



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
28.04.2010 Bulletin 2010/17

(21) Application number: **08764317.7**

(22) Date of filing: **16.05.2008**

(51) Int Cl.:
F23G 5/44 (2006.01) **F23G 5/027** (2006.01)
F23G 5/16 (2006.01) **F23G 5/24** (2006.01)
F27D 7/02 (2006.01)

(86) International application number:
PCT/JP2008/059038

(87) International publication number:
WO 2008/152880 (18.12.2008 Gazette 2008/51)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **08.06.2007 JP 2007153059**

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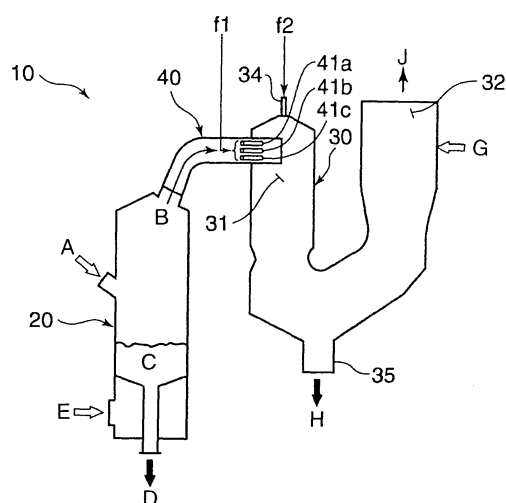
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(54) **GASIFICATION MELTING EQUIPMENT AND METHOD OF FEEDING AIR FOR COMBUSTION IN MELTING FURNACE OF GASIFICATION MELTING EQUIPMENT**

(57) An object of the present invention is to provide gasification melting equipment and a method for supplying combustion air to a melting furnace of gasification melting equipment, with which clinker is prevented from sticking to an upper inner wall of a primary combustion chamber of a melting furnace. The gasification melting equipment 10 comprises a gasification furnace 20, a melting furnace 30 that combusts a pyrolysis gas contained in the produced gas and converts ash into a molten slag, and a gas duct 40 that leads the produced gas in the gasification furnace 20 to a produced gas introduction port of the melting furnace 30. The produced gas introduction port of the melting furnace 30 is provided to an upper side wall of a primary combustion chamber 31 thereof. The gas duct 40 is provided with first combustion air supply nozzles 41a to 41c and 42a to 42c that supply at least 70% of the combustion air out of the total amount of combustion air for the primary combustion chamber of the melting furnace 30, at positions near the produced gas introduction port.

FIG. 1



Description

Technical Field

[0001] This invention relates to gasification melting equipment and a method for supplying combustion air to a melting furnace of gasification melting equipment.

Background Art

[0002] Gasification melting equipment is at the very core of a gasification melting facility, generally comprising a gasification furnace that performs pyrolysis of waste such as municipal solid waste and industrial waste to produce a produced gas (pyrolysis gas and char), and a melting furnace having an introduction port through which the produced gas is introduced into the melting furnace through a gas duct linked to the gasification furnace: the pyrolysis gas (combustible gas) in the produced gas is combusted in the melting furnace to melt the ash in the produced gas into a molten slag.

[0003] As shown in Figs. 7 and 8, this type of gasification melting equipment comprises an melting furnace 80 with a primary combustion chamber 82 having an upper inner wall (i.e., an inner wall at the top of the melting furnace 80) to which a clinker 84 tends to adhere. This clinker 84 grows to prevent maintaining the produced gas retention time necessary for proper combustion of the produced gas introduced from the gas duct 86 into the primary combustion chamber 82, thus decreasing combustion efficiency, or prevent maintaining a proper shape of the primary combustion chamber 82 for the swirling produced gas flow in the primary combustion chamber to decrease the slag conversion rate (the trapping of ash contained in the produced gas). Besides, the gasification melting equipment has a risk that the clinker 84 having grown will block off the primary combustion chamber 82, or fall to damage the melting furnace 80 or block off the slag discharge hole.

[0004] There is conventionally described a technique for preventing an adherence of clinker in a melting furnace of gasification melting equipment as discussed above in Patent Document 1. The melting furnace discussed in Patent Document 1 comprises a side wall and a ceiling wall that constitute a primary combustion chamber, and a plurality of combustion gas supply nozzles each having an opened tip and being provided to the side wall and ceiling wall. The combustion gas supply nozzles blow combustion gas (combustion air) therefrom into the primary combustion chamber, thereby promoting mixing of the combustion gas and produced gas for quick temperature rise to prevent clinker from adhering to the upper inner wall of the primary combustion chamber of the melting furnace.

[0005] This melting furnace, however, has room for improvement of the locations of the combustion air supply nozzles for supplying combustion air for primary combustion in the melting furnace, in order to prevent the

clinker from adhering to the upper inner wall of the primary combustion chamber of the melting furnace.

Patent Document 1: Japanese Patent Application Laid-Open No. 2003-4214

Disclosure of the Invention

[0006] The present invention provides gasification melting equipment and a method for supplying combustion air to a melting furnace of gasification melting equipment, which make it possible to more effectively prevent the adherence of clinker onto the upper inner wall of the primary combustion chamber of the melting furnace in gasification melting equipment comprising a gasification furnace, a melting furnace, and a gas duct that links these furnaces.

[0007] To achieve the object, the gasification melting equipment pertaining to the present invention comprises a gasification furnace that pyrolyzes waste to produce a produced gas, a melting furnace that has a produced gas introduction port and combusts a pyrolysis gas contained in the produced gas introduced through the produced gas introduction port to convert ash in the produced gas into a molten slag, and a gas duct that links the gasification furnace and the melting furnace to lead the produced gas produced in the gasification furnace to the produced gas introduction port. The produced gas introduction port is provided to the upper side wall of a primary combustion chamber of the melting furnace, and the gas duct is provided with first combustion air supply nozzles at positions near the produced gas introduction port, the first combustion air supply nozzles supplying at least 70% of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace.

[0008] The present invention is also a method for supplying combustion air to a melting furnace of gasification melting equipment comprising a gasification furnace that pyrolyzes waste to produce a produced gas by, a melting furnace that has a produced gas introduction port, for combusting a pyrolysis gas contained in the produced gas introduced through the produced gas introduction port and converting ash in the produced gas into a molten slag, and a gas duct that links the gasification furnace and the melting furnace to lead the produced gas produced in the gasification furnace to the produced gas introduction port: the method comprises providing the produced gas introduction port to an upper side wall of a primary combustion chamber of the melting furnace, providing first combustion air supply nozzles to the gas duct at positions near the produced gas introduction port, and supplying, from the first combustion air supply nozzles, at least 70% of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace.

[0009] According to the above-mentioned gasification melting equipment and method for supplying combustion air to a melting furnace of gasification melting equipment,

the first combustion air supply nozzles, which are provided to the gas duct at positions near the produced gas introduction port provided to the upper side wall of the primary combustion chamber of the melting furnace, supply at least 70% of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace: the produced gas and the combustion air supplied from the first combustion air supply nozzles, which air accounts for the majority of the total amount of combustion air, can be mixed in a state that the calorific power of the produced gas led from the gasification furnace through the gas duct to the primary combustion chamber is high. This makes it possible to raise the internal furnace temperature at the upper part of the primary combustion chamber of the melting furnace over the melting temperature of the ash contained in the produced gas to prevent clinker from adhering to the upper inner wall of the primary combustion chamber of the melting furnace.

Brief Description of the Drawings

[0010]

[Fig. 1] Fig. 1 is a diagram of the overall configuration of the gasification melting equipment pertaining to an embodiment of the present invention;

[Fig. 2] Fig. 2 is a plan view of the main components of the gas duct and swirling flow melting furnace in Fig. 1;

[Fig. 3] Fig. 3 is a side view along the arrow III in Fig. 2;

[Fig. 4] Fig. 4 is a side view along the arrow IV in Fig. 2;

[Fig. 5] Fig. 5 is a cross section along the V-V line in Fig. 3;

[Fig. 6] Fig. 6 is a graph of the relation between the allocation ratio η of the amount of combustion air supplied by the first combustion air supply nozzles provided to the gas duct with respect to the total amount of combustion air for the primary combustion chamber of the swirling flow melting furnace, and the internal furnace temperature T at the upper part of the primary combustion chamber;

[Fig. 7] Fig. 7 is a plan view showing how clinker adheres to the upper inner wall of the primary combustion chamber of the swirling flow melting furnace; and

[Fig. 8] Fig. 8 is a side view showing how clinker adheres to the upper inner wall of the primary combustion chamber of the swirling flow melting furnace.

Best Mode for Carrying Out the Invention

[0011] An embodiment of the present invention will now be described through reference to the drawings. Fig. 1 is a diagram of the overall configuration of the gasification melting equipment pertaining to an embodiment of the present invention.

[0012] The gasification melting equipment 10 shown in Figs. 1 to 5 comprises a fluidized bed gasification furnace 20, a swirling flow melting furnace 30, and a gas duct 40. In the fluidized bed gasification furnace 20, a produced gas B containing pyrolysis gas and char is produced by pyrolysis of waste A. The swirling flow melting furnace 30 has a produced gas introduction port 33, through which the produced gas B from the fluidized bed gasification furnace 20 is introduced into the swirling flow melting furnace 30. In the swirling flow melting furnace 30, the pyrolysis gas (combustible gas) in the produced gas B is combusted, while the ash in the produced gas B is converted into molten slag. The gas duct 40 links the fluidized bed gasification furnace 20 and the swirling flow melting furnace 30 to lead the produced gas B produced in the fluidized bed gasification furnace 20 to the produced gas introduction port 33 of the swirling flow melting furnace 30.

[0013] The swirling flow melting furnace 30 has a primary combustion chamber 31 and a secondary combustion chamber 32. The produced gas B from the fluidized bed gasification furnace 20 is supplied through the gas duct 40 to the primary combustion chamber 31 of the swirling flow melting furnace 30 to form a swirling flow within the primary combustion chamber 31. The primary combustion chamber 31 has a ceiling wall, which has a top provided with a second combustion air supply nozzle 34 (one is depicted). The second combustion air supply nozzle 34 has an opened tip to blow combustion air f_2 into the primary combustion chamber 31 from the tip.

[0014] Figs. 2 to 4 show the main components of the gas duct 40 and the swirling flow melting furnace 30: Fig. 2 is a plan view; Fig. 3 is a side view along the arrow III in Fig. 2; and Fig. 4 is a side view along the arrow IV in Fig. 2.

[0015] As shown in Fig. 2, the produced gas introduction port 33 is placed in the upper side wall of the primary combustion chamber 31 of the swirling flow melting furnace 30, and the gas duct 40 is connected to this produced gas introduction port 33. The gas duct 40 is provided with a plurality of (six are depicted) first combustion air supply nozzles 41a to 41c and 42a to 42c, at positions near the produced gas introduction port 33A. Each of the first combustion air supply nozzles 41a to 41c and 42a to 42c has an opened tip to blow combustion air f_1 from the tip into the primary combustion chamber 31, being placed in an attitude inclined along the flow direction of the produced gas B (see Fig. 2).

[0016] More specifically, the first combustion air supply nozzles 41a to 41c are provided to the outer side wall 43 of the gas duct 40 so as to be vertically aligned and supply combustion air from the outer side wall 43 while being inclined along the flow direction of the produced gas B. On the other hand, the first combustion air supply nozzles 42a to 42c are provided in the inner side wall 44 of the gas duct 40 so as to be vertically aligned and supply combustion air from the inner side wall 44 while being inclined along the flow direction of the produced gas B.

[0017] Fig. 5 is a cross section along the V-V line in Fig. 3. As shown in Fig. 5, the first combustion air supply nozzle 41a is provided so as to blow the combustion air f1 toward the intersection point P1 of the produced gas introduction port 33 and the duct width center line CL of the gas duct 40 near the produced gas introduction port 33 in plan view, in order to raise the temperature inside the furnace (the temperature inside the chamber) at the upper part of the primary combustion chamber 31. In other words, the nozzle 41a is positioned so that an extension of the axis of the first combustion air supply nozzle 41a in plan view passes through the intersection point P1.

[0018] If the first combustion air supply nozzle 41a were placed so as to blow the combustion air f1 toward a location upstream from the point of intersection P1 in plan view (such as a point P2), the temperature could rise inside the gas duct 40 to allow clinker to block off the gas duct 40. Conversely, if the first combustion air supply nozzle 41a were placed so as to blow the combustion air f1 toward a location downstream from the point of intersection P1 in plan view (such as a point P3), the combustion time during which the produced gas B mixed with the combustion air should be collided with the inner wall of the primary combustion chamber 31 could be so insufficient that the effect of raising the internal furnace temperature of the upper part of the primary combustion chamber 31 could not be easily obtained.

[0019] Also, if the first combustion air supply nozzle 41a were provided so as to blow the combustion air f1 toward a location at an outer side of the duct width center line CL with respect to the point of intersection P1 in plan view (such as a point P4), the combustion time during which the produced gas B mixed with the combustion air should be collided with the inner wall of the primary combustion chamber 31 could be so insufficient that the effect of raising the internal furnace temperature of the upper part of the primary combustion chamber 31 could not be easily obtained. On the other hand, if the first combustion air supply nozzle 41a were provided so as to blow the combustion air f1 toward a location at an inner side of the duct width center line CL with respect to the point of intersection P1 in plan view (such as a point P5), the combustion air f1 could hinder the swirling flow in the primary combustion chamber 31 to lower the slag conversion ratio (ash capture ratio).

[0020] Accordingly, preferable is that the first combustion air supply nozzle 41a is so placed as to blow the combustion air f1 toward the intersection point P1 of the produced gas introduction port 33 and the duct width center line CL in plan view, as mentioned above. The same holds true for the other combustion air supply nozzles 41b and 41c and 42a to 42c. For this reason, the combustion air supply nozzles 41a to 41c pertaining to this embodiment are provided to the side wall 43 of the gas duct 40 at an outer side of the duct width center line CL, and disposed so as to blow combustion air from the side wall 43 toward the point of intersection P1, while the combustion air supply nozzles 42a to 42c are provided

to the side wall 44 of the gas duct 40 at an inner side of the duct width center line CL, and disposed so as to blow combustion air from this side wall 44 toward the point of intersection P1.

[0021] The swirling flow melting furnace 30, differently from a conventional melting furnace in which a plurality of combustion air supply nozzles are dispersedly placed in an upper part of the primary combustion chamber, is adapted to supply combustion air for the primary combustion chamber of the swirling flow melting furnace 30 only from the first combustion air supply nozzles 41a to 41c and 42a to 42c placed in the gas duct 40 at positions near the produced gas introduction port 33 provided to an upper side wall of the primary combustion chamber 31 of the swirling flow melting furnace 30, and from the second combustion air supply nozzle 34 placed in the ceiling wall of the primary combustion chamber 31. Concerning the allocation ratio of the amount of the combustion air supplied by the first combustion air supply nozzles 41a to 41c and 42a to 42c to the amount of combustion air supplied by the second combustion air supply nozzle 34, the ratio is set such that the first combustion air supply nozzles 41a to 41c and 42a to 42c supply at least 70% of the total amount of combustion air supplied to the primary combustion chamber 31.

[0022] Fig. 6 is a graph of the relation between the allocation ratio η of the amount of combustion air supplied by the first combustion air supply nozzles provided to the gas duct 40 with respect to the total amount of combustion air for the primary combustion chamber of the swirling flow melting furnace 30, and the internal furnace temperature T at the upper part of the primary combustion chamber.

[0023] As shown in Fig. 6, the allocation ratio η of 46% resulted in a measured value for the internal furnace temperature T of 1015°C to 1149°C (average of 1082°C); the allocation ratio η of 63% resulted in a measured value for the internal furnace temperature T of 1154°C to 1198°C (average of 1176°C); and the allocation ratio η of 84% resulted in a measured value for the internal furnace temperature T of 1165°C to 1238°C (average of 1201°C). These test results gave the conclusion that the allocation ratio η of at least 70% permits the internal furnace temperature T at the upper part of the primary combustion chamber to be raised over 1200°C that is higher than the melting point of the ash contained in char. In short, the results shown in Fig. 6 taught us that the allocation ratio η should be set to at least 70%.

[0024] The amount of the combustion air in the fluidized bed gasification furnace 20 (the amount of forced air E shown in FIG. 1) and the amount of combustion air for the primary combustion chamber supplied from the first combustion air supply nozzles 41a to 41c and 42a to 42c and the second combustion air supply nozzle 34 are both favorably from 1.0 to 1.2 in terms of the air ratio (the air ratio is the ratio of the amount of supplied air to the minimum amount of air required for completely combusting the combustibles in the waste serving as the raw

material). This is for an efficient combustion of the produced gas that is the mixture of solid fuel and gas fuel: neither the excessively low nor high air ratio can provide a required internal furnace temperature at the upper part of the primary combustion chamber. Concerning a flow speed of the combustion air for the primary combustion chamber supplied by the first and second combustion air supply nozzles, which speed is determined by the blower capacity and the piping design, a relatively high flow speed of 30 to 100 m/s, for example, will promote the mixing of the combustion air and the produced gas to improve combustion efficiency.

[0025] The speed of the produced gas supplied from the fluidized bed gasification furnace 20 to the swirling flow melting furnace 30 is preferably set to 15 to 25 m/s (preferably 18 to 20 m/s). While the high supply speed is preferable, the excessively high speed let the collision pressure against the inner wall of the primary combustion chamber 31 of the swirling flow melting furnace 30 rise excessively to cause the adhesion of clinker: therefore, the speed is preferably controlled no higher than the above maximum of 25 m/s.

[0026] Next will be described a method for supplying melting furnace combustion air in gasification melting equipment 10 configured as above.

[0027] In the fluidized bed gasification furnace 20, the forced air E which is forced-introduced from the lower portion of the furnace bed fluidizes a fluid media C such as sand with to form a fluidized bed. Then, waste A is thrown into the fluidized bed gasification furnace 20 and pyrolyzed (gasified) in the fluidized bed. Non-combustibles D contained in the waste A and not gasified are discharged out of the furnace from the lower portion of the fluidized bed.

[0028] The produced gas B (pyrolyzed gas and char) produced in the fluidized bed gasification furnace 20 is led through the gas duct 40 to the produced gas introduction port 33 of the swirling flow melting furnace 30. This produced gas B, while mixed with the combustion air f1 for the primary combustion chamber supplied from the first combustion air supply nozzles 41a to 41c and 42a to 42c placed to the gas duct 40 at positions near the produced gas introduction port 33, is introduced from the produced gas introduction port 33 into the primary combustion chamber 31 of the swirling flow melting furnace 30, thereby forming a swirling flow in the primary combustion chamber 31. Furthermore, the produced gas G is mixed with the combustion air f2 for the primary combustion chamber supplied from the second combustion air supply nozzle 34 placed in the ceiling wall of the primary combustion chamber 31, thus being combusted in the primary combustion chamber 31. On the supply of the combustion airs f1 and f2 for the primary combustion chamber, at least 70% (such as 75%) of the total amount of combustion air for the primary combustion chamber of the swirling flow melting furnace 30 is supplied by the first combustion air supply nozzles 41a to 41c and 42a to 42c.

[0029] This method makes it possible to mix the produced gas B, which is led from the gasification furnace 20 to the primary combustion chamber 31 through the gas duct 40 and has a high calorific power, and the combustion air f1 supplied from the first combustion air supply nozzles 41a to 41c and 42a to 42c, which air accounts for the majority of the total amount of combustion air, thus allowing the produced gas B to be combusted all at once. This makes it possible to raise the internal furnace temperature at the upper part of the primary combustion chamber 31 over 1200°C, the melting point of the ash contained in char, to prevent clinker from adhering onto the upper inner wall of the primary combustion chamber 31.

[0030] The melted ash flows down the inner wall of the primary combustion chamber 31, and flows down the bottom of the swirling flow melting furnace (slag separation component) along with the ash melted in the lower portion of the primary combustion chamber 31, thus discharged to the outside through a slag tap hole 35, as molten slag H. The produced gas led from the primary combustion chamber 31 to the secondary combustion chamber 32 is mixed with combustion air G for the secondary combustion chamber and completely combusted in the secondary combustion chamber 32. Flue gas J that has undergone complete combustion in the secondary combustion chamber 32 is discharged from the swirling flow melting furnace 30, and is released into the atmosphere through a heat recovery device, bag filter, and so forth.

[0031] Thus, the method for supplying combustion air to the melting furnace of gasification melting equipment according to the present invention makes it possible to prevent clinker from adhering onto the upper inner wall of the primary combustion chamber 31 of the swirling flow melting furnace 30. Accordingly, there can be prevented a damage of the swirling flow melting furnace 30 or a block off of the slag tap hole 35 due to dropped clinker, block off of the primary combustion chamber 31 of the swirling flow melting furnace 30 due to the growth of clinker, and a decrease in combustion efficiency and a decrease in the slag conversion ratio due to the adhesion or growth of clinker. As a result, stable operation of the gasification melting equipment 10 in the proper state can be carried out over an extended period.

[0032] In short, according to the gasification melting equipment and the method for supplying combustion air to the melting furnace of gasification melting equipment pertaining to the present invention, providing first combustion air supply nozzles to a gas duct near a produced gas introduction port provided to an upper side wall of the primary combustion chamber of the melting furnace and supplying at least 70% of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace from these nozzles make it possible to mix the produced gas, which is led from the gasification furnace through the gas duct to the primary combustion chamber and has a high calorific power of the produced gas, and the combustion air supplied from the

first combustion air supply nozzles, which air accounts for the majority of the total amount of combustion air, thereby raising the internal furnace temperature at the upper part of the primary combustion chamber of the melting furnace over the melting temperature of the ash contained in the produced gas to prevent clinker from adhering onto the upper inner wall of the primary combustion chamber of the melting furnace. This makes it possible to prevent a damage of the melting furnace, block off of the slag tap hole due to dropped clinker, block off of the primary combustion chamber of the melting furnace due to the growth of clinker, and a decrease in combustion efficiency and a decrease in the slag conversion ratio due to the adhesion or growth of clinker, thus allowing stable operation of the gasification melting equipment in the proper state to be carried out over an extended period.

[0033] In this, it is preferable that the first combustion air supply nozzles be placed so as to blow the combustion air toward the intersection point of the produced gas introduction port and the duct width center line of the gas duct near the produced gas introduction port in plan view. This makes it possible to prevent the rise of the temperature in the gas duct and block off of the gas duct by clinker, while ensuring sufficient combustion time during which the produced gas containing the combustion air collides with the inner wall of the primary combustion chamber to raise the internal furnace temperature at the upper part of the primary combustion chamber.

[0034] In this case, the first combustion air supply nozzles are preferably placed in the gas duct in an attitude for blowing combustion air toward the intersection point while inclined along the duct width center line. This enables combustion air to be smoothly supplied from the nozzles to the primary combustion chamber.

[0035] More preferable is that the first combustion air supply nozzles include a nozzle that is placed in a side wall of the gas duct at an outer side of the duct width center line and blows combustion air from the side wall toward the intersection point, and a nozzle that are placed in a side wall of the gas duct at an inner side of the duct width center line and blows combustion air from the side wall toward the intersection point. This enables a sufficient quantity of combustion air to be supplied from both side walls of the gas duct toward the above-mentioned point of intersection. Furthermore, since the first combustion air supply nozzles are placed so as to supply combustion air while being inclined along the duct width center line, the combustion air supplied from the outer side wall and the combustion air supplied from the inner side wall have few elements interfering with each other.

[0036] In the present invention, combustion air may be supplied to the primary combustion chamber of the melting furnace by just the above-mentioned first combustion air supply nozzles and a second combustion air supply nozzle placed in a ceiling wall of the primary combustion chamber of the melting furnace.

Claims

1. Gasification melting equipment, comprising:

5 a gasification furnace that pyrolyzes waste to produce a produced gas;
a melting furnace that has a produced gas introduction port and combusts a pyrolysis gas contained in the produced gas introduced through the produced gas introduction port to convert ash in the produced gas into a molten slag; and
10 a gas duct that links the gasification furnace and the melting furnace to lead the produced gas produced in the gasification furnace to the produced gas introduction port,
15 wherein the produced gas introduction port is provided to an upper side wall of a primary combustion chamber of the melting furnace, and the gas duct is provided with first combustion air supply nozzles that supply at least 70% of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace, at positions near the produced gas introduction port.

2. The gasification melting equipment according to Claim 1,
wherein the first combustion air supply nozzles are placed so as to blow combustion air toward an intersection point of the produced gas introduction port and a duct width center line of the gas duct near the produced gas introduction port in plan view.

3. The gasification melting equipment according to Claim 2,
35 wherein the first combustion air supply nozzles are placed in the gas duct in an attitude for blowing combustion air toward the point of intersection while being inclined along the duct width center line.

4. The gasification melting equipment according to Claim 3,
40 wherein the first combustion air supply nozzles include a nozzle that is placed in a side wall of the gas duct at an outer side of the duct width center line and blows combustion air from the side wall toward the intersection point, and a nozzle that is placed in a side wall of the gas duct at an inner side of the duct width center line and blows combustion air from the side wall toward the point of intersection.

5. The gasification melting equipment according to any of Claims 1 to 4,
55 wherein a second combustion air supply nozzle is provided to a ceiling wall of the primary combustion chamber of the melting furnace, and combustion air is supplied to the primary combustion chamber of the melting furnace by only the first and

second combustion air supply nozzles.

6. A method for supplying combustion air to a melting furnace of gasification melting equipment including a gasification furnace that pyrolyzes waste to produce a produced gas, a melting furnace that has a produced gas introduction port, for combusting a pyrolysis gas contained in the produced gas introduced through the produced gas introduction port and converting ash in the produced gas into a molten slag, and a gas duct that links the gasification furnace and the melting furnace to lead the produced gas produced in the gasification furnace to the produced gas introduction port, the method comprising:

providing the produced gas introduction port to an upper side wall of a primary combustion chamber of the melting furnace;
providing first combustion air supply nozzles to the gas duct at positions near the produced gas introduction port; and
supplying at least 70% of the combustion air out of the total amount of combustion air supplied to the primary combustion chamber of the melting furnace, from the first combustion air supply nozzles.

7. The method for supplying combustion air to a melting furnace of gasification melting equipment according to Claim 6,
wherein combustion air is blown from the first combustion air supply nozzles toward an intersection point of the produced gas introduction port and the duct width center line of the gas duct near the produced gas introduction port in plan view.

8. The method for supplying combustion air to a melting furnace of gasification melting equipment according to Claim 7,
wherein the first combustion air supply nozzles are placed in the gas duct in an attitude for blowing combustion air toward the intersection point while being inclined along the duct width center line.

9. The method for supplying combustion air to a melting furnace of gasification melting equipment according to Claim 8,
wherein the first combustion air supply nozzles include a nozzle that is placed in a side wall of the gas duct at an outer side of the duct width center line and blows combustion air from the side wall toward the point of intersection, and a nozzle that is placed in a side wall of the gas duct at an inner side of the duct width center line and blows combustion air from the side wall toward the intersection point.

10. The method for supplying combustion air to a melting furnace of gasification melting equipment according

to any of Claims 6 to 9,
further comprising providing a second combustion air supply nozzle to a ceiling wall of the primary combustion chamber of the melting furnace, and
wherein combustion air is supplied to the primary combustion chamber of the melting furnace by only the first and second combustion air supply nozzles.

FIG. 1

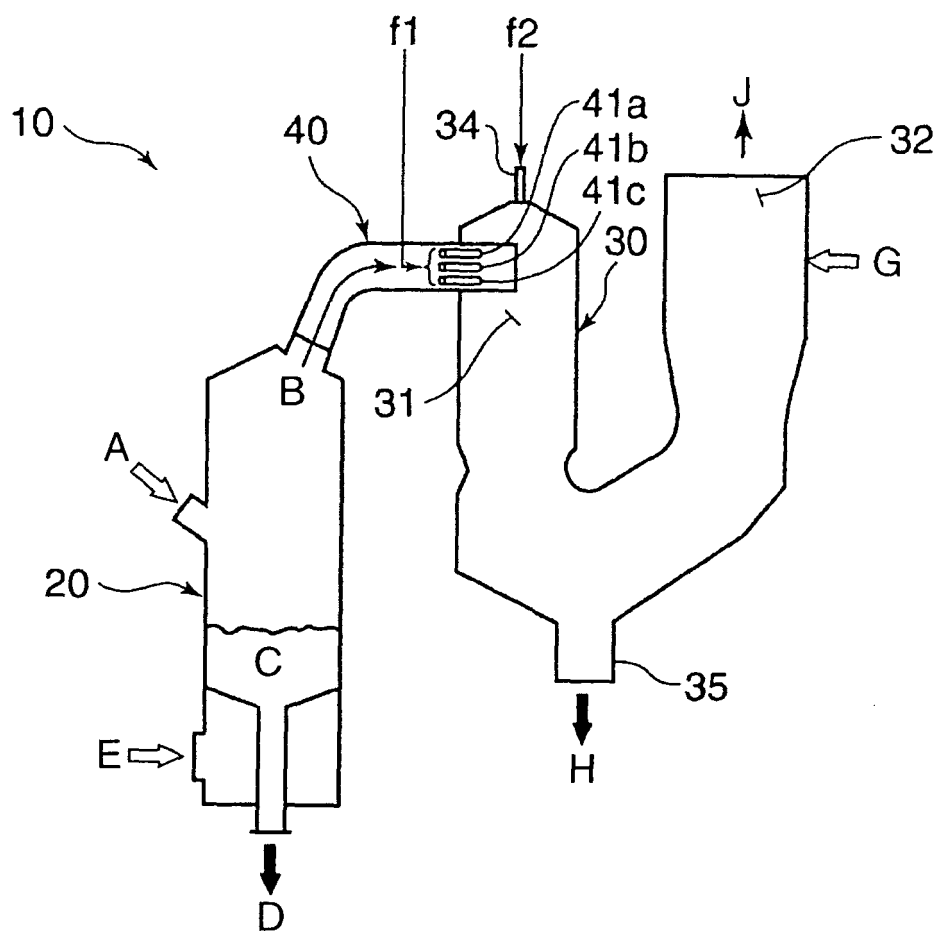


FIG. 2

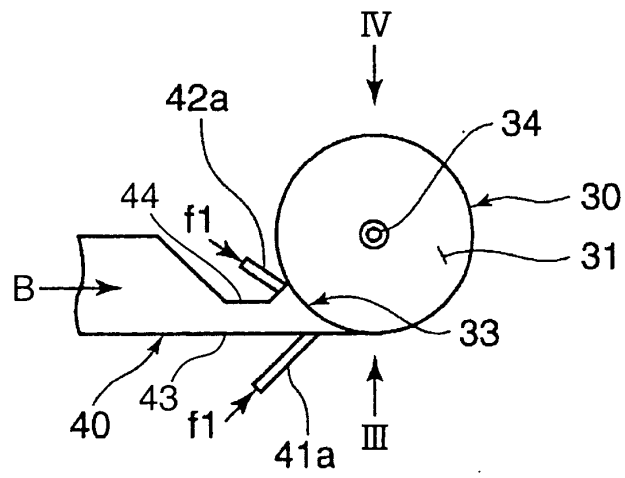


FIG. 3

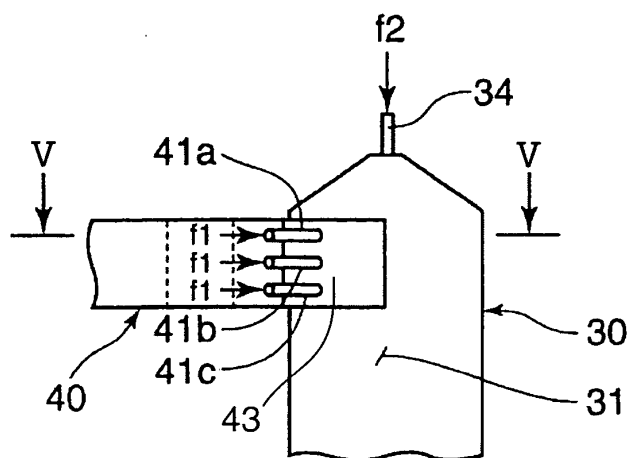


FIG. 4

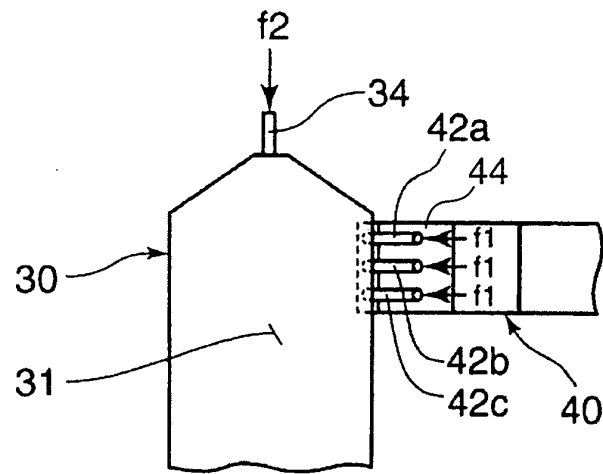


FIG. 5

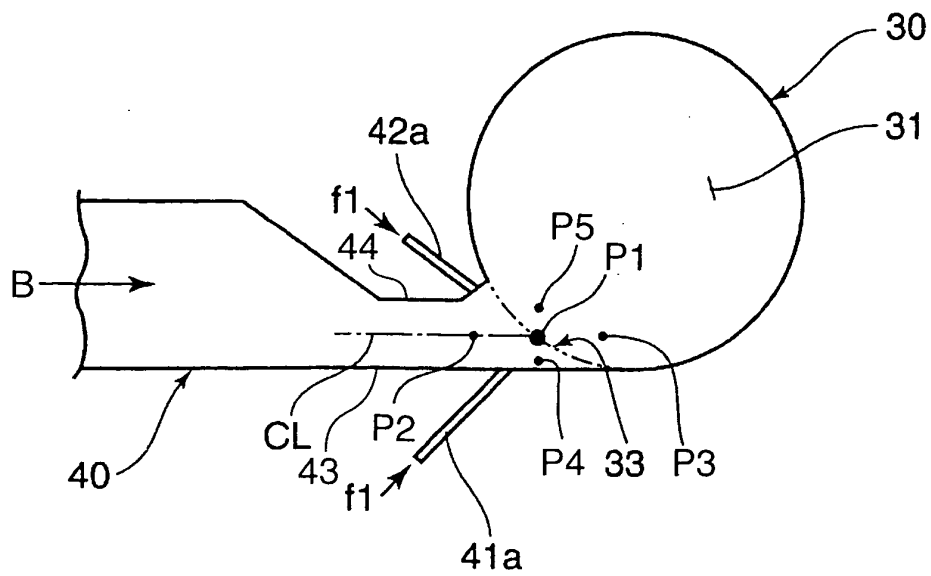


FIG. 6

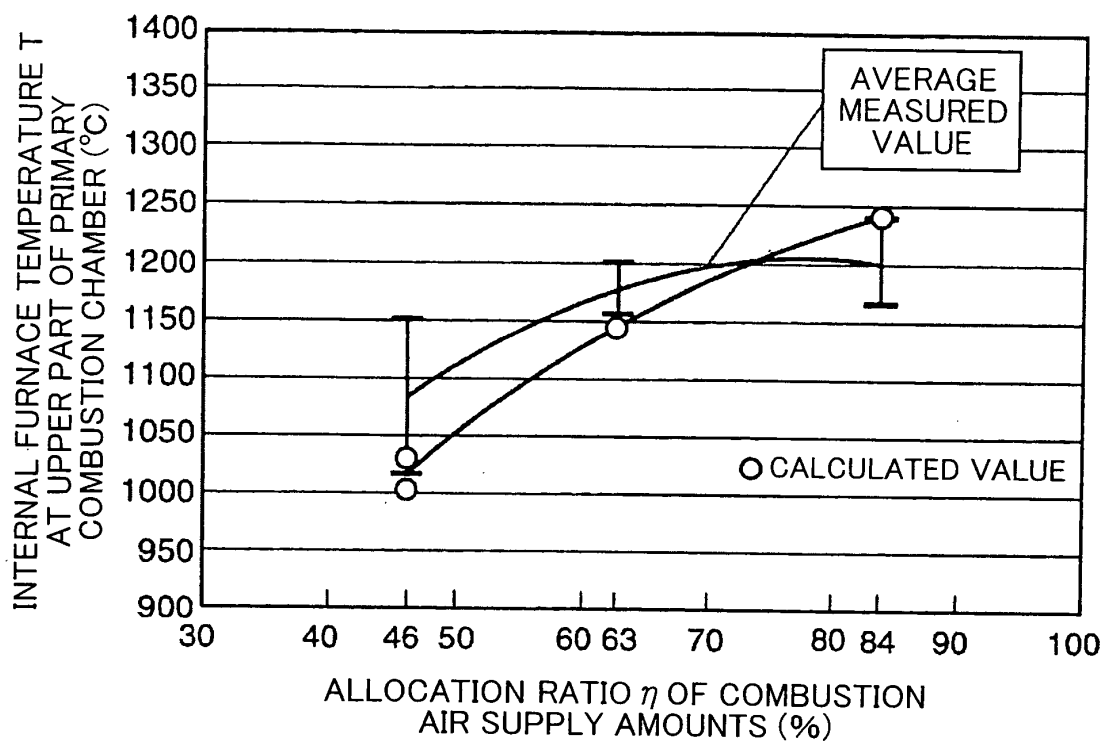


FIG. 7

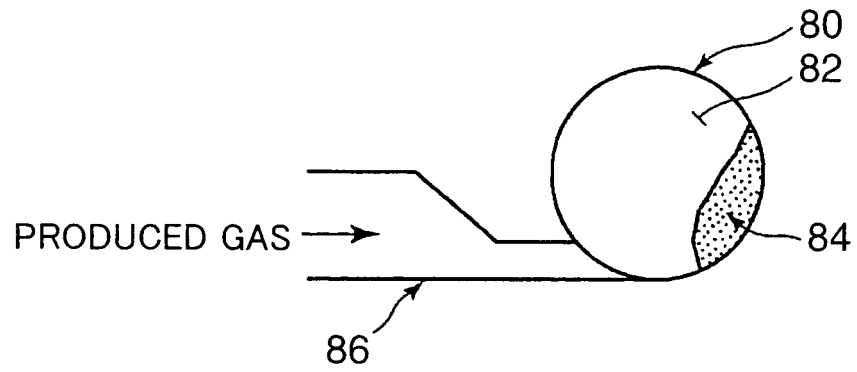
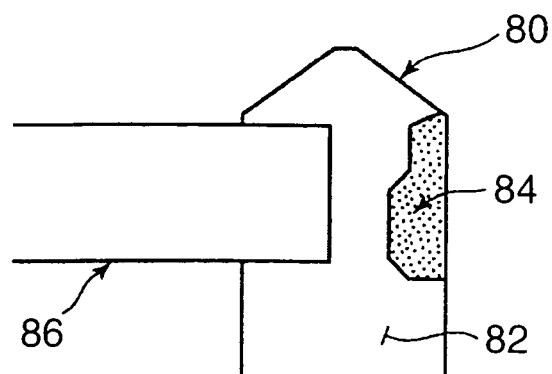


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/059038

A. CLASSIFICATION OF SUBJECT MATTER

F23G5/44(2006.01)i, F23G5/027(2006.01)i, F23G5/16(2006.01)i, F23G5/24(2006.01)i, F27D7/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F23G5/44, F23G5/027, F23G5/16, F23G5/24, F27D7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2003-004214 A (Ebara Corp.), 08 January, 2003 (08.01.03), Column 6, lines 22 to 36; Figs. 1, 6 & EP 1489354 A1 & WO 2002/086405 A2 & CA 2443542 A1	1-10
Y	JP 11-173523 A (Ebara Corp.), 29 June, 1999 (29.06.99), Column 5, lines 35 to 43; Figs. 1 to 3 (Family: none)	1-10
Y	JP 2007-078239 A (Mitsubishi Heavy Industries, Ltd.), 29 March, 2007 (29.03.07), Page 9, line 44 to page 10, line 9; Figs. 1 to 4 (Family: none)	2-5, 7-10

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

01 August, 2008 (01.08.08)

Date of mailing of the international search report

12 August, 2008 (12.08.08)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003004214 A [0005]