uppermost stream position while the first air flow block valve 25 is in "blocked" status and the second air flow block valve 26 is in "non-blocked" status. When the pump 10 of the garbage collection vehicle 8 sucks air, then the butterfly valve 28 is in "open" status (Status 6).

As a result, the garbage storage bath 20 has therein negative pressure, thus causing air flow moving from the air introduction opening 27 via the garbage storage bath 20, the transport tube 6, and the sucking tube 9 to the garbage collection vehicle 8. As a result, the garbage storage bath 20 has therein a strong air flow moving in the circumferential direction of the garbage storage bath 20 because the air introduction opening 27 is provided to be opened in the direction of the circumference of the garbage storage bath 20.

By the air flow, pieces of garbage accumulated in the garbage

storage bath 20 are agitated by the generated air flow and thus are separated from one another, thus being easy to be transported. The agitated garbage is moved by the air flow and is discharged from the discharge outlet 22 of the garbage storage bath 20 (Status 7). Then, the garbage is sucked via the transport tube 6 and the sucking tube 9 and is collected in the salvage room 11 in the garbage collection vehicle 8.

Since the air introduction opening 27 is provided at the downstream side of the garbage storage bath 20, the above-described garbage collection operation may not allow all of the garbage accumulated at the upstream of the garbage storage bath 20 to be perfectly sucked into the garbage collection vehicle 8. In this case, the push plate 30 is moved to transport the remaining garbage at the upstream side toward the downstream side (Status 8) to suck the garbage with air (Status 9).

When the above operation for collecting the remaining garbage still cannot collect all of the garbage, then the push plate 30 is located at the uppermost stream side to suck the remaining garbage while the first air flow block valve 25 is in "non-blocked" status. As a result, the garbage storage bath 20 can have therein air flow moving from the input opening 21 to the discharge outlet 22, thereby sucking almost all of the remaining (Status 10).

The garbage collection operation may be started by a human operator when the operator checks the information regarding the filling status of garbage displayed on a display of the garbage storage apparatus 4 by the output section 44 based on a signal detected by the sensor 29. The garbage collection operation also may be started based on the information sent from the control apparatus 40 via the docking station 7 when the garbage collection vehicle 8 is regularly linked to the docking station 7. Alternatively, the garbage collection operation also may be started when the information sent from the output section 44 via a wireless connection or a wired connection is judged by a garbage disposal facility.

Although this embodiment provided only one sensor 29, a plurality

of sensors also may be provided. In this case, the garbage filling status can be detected in a phased manner to calculate an appropriate timing for collecting the garbage.

The microwave type sensor 29 also may be substituted by another means for detecting the garbage filling status. For example, a photoelectric switch also may be used like a microwave type sensor. Alternatively, the garbage filling status also may be detected by a proximity switch provided at an appropriate position of the downstream of the garbage storage bath 20 when the proximity switch has a contact with accumulated garbage.

Alternatively, the garbage filling status also may be detected by a pressure sensor for detecting the oil pressure in a hydraulic circuit for driving the push plate 30. In this case, the pressure sensor can detect the oil pressure in the hydraulic circuit when the push plate 30 pushes the garbage, thereby detecting the filling status of the garbage. When the hydraulic cylinder 33 is substituted by a motor to move the push plate 30, then a torque sensor for detecting the load to the motor also may be provided.

The garbage filling status also may be detected by a pressure sensor for detecting the weight of the garbage storage bath 20 to measure the weight of the garbage therein.

Although the above section described the garbage storage apparatus 4 of the push plate type, other types of apparatuses also may be used. FIG.6 is a partial cross sectional side view illustrating the screw-type garbage storage apparatus 60.

The garbage storage apparatus 60 shown in FIG.6 includes the center shaft 61 that is provided at the axial center of the garbage storage bath 20 and that extends from the downstream end to the upstream end as well as the screw feeder 62 that rotates around the center shaft 61. The screw feeder 62 is designed to extend from the upstream end of the garbage storage bath 20 to a position in the vicinity of the upstream of the

air introduction opening 27.

The upstream end of the center shaft 61 penetrates the garbage storage bath 20 to protrude to the exterior so as to be connected to the motor 63 via a sprocket and chain. The motor 63 is connected via the signal line 64 to the control apparatus 40. Thus, when the motor 63 starts to operate based on the control signal from the control apparatus 40 and the screw feeder 62 is rotated in one direction, then the garbage in the garbage storage bath 20 can be transported to the downstream.

Those components shown in FIG.6 having the same reference numerals as those of FIG.2 have similar structures as shown in FIG.2 and thus will not be further described. The garbage storage apparatus 60 also can be applied to the garbage collection system 1 shown in FIG.1 as in the case of the garbage storage apparatus 4.

Next, the operation of the system when such a garbage storage apparatus 60 is applied to the garbage collection system 1 will be described.

FIG.7 to FIG.9 show the operation of the garbage storage apparatus 60 when the garbage storage apparatus 60 is applied to the garbage collection system 1. When garbage is being accumulated in the garbage storage bath 20, then the screw feeder 62 is stopped while the first air flow block valve 25 is in "non-blocked" status, the second air flow block valve 26 is in "blocked" status, and the butterfly valve 28 is in "closed" status (Status 11). In this way, the garbage inputted from the input opening 21 via the garbage chute 5 (FIG.1) is accumulated in the garbage storage bath 20.

When a large amount of garbage is accumulated at the lower part of the input opening 21 over a certain period of time (Status 12), then the motor 63 is operated to drive the screw feeder 62, thereby transporting the accumulated garbage toward the downstream (Status 13). As a result, the lower part of the input opening 21 has a sufficient space for receiving garbage.

By repeating the reception of garbage and the transportation of the garbage to the downstream as described above, a large amount of garbage can be accumulated in the garbage storage bath 20. By allowing the motor 63 to generate a further torque, the garbage transported by the push plate 30 to the downstream while being pressurized and compressed and thus the space in the garbage storage bath 20 can be used to the maximum, thus storing a larger amount of garbage (Status 14).

When a large amount of garbage accumulated in the garbage storage bath 20 is detected by the sensor 29 (Status 15), then the storage of garbage is temporarily stopped and each floor in the building 2 has an indication or display of "GARBAGE CHUTE IS TEMPORARILY UNAVAILABLE", for example. Thereafter, the garbage collection vehicle 8 is connected to the docking station 7 (see FIG. 1) to start an operation for collecting garbage.

In the operation, the screw feeder 62 is firstly stopped while the first air flow block valve 25 is in "blocked" status and the second air flow block valve 26 is in "non-blocked" status. When the pump 10 of the garbage collection vehicle 8 sucks air, then the butterfly valve 28 is in "open" status (Status 16). As a result, as in the case of the garbage storage apparatus 4, the garbage collected at the downstream of the garbage storage bath 20 is agitated and discharged with air flow from the discharge outlet 22 (Status 17). Then, the garbage is sucked into the garbage collection vehicle 8 for salvage.

When there is remaining garbage at the upstream of the garbage storage bath 20, then the screw feeder 62 is rotated to transport the garbage accumulated at the upstream toward the downstream (Status 18). As a result, the garbage is transported to the downstream and then is sequentially agitated by air flow to be discharged from the discharge outlet 22 (Status 19), thereby being salvaged by the garbage collection vehicle 8.

When even the above operation for collecting the remaining

garbage leaves a small amount of garbage in the garbage storage bath 20, then the remaining garbage is sucked not only by rotating the screw feeder 62 (see Status 19) but by allowing the first air flow block valve 25 to be in "non-blocked" status. As a result, the garbage storage bath 20 can have therein air flow moving from the input opening 21 to the discharge outlet 22 and thus almost all of the remaining garbage can be sucked (Status 20).

The above-described push plate type and screw type apparatuses also may be substituted by the belt conveyor type one. FIG.10 is a partial cross sectional side view illustrating the belt conveyor type garbage storage apparatus 70.

The garbage storage apparatus 70 shown in FIG.10 includes the belt conveyor 71 that is provided in the garbage storage bath 20 and that extends from the upstream end to a position in the vicinity of the upstream of the air introduction opening 27. The belt conveyor 71 has the rotation drum 72 that is connected to the motor 73. The motor 73 is connected to the control apparatus 40 via the signal line 74. By the above structure, when the motor 73 is operated based on the control signal from the control apparatus 40 and the belt conveyor 71 is rotated in one direction, then the garbage in the garbage storage bath 20 can be transported to the downstream.

Those components shown in FIG.10 having the same reference numerals as those of FIG.2 have similar structures as shown in FIG.2 and thus will not be further described. The garbage storage apparatus 70 also can be applied to the garbage collection system 1 shown in FIG.1 as in the case of the garbage storage apparatus 4. As a result, a large amount of garbage can be stored in the garbage storage bath 20 while providing an operation for collecting garbage effectively.

The operation of the garbage collection system 1 using the garbage storage apparatus 70 is similar to that of the garbage collection system 1 using the garbage storage apparatus 4 (see FIG.3 to FIG.5) and thus will

not be further described.

The present invention also can be used to collect and store the garbage in a high-rise condominium, high-rise office building, for example.

CLAIMS

1. A garbage storage apparatus, comprising:
 - a garbage storage bath having a cylindrical shape in which both ends are closed;
 - an input opening through which garbage is inputted into the garbage storage bath and that is provided at one end portion of the garbage storage bath;
 - a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath;
 - an air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet;
 - a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and
 - a driving portion configured to drive the transport means.
2. The garbage storage apparatus according to Claim 1, wherein the transport means also serves as a means for compressing, at the other end of the garbage storage bath, the garbage inputted from the input opening.
3. The garbage storage apparatus according to Claim 1 or Claim 2, wherein the transport means is any one of a belt conveyor, a push plate, and a screw feeder.
4. The garbage storage apparatus according to any one of the preceding claims, further comprising:

a filling status detection means for detecting the filling status of the garbage in the garbage storage bath.

5. The garbage storage apparatus according to Claim 4, wherein the filling status detection means is a means for detecting the occupation status of the garbage in the garbage storage bath.

6. The garbage storage apparatus according to Claim 4 or Claim 5, wherein the filling status detection means is a means for detecting a load caused to the transport means.

7. The garbage storage apparatus according to any one of claims 4 to 6, wherein the filling status detection means is a means for detecting the weight of the garbage in the garbage storage bath.

8. The garbage storage apparatus according to any one of claims 4 to 7, further comprising:

a filling information output means for outputting the information detected by the filling status detection means.

9. The garbage storage apparatus according to any one of the preceding claims, further comprising:

an air flow block means for blocking or not blocking air flow coming via the input opening.

10. A garbage collection system, comprising:

a garbage storage apparatus including: a garbage storage bath having a cylindrical shape in which both ends are closed; an input opening through which garbage is inputted into the garbage storage bath and that is

provided at one end portion of the garbage storage bath; a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath; an air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet; a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and a driving portion configured to drive the transport means;

an input tube connected to the input opening;

an air flow block means for blocking or not blocking air flow coming via the input opening; and

a transport tube that is connected to the discharge outlet for transporting the garbage.

11. A garbage collection system according to claim 10, wherein the garbage storage apparatus further comprises a filling status detection means for detecting the filling status of the garbage in the garbage storage bath; and the garbage collection system further comprises

a filling information output means for outputting the information detected by the filling status detection means.

12. A method for operating a garbage collection system, the garbage collection system comprising:

a garbage storage apparatus including: a garbage storage bath having a cylindrical shape in which both ends are closed; an input opening through which garbage is inputted into the garbage storage bath and that is provided at one end portion of the garbage storage bath; a discharge outlet through which garbage is discharged from within the garbage storage bath and that is provided at the other end portion of the garbage storage bath; an

air introduction valve for controlling the introduction of air into the garbage storage bath that is provided in the vicinity of the discharge outlet; a transport means for transporting the garbage inputted from the input opening toward the other end and that is provided in the garbage storage bath; and a driving portion configured to drive the transport means;

an input tube connected to the input opening;

an air flow block means for blocking or not blocking air flow coming via the input opening; and

a transport tube that is connected to the discharge outlet for transporting the garbage,

wherein the method for operating the garbage collection system is characterized in comprising a step for storing the garbage and a step for collecting the garbage,

wherein the step for storing the garbage includes:

a step for allowing the air flow block means to be in "non-blocked" status; and

a step for transporting by the transport means the garbage inputted via the input opening to the other end of the garbage storage bath,

wherein the a step for collecting the garbage includes:

a step for allowing the air flow block means to be in "blocked" status; and

a step for allowing the transport tube to have therein negative pressure to suck the garbage.

13. A method for operating a garbage collection system according to Claim 12, wherein the garbage storage apparatus further comprises

a filling status detection means for detecting the filling status of the garbage in the garbage storage bath, the garbage collection system further comprises

a filling information output means for outputting the information detected by the filling status detection means, and wherein the step for storing the garbage further comprises

a step for determining, based on the information outputted by the filling status output means regarding the filling status of the garbage in the garbage storage bath, whether the step for collecting the garbage is performed or not.