DESCRIPTION

Title of Invention

ASH EXTRUSION DEVICE

[Technical Field]

[0001]

The present invention relates to an ash extrusion device that cools and extrude incinerated ash.

[Background Art]

[0002]

Conventionally, in a waste treatment plant, an ash extrusion device that cools and discharges incinerated ash is arranged in a waste incinerator such as a stoker incinerator. Such an ash extrusion device receives the incinerated ash at an introduction port of a cooling tank and then cools the ash with the cooling water stored in the cooling tank. The incinerated ash cooled in the cooling tank is pushed up on an inclined surface by the operation of a scraper to drain water, and is then discharged from a discharge port.

[0003]

Incidentally, waste to be incinerated in a waste incinerator may contain metal aluminum. In addition, the cooling water infiltrated with the incinerated ash exhibits alkalinity. For this reason, in the cooling tank of the ash extrusion device, the alkaline solution and the

metal aluminum may chemically react with each other to generate hydrogen. It is concerned that when the generated hydrogen is brought into contact with high-temperature incinerated ash introduced from the introduction port in the ash extrusion device, the ash extrusion device may be damaged.

As a solution to the above, a configuration has been proposed in which the cooling tank of the ash extrusion device is ventilated. For example, the configurations have been proposed in which air is supplied to the inclined surface or a portion close to the discharge port and the cooling tank is ventilated (Patent Documents 1 and 2).

[Citation List]

[Patent Document]

[0004]

[Patent Document 1] Japanese Laid-open Patent Publication No. HEI 9-318037

[Patent Document 2] Japanese Laid-open Patent Publication No. HEI 11-22949

[Summary of Invention]

[Technical Subject]

[0005]

Incidentally, in order to avoid the damaging by effectively ventilating the cooling tank, it is desirable to provide an air supplying port for supplying air at a position at which the incinerated ash containing metal

aluminum is brought into contact with the alkaline solution in a large amount and also the generated hydrogen is likely to stay, in other words, at a position at which the hydrogen is likely to stay at a high hydrogen concentration.

However, even if hydrogen is generated directly under an introduction port, partly since hydrogen is less likely to stay in the vicinity of the vertically extending introduction port and partly since the waste incinerator is sucked by an induction blower and maintained to have a negative pressure, light-weight hydrogen flows automatically from the introduction port toward the waste incinerator and consequently agitation and ventilation are performed. For the above, it is not necessary to provide the air supplying port at the position.

On the other hand, as in the configuration of Patent Document 1, providing, in the above inclined surface different from the portion directly under the introduction port, an air supplying port a position at which the incinerated ash containing metal aluminum is in contact with an alkaline solution in a large amount, in other words, at a position close to the lower portion of the inclined surface (in the vicinity of the root connected to the lowest surface directly under the introduction port) raises a large amount of incinerated ash pushed up by scraper toward upside and may block the air supplying port.

On the other hand, as in the configuration of Patent

Document 2, providing an air supplying port at a position close to the discharge port of the ash extrusion device has difficulty in efficiently ventilating the cooling tank because the air supplying port is too far from a position that is likely to generate hydrogen.

[0006]

With the foregoing problems in view, one of the objects of the present invention is to provide an ash extrusion device capable of ventilating a cooling tank by effectively diluting hydrogen generated in the cooling tank.

[Subject to be solved]

[0007]

An ash extrusion device of the present invention includes: a cooling tank including an introduction port having a wall surface through which incinerated ash is introduced and a discharge port that discharges the incinerated ash cooled by stored water, the wall surface being in a cylindrical shape; a scraper being disposed inside the cooling tank, having a tip being in contact with a total width of a bottom surface of the cooling tank, and extruding the incinerated ash to a discharge port side; and a drive device disposed on a side opposite to the discharge port with respect to the introduction port, and driving the scraper, wherein the bottom surface of the cooling tank includes a first inclined surface inclined upward from directly under the introduction port toward the discharge port, and a second inclined surface having the same width of the first

inclined surface and inclined upward from directly under the introduction port toward a side opposite to the first inclined surface; the stored water is stored in the cooling tank at a predetermined water level above a lower end of the wall surface and below the discharge port; and the drive device includes a drive shaft disposed above the second inclined surface, and the drive shaft pivots so that an arm connected to the drive shaft and the scraper causes the scraper to reciprocate forward and rearward along the bottom surface.

The first inclined surface, a ceiling surface connected to the wall surface, and two side surfaces connected to the first inclined surface and the ceiling surface form a cylindrical shape extending from the wall surface to the discharge port and having a rectangular cross-section. The ash extrusion device further includes a gas supplying port arranged at an ash non-contact position close to an ash contact limit position in the ceiling surface, a gas supplying pipe connected to the gas supplying port, and a gas supplying device that supplies the gas supplying pipe with air or inert gas. The air or the inert gas is ejected from the gas supplying port.

[Advantageous Effects of Invention]

[0008]

Since arranging the gas supplying port at an ash non-contact position close to an ash contact limit position on a ceiling surface of a cooling tank, the ash extrusion device of the present invention can ventilate the cooling tank by effectively diluting hydrogen generated in the

cooling tank, inhibiting blocking of the gas supplying port.

[Brief Description of Drawings]

[0009]

FIG. 1 is a cross-sectional diagram showing an ash extrusion device according to an embodiment of the present invention.

FIG. 2 is a cross-sectional view taken along the arrow A-A of FIG. 1.

FIG. 3 is a schematic perspective view of a ceiling surface of a cooling tank included in the ash extrusion device of FIG. 1 viewed from the vertically above point.

FIG. 4 is a cross-sectional diagram showing an ash extrusion device according to a modification of the present invention.

[Description of Embodiments]

[0010]

Hereinafter, description will now be made in relation to an ash extrusion device according to an embodiment and a modification of the present invention with reference to FIGs. 1-4. The following embodiment and modification are merely examples, and there is no intention to exclude various changes and application of techniques not explicitly described herein. Various changes and modifications to the following configurations can be suggested without departing from the scopes thereof. The configurations except for essential configurations can be

omitted or selected according to requirement or can be combined with a configuration known to the public.

[0011]

[1. Embodiment]

First, the entire configuration of an ash extrusion device 1 will now be briefly described, and then the respective configurations will be described in detail.

The direction of gravitational action in the vertical direction is downward (indicated by "D" in the drawings), and the opposite direction to the downward is upward (indicated by "U" in the drawings). The direction that is perpendicular to the vertical direction and that is a direction in which the cooled incinerated ash is extruded is referred to as forward (indicated by "F" in the drawings) and the opposite direction (rightward in the drawings) to "forward" is referred to as rearward (indicated by "R" in the drawings). In addition, the direction perpendicular to both the vertical direction and the front-rear direction is defined as a width direction. Furthermore, the left hand (indicated by "LH" in the drawings) and the right hand (indicated by "RH" in the drawings) of the width direction are defined on the basis of the front-to-rear direction viewed from the front to rear.

[0012]

The entire configuration of the ash extrusion device 1 will now be described. FIG. 1 is a cross-sectional

diagram schematically showing the entire configuration of an ash extrusion device 1.

The ash extrusion device 1 includes a cooling tank 3 including an introduction port 31 having a cylindrical wall surface 31F through which incinerated ash is introduced and a discharge port 32 that discharges the incinerated ash cooled by stored water, a scraper 4 being disposed inside the cooling tank 3 which the scraper 4 has a tip being in contact with a total width of a bottom surface of the cooling tank 3, and extruding the incinerated ash to a side of the discharge port 32, and a drive device 5 being disposed on a side opposite to the discharge port 32 with respect to the introduction port 31 and driving the scraper 4.

Besides, the bottom surface of the cooling tank 3 includes a first inclined surface 34 inclined upward from directly under the introduction port 31 toward the discharge port 32, and a second inclined surface 35 having the same width of the first inclined surface 34 and inclined upward from directly under the introduction port 31 toward a side opposite to the first inclined surface 34.

The stored water is stored in the cooling tank 3 at a predetermined water level above a lower end of the wall surface 31F and below the discharge port 32.

The drive device 5 includes a drive shaft 40 disposed above the second inclined surface 35, and the drive shaft

40 pivots, so that an arm 41 connected both to the drive shaft 40 and the scraper 4 causes the scraper 4 to reciprocate forward and rearward along the bottom surface as indicated by the two-dotted dash line and the solid line in FIG. 1.

The tip portion (front end) of the scraper 4 is provided with a planar member (extrusion plate) erected at a predetermined angle with respect to a bottom surface 33 of the cooling tank 3.

The first inclined surface 34, a ceiling surface 37 connected to the wall surface 31F, and two side surfaces 38 connected both to the first inclined surface 34 and the ceiling surface 37 form a cylindrical shape extending from the wall surface 31F to the discharge port 32 and having a rectangular cross-section.

The ash extrusion device 1 includes a gas supplying port 20 arranged at an ash non-contact position P1 (to be detailed below) close to an ash contact limit position P3 (to be detailed below) on the ceiling surface 37, a gas supplying pipe 21 connected to the gas supplying port 20, and a gas supplying device 11 that supplies the gas supplying pipe 21 with air or inert gas. The gas supplying port 20 ejects air or inert gas.

[0013]

Hereinafter, each configuration will now be detailed.

The cooling tank 3 includes the introduction port 31 into which incinerated ash is to be introduced, and the

discharge port 32 which discharges the cooled incinerated ash to the outside of the cooling tank 3. The bottom surface 33 of the cooling tank 3 has a curved shape of a downward convex, and includes a lowest part (hereinafter, referred to as a lowest surface 36) of the convex, the first inclined surface 34 inclined upward from the lowest surface 36 toward the forward discharge port 32, and the second inclined surface 35 inclined upward from the lowest surface 36 to the rear portion. The first inclined surface 34, the lowest surface 36, and the second inclined surface 35 have the same dimension (width dimension) in the width direction.

The introduction port 31 is provided directly over the lowest surface 36. The introduction port 31 is formed by a cylindrical wall surface 31F having a cross-sectional shape substantially similar to that of the ash chute 2. Here, the ash chute 2 and the introduction port 31 are assumed to have a rectangular cylindrical shape (a cylindrical shape having a rectangular cross section) extending in the vertical direction.

The wall surface 31F has two wall surfaces present in the front-rear direction, i.e., a front surface (discharge-port-side wall surface) 31Fa present in a more front side and a rear surface 31Fb present in a more rear side. The upper end of the wall surface 31F is joined to the lower end of the ash chute 2. In addition, the wall surface 31F is disposed so that its lower end is below a

predetermined water level (dashed line in FIG. 1) of the stored water in the cooling tank 3 for the purpose of water sealing. The predetermined water level is set to be lower than the discharge port 32.

A drainage pipe 8 through which the stored water is discharged is set so as to penetrate the second inclined surface 35 of the cooling tank 3. The drainage pipe 8 is arranged such that the height of the upper end thereof is at the predetermined water level. This automatically maintains the water level of the stored water at the predetermined water level.

Since the inside of the incinerator is sucked by a non-illustrated induction blower and is controlled so as to maintain a negative pressure (a pressure lower than the atmospheric pressure), the inside of the ash chute 2 and the introduction port 31 also has a negative pressure.

[0014]

The cooling tank 3 has a ceiling surface 37 arranged so as to cover the upper side of the first inclined surface 34. The ceiling surface 37 is formed so as to be inclined upward toward the front and also be substantially parallel to the first inclined surface 34, has a rear end 37e connected to the front surface 31Fa of the introduction port 31, and also has a front end serving as a part of the discharge port 32.

The cooling tank 3 has two side surfaces 38 (see FIG. 2) connecting the left and right ends of the first

inclined surface 34 and the ceiling surface 37. Accordingly, the first inclined surface 34, the ceiling surface 37, and the left and right side surfaces 38 form a cylindrical shape having a rectangular cross section as shown in FIG. 2.

[0015]

The discharge port 32 is composed of the front ends of the first inclined surface 34, the ceiling surface 37, and the side surfaces 38. This means that the ends form an opening end 32e, and the opening end 32e is the discharge port 32.

The discharge port 32 is opened forward and upward at a position ahead of the introduction port 31 and upper than the predetermined water level.

[0016]

A discharge chute 6 is a pipe member into which the incinerated ash discharged from the discharge port 32 is introduced and has a cylindrical-shaped wall surface 6F extending vertically. The upper end of the discharge chute 6 is opened in the direction facing the discharge port 32, i.e., rearward and also obliquely downward, and is air-tightly connected to the discharge port 32. The lower end of the discharge chute 6 is opened to a conveyance device 7 such as a vibrating conveyor or a belt conveyor. The cooled incinerated ash extruded from the cooling tank 3 falls on the conveyance device 7 through the discharge chute 6, and is conveyed to a non-

illustrated post-stage facility (for example, an ash pit) by the conveyance device 7.

[0017]

The control device 10 controls the drive device 5 and the amount of gas (air or inert gas exemplified by nitrogen) supplied from the gas supplying device 11 to be described below.

Specifically, the control device 10 controls the drive device 5 to cause the scraper 4 to reciprocate continuously or intermittently. Then, the control device 10 controls the gas supplying device 11 to adjust an amount of gas output from the gas supplying device 11 to , for example, a preset pressure or a preset flow amount on the basis of measurement information that is specifically the value of the pressure of the gas measured by a pressure gauge 12 to be described below or the value of the flow amount of the gas measured by a flow meter 13 to be described below.

[0018]

As shown in FIG. 1, the gas supplying port 20 is formed so as to penetrate a predetermined position (the "ash non-contact position P1 close to the ash contact limit position P3" to be described below) of the ceiling surface 37 of the cooling tank 3. Since one end of the gas supplying pipe 21 in a tubular shape is connected to the gas supplying port 20 and the other end of the gas supplying pipe 21 is connected to the gas supplying device

11, air or inert gas that the gas supplying device 11 continuously or intermittently supplies is ejected from the gas supplying port 20. The gas ejected from the gas supplying port 20 is preferably air from the viewpoint of cost reduction, influences on the human body, and the easiness in handling.

As shown in FIG. 1, the one end (hereinafter, referred to as a "tip portion 21e") of the gas supplying pipe 21 is formed to have an oblique end face along the ceiling surface 37 so as not to protrude into the cooling tank 3.

[0019]

A connecting portion 22 may be used to fix the gas supplying pipe 21 to the ceiling surface 37. The connecting portion 22 is a part that air-tightly connects the gas supplying pipe 21 to the gas supplying port 20 on the ceiling surface 37. As described in FIG. 4 and the relevant description to the drawing in Japanese Patent Number 7022251 possessed by the inventor of the present invention, a doughnut-shaped flange that is welded to the outer side of the ceiling surface 37 may be fixed to a flange that air-tightly fixes the gas supplying pipe 21 being inserted through the flange via a gasket, using a bolt.

[0020]

Here, the "ash contact limit position P3" will be described.

As shown in FIG. 2 and FIG. 3, the gas supplying port 20 is provided at a position (hereinafter, referred to as "ash non-contact position P1") in the ceiling surface 37 where the incinerated ash is not brought into contact with the ceiling surface 37. More specifically, the gas supplying port 20 is arranged at an ash non-contact position P1 close to a boundary between the ash non-contact position P1 and a position (hereinafter, referred to as "ash contact position P2") where the incinerated ash is brought into contact with the ceiling surface 37.

The incinerated ash inside the cooling tank 3 deforms when being pushed up toward the discharge port 32 by the scraper 4 and moves on the first inclined surface 34 while being deposited up to and being brought into contact with the ceiling surface 37 from the rear end 37e to a predetermined range ahead of the rear end 37e.

As shown in FIG. 1, when the incinerated ash deposited on the first inclined surface 34 is viewed from the side of the side surface 38 (i.e., in the width direction), the incinerated ash is tightly deposited up to a certain forward position of the ceiling surface 37 from the rear end 37e. However, the incinerated ash comes to no longer contact with the ceiling surface 37 from the certain forward position. This "certain forward position" is the "boundary" between the ash contact position P2 and the ash non-contact position P1 in the ceiling surface 37.

As shown in FIG. 2 and FIG. 3, the incinerated ash is

pushed by scraper 4 and consequently, rises upward from the center portion 37c. This means that the incinerated ash is deposited to form an upward convex, specifically deposited the most in the vicinity of the center portion 37c in the width direction and gradually departing from the ceiling surface 37 as approaching the side surfaces 38 of the cooling tank 3. Thus, when viewed in the width direction of the ceiling surface 37, the incinerated ash first comes into contact with the center portion 37c and then both sides of the center portion 37c. Therefore, being expressed in a line, the "boundary" is a curve approximated to a parabola having a vertex at the center portion 37c (i.e., a parabola having a forward convex based on the center portion 37c), as shown in FIG. 3.

Even in the same ash extrusion device 1, the position of the "boundary" varies with the environment (climatic, room temperature, and others) in which ash extrusion device 1 is installed, the property of the incinerated ash, and the driving conditions of the scraper 4, as indicated by the dashed lines in FIG. 3.

Therefore, in the present invention, "ash contact limit position P3" is defined as a foremost position from the rear end 37e among the variable range of the "boundary" according to these conditions. The “ash contact limit position P3” is set by a test or simulation performed in advance on every ash extrusion device 1 to be installed to a waste treatment plant.

[0021]

Therefore, the "ash non-contact position P1 close to the ash contact limit position P3" is a position slightly distant forward from the ash contact limit position P3 in the ash non-contact position P1. The "position slightly distant" corresponds to a position where the end portion of the rear "R" of the gas supplying port 20 is distant from the ash contact limit position P3 in the range of zero to 400 mm, preferably zero to 200 mm in the extending direction (here, forward and upward) along the surface of the ceiling surface 37.

[0022]

The present inventor has found that the length from the rear end 37e of the ceiling surface 37 to the above-described "ash contact limit position P3" never comes to be less than one-third the length of the ceiling surface 37 from the rear end 37e to the opening end 32e and further the length is in the range of one-third to two-third the length of the ceiling surface 37 from the rear end 37e to the opening end 32e irrespective of the above conditions and the scale of the ash extrusion device 1 as long as the fundamental shape of the ash extrusion device 1 conforms to the one shown in FIG. 1.

That is, expressing the length obtained by equally dividing the length of the ceiling surface 37 from the rear end 37e to the opening end 32e into three segments is by a dimension L1, the end of the rear "R" of the gas

supplying port 20 is arranged at a position that is distant by more than the dimension L1 from the rear end 37e of the ceiling surface 37 along the extending direction of the ceiling surface 37.

[0023]

As described above, since the gas supplying port 20 is disposed at the "ash non-contact position P1 close to the ash contact limit position P3", the ash extrusion device 1 can reliably prevent gas supplying port 20 from being blocked by the incinerated ash.

The incinerated ash deposited on the first inclined surface 34 where the incinerated ash containing metal aluminum is brought into contact with an alkaline solution in a large amount may increase the hydrogen concentration because the generated hydrogen remains the interstice in the incinerated ash and consequently the concentration of the hydrogen may reach the critical point of explosion. However, since the air or inert gas is ejected from the gas supplying port 20 disposed at the "ash non-contact position P1 close to the ash contact limit position P3", which means that a position very close to the deposited incinerated ash, the air or inert gas sufficiently enters the interstice in the incinerated ash, which can consequently be stirred and ventilated with, so that the hydrogen concentration can be lowered. Accordingly, the ash extrusion device 1 can ventilating the cooling tank 3 by effectively diluting hydrogen generated in the cooling

tank 3, inhibiting blocking of the gas supplying port 20.

[0024]

Incidentally, as described above, being expressed in a line, the "boundary" is a curve approximated to a parabola having a vertex at the center portion 37c, as shown in FIG. 3. Therefore, in the ash extrusion device 1, at least two gas supplying ports 20 in total are arranged one to each of a left portion and a right portion of the ceiling surface 37 except for the center portion 37c in the width direction of the ceiling surface 37 in the cross section of the cooling tank 3 viewed from the discharge port 32, as shown in FIG. 2 and FIG. 3. Ejecting air or inert gas from the two gas supplying ports 20 located on the left hand and the right hand of the center portion 37c can generate strong turbulence of the air or the inert gas in the cooling tank 3, so that the hydrogen generated in the cooling tank 3 can be effectively diluted and the cooling tank 3 can be efficiently ventilated. In the illustrated example, one gas supplying port 20 is disposed on each of the left and right portions in the width direction. Alternatively, two or more gas supplying ports 20 may be arranged on each portion in order to enhance the ventilation efficiency.

Here, the ash extrusion device 1 is provided with plural gas supplying ports 20 to further enhance the effectiveness of agitation and ventilation. However, if a single gas supplying port 20 can sufficiently attain the

above effect, the ash extrusion device 1 may have a single gas supplying port 20 from the cost-effective viewpoint.

[0025]

In a state where the incinerated ash is unevenly deposited on either the left or right hand as compared with a state shown in FIG. 2, the gas supplying ports 20 may be asymmetrically arranged to deal with uneven deposit (in space) of the incinerated ash. In this alternative, the number of gas supplying ports 20 arranged in one side may be different between the right hand and the left hand of the center portion 37c such that the hand having a larger space in the cooling tank 3 have more gas supplying ports 20.

[0026]

[2. Modification]

The above ash extrusion device 1 is an example, and the configuration thereof is not limited to the above described.

FIG. 4 is a cross-sectional diagram schematically showing the configuration of an ash extrusion device 1' according to a modification. The reference numbers with primes designate the same or substantially same elements of the above ash extrusion device 1, so repetitious description of the configurations and the effects is omitted here.

Comparing the above ash extrusion device 1 and the ash extrusion device 1' according to this modification,

the ash extrusion device 1' is different from the ash extrusion device 1 in the point of including a supplemental gas supplying port 23 penetrating the wall surface 6F' of the discharge chute 6′ and a branch pipe 39 that connects the supplemental gas supplying port 23 to the gas supplying pipe 21′ in addition to the gas supplying port 20' formed so as to penetrate the ceiling surface 37' of the cooling tank 3'.

The branch pipe 39 branches off from the gas supplying pipe 21′ at the upstream portion of the pressure gauge 12′ and the flow meter 13′, and is a pipe that ejects the gas from the supplemental gas supplying port 23. Since the branch pipe 39 branches off from the gas supplying pipe 21′ at the upstream portion, the control device 10′ can adjust the amount of air or inert gas to be ejected from the gas supplying port 20' to a predetermined amount without being affected by the branch pipe 39.

The supplemental gas supplying port 23 is provided on an upper wall surface 6Fa located on the upper part of the wall surface 6F′ of the discharge chute 6′. Although not being shown, the supplemental gas supplying port 23 may be air-tightly connected from the outside of the upper wall surface 6Fa using a flange structure similar to the connecting portion 22'.

In addition to the same effect obtained by the ash extrusion device 1 described above, the ash extrusion device 1' can efficiently stir and dilute the generated

hydrogen with the gas supplied from the supplemental gas supplying port 23 even if hydrogen generated in the cooling tank 3' rises and stays near the upper wall surface 6Fa in the discharge chute 6'.

[Reference Signs List]

[0027]

1, 1′: Ash extrusion device

2, 2′: Ash chute

3, 3′: Cooling tank

4, 4′: Scraper

5, 5′: Drive device

6, 6′: Discharge chute

6F, 6F′: Wall surface

6Fa: Upper wall surface

7, 7′: Conveyance device

8, 8′: Drainage pipe

10, 10′: Control device

11, 11′: Gas supplying device

12, 12′: Pressure gauge

13, 13′: Flow meter

20, 20′: Gas supplying port

21, 21′: Gas supplying pipe

21e, 21e′: Tip portion

22, 22′: Connecting portion

23: Supplemental gas supplying port

31, 31′: Introduction port

31F, 31F′: Wall surface

31Fa, 31Fa′: Front surface (Discharge-port-side wall surface)

31Fb, 31Fb′: Rear surface

32, 32′: Discharge port

32e, 32e′: Opening end

33, 33′: Bottom surface

34, 34′: First inclined surface

35, 35′: Second inclined surface

36, 36′: Lowest surface

37, 37′: Ceiling surface

37c: Center portion

37e, 37e′: Rear end

38: Side surface

39: Branch pipe

40: Drive shaft

41: Arm

L1: Dimension

P1, P1′: Ash non-contact position

P2, P2′: Ash contact position

P3, P3′: Ash contact limit position

CLAIMS

[Claim 1]

An ash extrusion device comprising:

a cooling tank including an introduction port having a wall surface through which incinerated ash is introduced and a discharge port that discharges the incinerated ash cooled by stored water, the wall surface being in a cylindrical shape;

a scraper being disposed inside the cooling tank, having a tip being in contact with a total width of a bottom surface of the cooling tank, and extruding the incinerated ash to a discharge port side; and

a drive device disposed on a side opposite to the discharge port with respect to the introduction port, and driving the scraper,

wherein the bottom surface of the cooling tank includes a first inclined surface inclined upward from directly under the introduction port toward the discharge port, and a second inclined surface having the same width of the first inclined surface and inclined upward from directly under the introduction port toward a side opposite to the first inclined surface;

the stored water is stored in the cooling tank at a predetermined water level above a lower end of the wall surface and below the discharge port;

the drive device includes a drive shaft disposed above the second inclined surface, and the drive shaft pivots so that an arm connected to the drive shaft and the scraper causes the scraper to reciprocate forward and rearward along the bottom

surface;

the first inclined surface, a ceiling surface connected to the wall surface, and two side surfaces connected to the first inclined surface and the ceiling surface form a cylindrical shape extending from the wall surface to the discharge port and having a rectangular cross-section;

the ash extrusion device further comprises

a gas supplying port arranged at an ash non-contact position close to an ash contact limit position from which the incinerated ash pushed up by the scraper no longer comes into contact with the ceiling surface to the discharge port side,

a gas supplying pipe connected to the gas supplying port, and

a gas supplying device that supplies the gas supplying pipe with air or inert gas; and

the air or the inert gas is ejected from the gas supplying port.

[Claim 2]

The ash extrusion device according to claim 1, wherein at least one of the gas supplying ports is respectively arranged on each of a right portion and a left portion of the ceiling surface excluding a center portion of the ceiling surface on a cross section of the cooling tank viewed from the discharge port side.

[Claim 3]

The ash extrusion device according to claim 2, wherein the

ash contact limit position is positioned at a point of which length from the wall surface toward the discharge port along the ceiling surface is in a range of one-third to two-third length of the ceiling surface from the wall surface to the discharge port.

[Claim 4]

The ash extrusion device according to claim 3, further comprising:

a discharge chute that is airtightly connected to the discharge port and into which the incinerated ash discharged from the discharge port is introduced; and

a branch pipe connected to the gas supplying pipe and the discharge chute close to the discharge port,

wherein the air or the inert gas is ejected into the discharge chute through the branch pipe.

[Claim 5]

The ash extrusion device according to any one of claims 1-4, further comprising:

a pressure gauge that measures a pressure of air or inert gas supplied to the gas supplying port, or a flow meter that measures a flow amount of the air or the inert gas; and

a control device that controls, based on the measurement information of the pressure gauge or the flow meter, the gas supplying device such that an amount of the air or the inert gas

to be supplied to the gas supplying port is adjusted to a predetermined amount.

ASH EXTRUSION DEVICE

ABSTRACT

An ash extrusion device 1 includes: a cooling tank 3 including an introduction port 31 having a cylindrical wall surface 31F through which incinerated ash is introduced and a discharge port 32 that discharges the incinerated ash cooled by stored water; a scraper 4 disposed inside the cooling tank 3 and extruding the incinerated ash to the discharge port 32 side; and a drive device 5 disposed on a side opposite to the discharge port 32 with respect to the introduction port 31 and driving the scraper 4. The cooling tank 3 includes a first inclined surface 34 inclined upward from directly under the introduction port 31 toward the discharge port 32, and a ceiling surface 37 arranged over the first inclined surface 34. A gas supplying port 20 is arranged at an ash non-contact position P1 close to an ash contact limit position P3 on the ceiling surface 37.

(Fig. 1)