

[DESCRIPTION]

[TITLE OF INVENTION]

STORAGE/DISCHARGE DEVICE

[Technical Field]

5 [0001]

The present invention relates to a storage and discharge device that transports and discharges an object to be conveyed such as waste or dust using a rotating drum.

Priority is claimed on Japanese Patent Application No. 2015-044891, filed March 6, 2015, the content of which is incorporated herein by reference.

10 [Background Art]

[0002]

For example, in a multi-dwelling house having a plurality of floors such as apartment, a waste air conveying system which allows disposal of waste that has passed through a waste input port provided on each floor is adopted in order to simplify waste
15 disposal of residents.

Waste (dust) which is input to the waste input port drops in an input chute that passes vertically through the multi-dwelling house, and then is stored in a rotating drum type storage and discharge device provided for each input chute. The waste is temporarily stored in the storage and discharge device and collected by a waste collection
20 vehicle as appropriate.

[0003]

As the storage and discharge device (a dust treatment device) provided in the waste air conveying system, a device as described in Patent Literature 1 is known. In the storage and discharge device, internal air of the rotating drum is suctioned using a
25 blower to generate air flow in a conveying tube, and waste and air are introduced into the

rotating drum. The waste falls into the rotating drum, and the air is suctioned into the blower via an intake tube.

[Citation List]

[Patent Literature]

5 [0004]

[Patent Literature 1]

Japanese Examined Patent Application, Second Publication No. 61-27284

[Summary of Invention]

[Technical Problem]

10 [0005]

In the storage and discharge device described in the above-mentioned Patent Literature 1, the diameters of the conveying tube serving as a receiving portion of waste and air, an intake tube for suctioning the air, and a fixed part constituted by the filter are large. Thus, a sealing mechanism which secures airtightness of the rotating drum while
15 allowing the rotation of the rotating drum is required between the fixed part and the rotating drum. However, since the diameter of the fixed part is large, there has been a problem of difficulty in securing airtightness. Specifically, as a sealing mechanism, since it is necessary to use a vacuum-compatible bearing having a large diameter or the like, there has been a problem of an increase in manufacturing cost.

20 [0006]

The present invention is to provide a storage and discharge device which can further simplify a sealing mechanism between the fixed part such as a conveying tube or an intake tube and the rotating drum.

[Solution to Problem]

25 [0007]

According to a first aspect of the present invention, a storage and discharge device includes a rotating drum in which a feed blade is provided and which transports an object to be treated to an axially downstream side of the rotating drum by rotation; a pipe in which at least part of an outer circumferential surface is formed in a cylindrical shape and is coaxially inserted from an end wall on the axially upstream side of the rotating drum to introduce a solid along with the air flow into the rotating drum; a seal mechanism configured to seal between the pipe and the rotating drum; and a separation device configured to separate the solid from the air flow, wherein the separation device has an introduction passage provided in the pipe to introduce the air flow and the solid into the rotating drum, and an exhaust passage provided in the pipe to be connected to the introduction passage via a separation plate, and connecting the interior of the rotating drum to a negative pressure source.

[0008]

According to such a configuration, since the introduction passage which introduces the air flow and the solid, and the exhaust passage which connects the interior of the rotating drum to the negative pressure source are provided in a pipe formed partly in a cylindrical shape, the diameter of the pipe can be reduced, and the sealing mechanism between the pipe and the rotating drum can be further simplified.

[0009]

In the storage and discharge device described above, the pipe may include an inner tube, and an outer tube provided on an outer circumferential side of the inner tube and having a hole formed on the outer circumferential surface of the outer tube, the introduction passage may be a space on the inner circumferential side of the inner tube, and the exhaust passage may be a space between the inner tube and the outer tube, and the hole.

[0010]

In the storage and discharge device described above, the pipe may include an inner tube; and an outer tube provided on an outer circumferential side of the inner tube, having an outer diameter changing in a concavo-convex shape, and having a plurality of
5 holes formed on a surface facing the axial direction, the introduction passage may be a space on an inner circumferential side of the inner tube, and the exhaust passage may be a space between the inner tube and the outer tube, and the plurality of holes.

[0011]

With such a configuration, it is possible to form more holes in the outer tube.
10 As a result, since the flow velocity of the air passing through the hole can be reduced, it is possible to suppress the waste from flowing into the exhaust passage together with the air.

[0012]

In the storage and discharge device described above, the outer tube may have an
15 outer tube main body; and a plurality of enlarged diameter portions having an internal space communicating with a space between the outer tube main body and the inner tube, and protruding radially outward from the outer tube main body over the entire circumferential direction, and the plurality of holes may be formed on the surface of the enlarged diameter portion facing the axial direction.

20 [0013]

In the storage and discharge device described above, a surface of the enlarged diameter portion disposed on the axially downstream-most side and facing the axially downstream side, among the plurality of the enlarged diameter portions, may be a support portion on which no hole is formed and supports the object to be treated.

25 [0014]

According to such a configuration, the deposit of waste can be pressed by the support portion. This makes it possible to prevent the waste from collapsing and flowing into the hole.

[0015]

5 In the storage and discharge device described above, a filter which covers the hole may be provided on a surface of the outer tube on which the hole is formed.

According to such a configuration, it is possible to prevent a solid smaller than the diameter of the hole from being suctioned to the negative pressure source.

[0016]

10 In the storage and discharge device described above, a partition plate configured to divide the interior into upper and lower parts may be provided in the pipe, the introduction passage may be a space on an inner circumferential side of the pipe and below the partition plate, and the exhaust passage may be a space on the inner circumferential side of the pipe and above the partition plate.

15 [0017]

In the storage and discharge device described above, a plurality of holes may be formed on an outer circumferential surface of the pipe above the partition plate.

[Advantageous Effects of Invention]

[0018]

20 According to the present invention, since an introduction passage which introduces the air flow and the solid, and an exhaust passage which connects the interior of the rotating drum to a negative pressure source are provided in the pipe formed partly in a cylindrical shape, the diameter of the pipe can be reduced, and the sealing mechanism between the pipe and the rotating drum can be further simplified.

25 [Brief Description of Drawings]

[0019]

Fig. 1 is a cross-sectional view of a storage and discharge device according to a first embodiment of the present invention.

Fig. 2 is a detailed cross-sectional view of pipe of the storage and discharge
5 device of the first embodiment of the present invention.

Fig. 3 is a cross-sectional view of the pipe taken along the arrow A-A of Fig. 1.

Fig. 4 is a cross-sectional view of a storage and discharge device according to a second embodiment of the present invention.

Fig. 5 is a cross-sectional view of the pipe taken along the arrow B-B of Fig. 4.

10 Fig. 6 is a cross-sectional view of a storage and delivery device according to a third embodiment of the present invention.

Fig. 7 is a detailed cross-sectional view of a pipe of a storage and discharge device according to the third embodiment of the present invention.

Fig. 8 is a view taken along the arrow C-C of Fig. 7, and is a front view of an
15 enlarged diameter portion of the storage and delivery device of the third embodiment of the present invention.

Fig. 9 is a front view of an enlarged diameter portion of a storage and delivery device of a modified example of the third embodiment of the present invention.

[Description of Embodiments]

20 [0020]

(First embodiment)

Hereinafter, a storage and discharge device according to a first embodiment of the present invention will be described in detail with reference to the drawings.

The storage and discharge device of the present embodiment is a device in
25 which waste and dust, which are objects to be treated that are transported by air, are

stored in a waste air conveying system using an air conveying method.

The waste air conveying system has a storage and discharge device in which waste is accumulated through an input port of waste provided in a building such as an apartment having a plurality of floors, a plurality of input chutes (waste chutes) vertically penetrating the building, a conveying tube, and a blower (a negative pressure source) which generates a waste conveying air flow. In the storage and discharge device, waste which is input to the input port is introduced together with the air flow of air.

[0021]

As illustrated in Fig. 1, the storage and discharge device 1 of the present embodiment includes a rotating drum 3, a pipe 4 inserted from an end portion on an upstream side in the transport direction T of waste (solid) in the rotating drum 3, and a separation device 5 which separates the waste from the air flow.

In the following description, a direction in which an axis O of the rotating drum 3 extends is set as an axial direction Da. Further, a direction orthogonal to the axis O is set as a radial direction, a side away from the axis O in the radial direction is set as a radially outer side, and a side approaching the axis O in the radial direction is set as a radially inner side. Further, in the axial direction Da, the upstream side in the transport direction T is set as an axially upstream side Da1, and a downstream side in the transport direction T is set as an axially downstream side Da2.

[0022]

The rotating drum 3 has a cylindrical shape. The rotating drum has a space which stores the waste. The rotating drum 3 transports the waste to the axially downstream side Da2 by the rotation. The rotating drum 3 does not need to be horizontally installed, and may be disposed to be lowered toward the axially downstream side Da2. The diameter of the rotating drum 3 is, for example, 2,000 mm.

[0023]

In the interior of the rotating drum 3, a feed blade 7 (blade portion, screw blade) formed in a spiral shape is provided. The feed blade 7 functions as a push mechanism. When the rotating drum 3 rotates in a predetermined direction, the waste which is input
5 into the rotating drum 3 is pushed into the axially downstream side Da2 and is compressed. That is, the rotating drum 3 has a function of storing the waste, and is capable of pressure-feeding the waste by giving the rotational force.

[0024]

A discharge opening 8 which discharges waste is provided on the axially
10 downstream side Da2 of the rotating drum 3.

The storage and discharge device 1 has a drive unit 9 which rotates the rotating drum 3. The drive unit 9 includes an electric motor 10, a drive gear 11 provided on an output shaft of the electric motor 10, and a driven gear 12 provided on an outer circumferential surface of the rotating drum 3.

15 [0025]

The rotating drum 3 is rotatably supported by four receiving rollers 14 (only two rollers are illustrated in Fig. 1). The rotating drum 3 is supported by the two receiving rollers 14 in the vicinity of one end portion of the rotating drum 3 in the axial direction Da, and is supported by the two receiving rollers 14 in the vicinity of an end portion on
20 the side opposite to the one end portion of the rotating drum 3 in the axial direction Da.

[0026]

The receiving roller 14 includes a tire-shaped roller main body 15, and a roller support base 16 which rotatably supports the roller main body 15. The receiving roller 14 is disposed to support the rotating drum 3 on the outer circumferential surfaces of a
25 pair of roller main bodies 15. A cylindrical rail ring 17 is attached to the contact portion

of the roller main body 15 on the outer circumferential surface of the rotating drum 3.

[0027]

The feed blades 7 are formed in a spiral shape, and the outer circumferential ends thereof are joined to the inner walls of the rotating drum 3 by welding. As the rotating drum 3 rotates, the feed blades 7 also rotate.

[0028]

As illustrated in Figs. 2 and 3, the pipe 4 is a cylindrical pipe inserted coaxially with the rotating drum 3 from the end wall 19 of the axially upstream side Da1 of the rotating drum 3. That is, the axis O (central axis) of the rotating drum 3 and the central axis of the pipe 4 coincide with each other. The diameter of the pipe 4 is, for example, 1,000 mm.

The pipe 4 has an inner tube 20 connected to a conveying tube 13 serving as a receiving portion of waste and air, and an outer tube 21 provided on the outer circumferential side of the inner tube 20. A portion of the pipe 4 inserted into an internal space 6 of the rotating drum 3 is a double tube including the inner tube 20 and the outer tube 21. The outer circumferential surface of the outer tube 21 is the outer circumferential surface of the pipe 4.

[0029]

The length of the inner tube 20 from the end wall 19 of the rotating drum 3 is longer than the length of the outer tube 21 from the end wall 19. An end portion of the outer tube 21 on the axially downstream side Da2 is disposed between the end wall 19 of the rotating drum 3 and the end portion of the inner tube 20 on the axially downstream side Da2.

A sealing plate 22 is provided between the end portion of the outer tube 21 on the axially downstream side Da2 and the outer circumferential surface of the inner tube

20. The sealing plate 22 is a circular plate-like member in which a through-hole 22a through which the inner tube 20 is inserted is formed at the center portion. An end portion of the outer tube 21 on the axially downstream side Da2 is sealed by the sealing plate 22 and the inner tube 20.

5 [0030]

In the outer tube 21, a plurality of holes 23 are formed in the portion inserted into the internal space 6 of the rotating drum 3. The portion in which the plurality of holes 23 are formed in the outer tube 21 can be formed by punching metal.

[0031]

10 A filter 24 is wound around the outer circumferential surface of the outer tube 21, on the surface in which the plurality of holes 23 are formed. As the filter 24, for example, a nonwoven fabric, a mesh, a sponge or the like can be adopted. The filter 24 is covered with a guard member 25 formed by a cylindrical mesh. The guard member 25 is a member which fixes the filter 24 to the outer tube 21, and is fixed to the rotating
15 drum 3 using a predetermined bracket.

[0032]

The inner tube 20 is provided inside the pipe 4 and functions as an introduction passage which introduces air and waste into the rotating drum 3. The introduction passage is a space on the inner circumferential side of the inner tube 20.

20 The outer tube 21 is provided in the pipe 4, is connected via the inner tube 20, and functions as an exhaust passage which connects the interior of the rotating drum 3 to the blower 2. The exhaust passage is a space between the inner tube 20 and the outer tube 21, and the plurality of holes 23.

Further, the inner tube 20 functions as a separation plate which separates the
25 pipe 4 into the introduction passage and the exhaust passage.

[0033]

A pipe insertion hole 27 through which the pipe 4 is inserted is formed on the end wall 19 of the rotating drum 3. In the pipe insertion hole 27, a cylindrical flange 28 is formed to protrude outward from the rotating drum 3. The flange 28 is formed so that the central axis of the flange 28 and the axis O of the rotating drum 3 coincide with each other.

A sealing mechanism 29 is provided between the flange 28 (rotating drum 3) and the pipe 4. As the sealing mechanism 29, for example, a gland packing or an oil seal packing can be adopted. As the seal mechanism 29, a mechanism capable of sealing between the rotating drum 3 (flange 28) which rotates and the fixed pipe 4 may be used, and a simple sealing mechanism can be used.

[0034]

The blower 2 is connected to the outer tube 21 and suctions air of the internal space 6 of the rotating drum 3. As the blower 2 suctions the air of the internal space 6 of the rotating drum 3, a waste conveying air flow is generated inside the conveying tube 13 and the inner tube 20.

The conveying tube 13 is connected to a waste input port (not illustrated). That is, the waste which is input from the waste input port is introduced into the rotating drum 3 together with the air flow via the conveying tube 13 and the inner tube 20.

20 [0035]

Next, the operation of the waste collection system of this embodiment will be described.

First, the waste which is input from the input port is conveyed via the conveying tube 13 while being carried by the air flow generated by the blower 2. That is, when the blower 2 is operated, the air of the internal space 6 of the rotating drum 3 is suctioned via

the outer tube 21 of the pipe 4. Thus, air flow is generated in the conveying tube 13 provided at the upstream side of the inner tube 20 and the inner tube 20, and waste (dust) and air are introduced into the rotating drum 3 via the inner tube 20 of the pipe 4 (indicated by “In” in Figs. 1 to 3).

5 [0036]

Waste introduced into the rotating drum 3 from the inner tube 20 falls into the rotating drum 3. Air introduced into the rotating drum 3 from the inner tube 20 flows into the outer tube 21 via the filter 24 and the plurality of holes 23 and is suctioned to the blower 2 (indicated by “Out” in Figs. 1 to 3).

10 The waste is transferred to the discharge opening 8 side by the feed blades 7. The waste is discharged from the discharge opening 8 and sent to a waste collection vehicle (not illustrated).

[0037]

According to the above embodiment, the inner tube 20 (introduction passage) serving as a tube which suctions the waste and air into the rotating drum 3, and the outer tube 21 (exhaust passage) which discharges air are provided in the cylindrical pipe 4. Thus, the diameter of the pipe 4 can be reduced, and the sealing mechanism 29 between the pipe 4 and the rotating drum 3 can be further simplified.

As the sealing mechanism 29, a mechanism that is capable of sealing between the cylindrical pipe and the flange 28 which is sufficiently smaller than the diameter of the rotating drum may be used, and general gland packing or oil seal packing can be adopted.

[0038]

Further, since the hole 23 formed in the outer tube 21 is covered with the filter 24, it is possible to prevent waste smaller than the diameter of the hole 23 from being

25

suctioned into the blower 2.

[0039]

Further, when replacing the filter 24, only the filter 24 can be dropped into the rotating drum 3 by pulling the pipe 4 from the rotating drum 3. Thus, the filter 24 can be easily discarded. When attaching the filter 24, after the filter 24 is wound around the pipe 4, the pipe 4 may be inserted into the rotating drum 3.

[0040]

In the above embodiment, the pipe 4 has a cylindrical shape. However, at least part of the pipe 4 may have a cylindrical outer circumferential surface at the part with which the pipe 4 overlaps the flange 28 in the axial direction Da. For example, the inner tube 20 may have an elliptical cross-sectional shape or the inner tube 20 can be bent upward or downward.

[0041]

(Second embodiment)

Hereinafter, a storage and discharge device 1B of a second embodiment of the present invention will be described with reference to the drawings. In the present embodiment, differences from the aforementioned first embodiment will be mainly described, and description of similar portions will be omitted.

As illustrated in Figs. 4 and 5, a pipe 4B of the present embodiment has a partition plate 31 that divides the interior of the pipe 4B into upper and lower parts. The end portion of the pipe 4B above the partition plate 31 is sealed by a sealing plate 22.

A plurality of holes 23 are formed on the outer circumferential surface of the pipe 4B above the partition plate 31. As in the first embodiment, the plurality of holes 23 are covered with the filter 24.

[0042]

The space below the partition plate 31 on the inner circumferential side of the pipe 4B functions as an introduction passage which introduces air and waste into the rotating drum 3.

5 A space above the partition plate 31 on the inner circumferential side of the pipe 4B functions as an exhaust passage which connects the interior of the rotating drum 3 to the blower 2. The exhaust passage is a space above the partition plate 31 on the inner circumferential side of the pipe 4B, and a plurality of holes 23.

Further, the partition plate 31 functions as a separation plate that separates the pipe 4B into an introduction passage and an exhaust passage.

10 [0043]

(Third embodiment)

Hereinafter, a storage and discharge device 1C of a third embodiment of the present invention will be described with reference to the drawings. In the present embodiment, differences from the aforementioned first embodiment will be mainly
15 described, and description of similar portions will be omitted.

As illustrated in Fig. 6, a pipe 4C of the present embodiment includes an inner tube 20, and an outer tube 21C which is provided on the outer circumferential side of the inner tube 20, has an outer diameter changing in a concavo-convex shape, and has a plurality of holes 23C formed on the surface facing in the axial direction Da.

20 [0044]

The outer tube 21C has an outer tube main body 33 formed coaxially with the inner tube 20, and a plurality of enlarged diameter portions 34 disposed at intervals in the axial direction Da. The enlarged diameter portions 34 protrude radially outward from the outer tube main body 33 over the entire circumferential direction. The enlarged
25 diameter portion 34 has a first enlarged diameter portion 34a disposed on the axially

downstream side Da2, and a second enlarged diameter portion 34b disposed on the axially upstream side Da1.

[0045]

As illustrated in Fig. 7, the second enlarged diameter portion 34b has a cylindrical outer circumferential portion 35, and circular plate portions 36 provided at both end portions of the outer circumferential portion 35 in the axial direction Da. The outer diameter of the outer circumferential portion 35 is sufficiently larger than the outer diameter of the outer tube main body 33. The outer diameter of the outer circumferential portion 35 can be set to be, for example, three times the outer diameter of the outer tube main body 33.

[0046]

In the second enlarged diameter portion 34b, the distance between the pair of disc portions 36 in the axial direction Da can be set to be, for example, twice the radial distance between the inner tube 20 and the outer tube main body 33.

[0047]

The disc portion 36 is a plate-like member in which a main surface is a surface orthogonal to the axis O. A space surrounded by the outer circumferential portion 35 and the pair of disc portions 36 communicates with a space between the inner tube 20 and the outer tube main body 33.

As illustrated in Fig. 8, a plurality of holes 23C are formed in the disc portion 36. The disc portion 36 having the plurality of holes 23C formed thereon can be formed by, for example, a punching metal.

[0048]

As illustrated in Fig. 7, the first enlarged diameter portion 34a has a cylindrical outer circumferential portion 35, a support portion 37 provided at an end portion of the

outer circumferential portion 35 on the axially downstream side Da2, and a disc portion 36 provided at an end portion of the outer circumferential portion 35 on the axially upstream side Da1. No hole is formed in the support portion 37.

5 The support portion 37 is a plate-like member in which the contact with waste deposits M (see Fig. 6) stored in the rotating drum 3 is considered. The support portion 37 is formed on a surface facing the axially downstream side Da2 of the first enlarged diameter portion 34a disposed on the axially downstream-most side Da2, among the plurality of enlarged diameter portions 34.

[0049]

10 In the first enlarged diameter portion 34a, the interval in the axial direction Da between the support portion 37 and the disc portion 36 can be set to be, for example, twice the interval in the radial direction between the inner tube 20 and the outer tube main body 33.

[0050]

15 A space surrounded by the outer circumferential portion 35, the support portion 37, and the circular plate portion 36 communicates with the space between the inner tube 20 and the outer tube main body 33. A plurality of holes 23C are formed in the disc portion 36.

[0051]

20 The support portion 37 has a main body portion 39 located on the inner circumferential side, and an inclined portion 40 which is located on the outer circumferential side of the main body portion 39 and is inclined toward the upstream side in the transport direction T toward the outer side in the radial direction.

The main body portion 39 is a circular plate-like member in which a
25 through-hole 39a through which the inner tube 20 is inserted is formed in the central

portion. The main surface of the main body portion 39 is a surface orthogonal to the axis O.

The inclined portion 40 is an annular member that connects the end portion of the main body portion 39 on the radially outer side and the end portion of the outer circumferential portion 35 on the axially downstream side Da2. The inclination angle of the inclined portion 40 with respect to the main body portion 39 can be appropriately set in accordance with the repose angle of the deposit M of the waste stored in the rotating drum 3. The inclined portion 40 does not need to have a linear cross-sectional shape when viewed from the circumferential direction, and may be formed into an arc shape.

[0052]

The outer tube 21C of the present embodiment has three disc portions 36. A plurality of holes 23C are formed in each disc portion 36.

The number of the holes 23C is determined on the basis of the flow velocity of the air passing through the hole 23C at the time of operation of the storage and discharge device 1C.

The flow velocity of the air passing through the holes 23C decreases as the number of holes 23C increases. The number of holes 23C is set so that the flow velocity of the air passing through the holes 23C is, for example, 2 m/s to 5 m/s. The number of holes 23C according to the present embodiment is set so that the flow velocity of the air passing through the holes 23C becomes slow.

[0053]

A guide plate 41 is provided at a distal end portion of the outer tube main body 33. The guide plate 41 is an annular member which protrudes from the connecting portion 42 between the radially inner end portion of the circular plate portion 36 of the

first enlarged diameter portion 34a and the distal end portion of the outer tube main body 33 to the axially downstream side Da2.

The guide plate 41 is formed to gradually enlarge in diameter from the connecting portion 42 toward the axially downstream side Da2.

5 [0054]

The position in the radial direction of the outer circumferential end 41a of the guide plate 41 is set in the vicinity of the middle between the connecting portion 42 (the radially inner end portion of the circular disc portion 36) and the radially inner end portion 36a (the outer circumferential portion 35) of the circular disc portion 36.

10 That is, the guide plate 41 is formed so that the distance from the connecting portion 42 to the outer circumferential end 41a of the guide plate 41 is substantially equal to the distance from the radially outer end portion 36a of the circular disc portion 36 to the outer circumferential end 41a of the guide plate 41.

Further, a predetermined gap G is formed in the circumferential direction between the outer circumferential end 41a of the guide plate 41 and the support portion 37.

[0055]

A filter (not illustrated) similar to the filter 24 of the first embodiment is attached to a surface on which the plurality of holes 23C are formed, on the outer surface of the disc portion 36.

[0056]

According to the above embodiment, the air introduced into the rotating drum 3 from the inner tube 20 flows into the outer tube 21C via the plurality of holes 23C formed in the disc portion 36, and is suctioned to the blower 2.

25 Here, the number of the plurality of holes 23C is set so that the flow velocity of

the air passing through the holes 23C is, for example, 2 m/s to 5 m/s. As a result, since the flow velocity of the air passing through the holes 23C becomes lower, it is possible to suppress the waste and the air from flowing into the internal space (the exhaust passage) of the outer tube 21C.

5 [0057]

Since the guide plate 41 is provided in the internal space of the outer tube 21C, a suction force acting on the vicinity of an end portion of the disc portion 36 on the radially outer side via the gap G, and a suction force acting on the vicinity of the end portion of the disc portion 36 on the radially inner side via the gap G are equalized. This makes it possible to equalize the flow velocity of the air passing through the plurality of the holes 23C.

[0058]

Also, as illustrated in Fig. 6, the waste transported to the discharge opening 8 side by the feed blades 7 becomes the deposit M having a predetermined gradient.

15 Since the outer tube 21C of the present embodiment is provided with the support portion 37 which presses down the deposit M of waste, it is possible to prevent the waste from collapsing to the axial upstream side Da1 and flowing into the hole 23C.

Further, by making the inclined portion 40 into a shape (angle) in consideration of the angle of repose of the deposit M of the waste, it is possible to prevent the collapse of the deposit M of the waste.

20 [0059]

In the above embodiment, no hole is formed in the outer circumferential portion 35, but if it is necessary to increase the number of holes, holes may be formed in the outer circumferential portion 35.

25 [0060]

Next, a modified example of the present embodiment will be described. As illustrated in Fig. 9, a disc portion 36 of the present modification has holes 43A, holes 43B, holes 43C, and holes 43D having different inner diameters.

[0061]

5 The holes 43A are holes formed on the innermost side of the disc portion 36 in the radial direction.

The holes 43D are holes formed on the outermost side of the disc portion 36 in the radial direction. The inner diameters of the holes 43D are larger than the inner diameters of the holes 43A.

10 The holes 43B are holes formed on the outer side of the hole 43A in the radial direction and on the inner side of the hole 43D in the radial direction. The inner diameters of the holes 43B are larger than the inner diameters of the holes 43A and smaller than the inner diameters of the holes 43D.

The holes 43C are holes formed on the outer side of the hole 43B in the radial
15 direction and on the inner side of the hole 43D in the radial direction. The inner diameters of the holes 43C are larger than the inner diameters of the holes 43B and smaller than the inner diameters of the holes 43D.

[0062]

That is, it is not necessary to make the diameters of the plurality of holes the
20 same, and the diameters may be made smaller toward the inner side in the radial direction.

A large amount of air flowing in through the holes 43 of the disc portion 36 tends to inflow to the outer side of the disc portion 36 in the radial direction. However, when the diameters of the holes 43 are smaller (the areas of the holes 43 are smaller), the
25 pressure loss of air increases. A large amount of air is also led to the radially outer

holes 43. This makes it possible to equalize the flow velocity of the air passing through the plurality of the holes 43.

[0063]

Although the embodiments of the present invention have been described in detail above, various modifications can be made within the scope that does not depart from the technical idea of the present invention.

For example, in each of the above embodiments, the filter 24 is provided in the pipe 4 inside the rotating drum 3, but the invention is not limited thereto, and the filter 24 may be provided outside the rotating drum 3. That is, the filter 24 needs to be provided only in a pipe line which suctions the air inside the rotating drum 3.

In each of the above embodiments, the outer circumferential surface of the rotating drum 3 is supported using the receiving roller 14, but the invention is not limited thereto. For example, a configuration in which the protruding tube of the flange 28 or the discharge opening 8 is supported using the receiving roller 14 may be adopted.

[Reference Signs List]

[0064]

	1, 1B	Storage and discharge device
	2	Blower (negative pressure source)
	3	Rotating drum
20	4, 4B	Pipe (separation device)
	5	Separation device
	6	Internal space
	7	Feed blade
	8	Discharge opening
25	9	Drive unit

	10	Electric motor
	11	Drive gear
	12	Driven gear
	13	Conveying tube
5	14	Receiving roller
	15	Roller main body
	16	Roller support base
	17	Rail ring
	19	End wall
10	20	Inner tube (introduction passage, separation plate)
	21, 21C	Outer tube (exhaust passage)
	22	Sealing plate
	23, 23C	Hole
	24	Filter
15	25	Guard member
	27	Pipe insertion hole
	28	Flange
	29	Sealing mechanism
	31	Partition plate (separation plate)
20	33	Outer tube main body
	34	Enlarged diameter portion
	34a	First enlarged diameter portion
	34b	Second enlarged diameter portion
	35	Outer circumferential portion
25	36	Disc portion

	37	Support portion
	39	Main body portion
	40	Inclined portion
	41	Guide plate
5	43	Hole
	Da	Axial direction
	Da1	Axially upstream side
	Da2	Axially downstream side
	G	Gap
10	O	Central axis
	T	Transport direction

[CLAIMS]

[Claim 1]

A storage and discharge device comprising:

5 a rotating drum in which a feed blade is provided and which transports an object to be treated to an axially downstream side of the rotating drum by rotation;

a pipe in which at least part of an outer circumferential surface is formed in a cylindrical shape and is coaxially inserted from an end wall on the axially upstream side of the rotating drum to introduce a solid along with the air flow into the rotating drum;

10 a seal mechanism configured to seal between the pipe and the rotating drum; and a separation device configured to separate the solid from the air flow, wherein the separation device has

an introduction passage which is provided in the pipe and in which at least a part of the introduction passage is inserted into the rotating drum to introduce the air flow and the solid into the rotating drum, and

15 an exhaust passage which provided in the pipe and in which at least a part of the exhaust passage is inserted into the rotating drum to be connected to the introduction passage via a separation plate, and connecting the interior of the rotating drum to a negative pressure source.

[Claim 2]

20 The storage and discharge device according to claim 1, wherein the pipe comprises an inner tube, and an outer tube provided on an outer circumferential side of the inner tube and having a hole formed on the outer circumferential surface of the outer tube,

the introduction passage is a space on the inner circumferential side of the inner
25 tube, and

the exhaust passage is a space between the inner tube and the outer tube, and the hole.

[Claim 3]

The storage and discharge device according to claim 1, wherein the pipe
5 comprises:

an inner tube; and

an outer tube provided on an outer circumferential side of the inner tube, having an outer diameter changing in a concavo-convex shape, and having a plurality of holes formed on a surface facing the axial direction,

10 the introduction passage is a space on an inner circumferential side of the inner tube, and

the exhaust passage is a space between the inner tube and the outer tube, and the plurality of holes.

[Claim 4]

15 The storage and discharge device according to claim 3, wherein the outer tube has:

an outer tube main body; and

a plurality of enlarged diameter portions having an internal space communicating with a space between the outer tube main body and the inner tube, and
20 protruding radially outward from the outer tube main body over the entire circumferential direction,

wherein the plurality of holes are formed on the surface of the enlarged diameter portion facing the axial direction.

[Claim 5]

25 The storage and discharge device according to claim 4, wherein a surface of the

enlarged diameter portion disposed on the axially downstream-most side and facing the axially downstream side, among the plurality of the enlarged diameter portions, is a support portion on which no hole is formed and supports the object to be treated.

[Claim 6]

- 5 The storage and discharge device according to claim 2, wherein a filter which covers the hole is provided on a surface of the outer tube on which the hole is formed.

[Claim 7]

 The storage and discharge device according to claim 1, wherein a partition plate configured to vertically divide the interior is provided in the pipe,

- 10 the introduction passage is a space on an inner circumferential side of the pipe and below the partition plate, and

 the exhaust passage is a space on the inner circumferential side of the pipe and above the partition plate.

[Claim 8]

- 15 The storage and discharge device according to claim 7, wherein a plurality of holes are formed on an outer circumferential surface of the pipe above the partition plate.