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(54) **REHEAT BOILER AND GAS TEMPERATURE CONTROL METHOD OF REHEAT BOILER**

BOILER VOM ZWISCHENÜBERHITZERTYP UND GASTEMPERATURREGELVERFAHREN EINES BOILERS VOM ZWISCHENÜBERHITZERTYP

CHAUDIÈRE À SURCHAUFFE ET PROCÉDÉ DE RÉGULATION DE LA TEMPÉRATURE DU GAZ D'UNE CHAUDIÈRE À SURCHAUFFE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a reheat boiler including a reheat furnace and a reheater provided downstream of an evaporation tube bank and reducing temperature unevenness of combustion gas near an outlet of the reheat furnace and to a gas temperature controlling method of such a reheat boiler.

BACKGROUND ART

[0002] Marine boilers including a super heater have been widely used (JP 2002-243106A). Furthermore, reheat boilers including a reheat furnace and a reheater provided downstream of combustion gas in conventional marine boilers have been used.

[0003] An exemplary configuration of the conventional marine reheat boiler is illustrated in Fig. 6. Fig. 6 is a schematic of a configuration of the conventional reheat boiler. As illustrated in Fig. 6, this conventional reheat boiler 100 includes: a main boiler 106 including a burner 101, a furnace 102, a front tube bank 103, a super heater (SH) 104, and an evaporation tube bank (rear tube bank) 105; a reheat furnace 108 including a reheat burner 107 provided downstream of the evaporation tube bank 105; and a reheater 109 provided at a combustion gas outlet side. The combustion gas originating from combustion in the burner 101 flows from the furnace 102, passes through the front tube bank 103, the SH 104, and the evaporation tube bank 105, and is mixed with the combustion gas originating from combustion in the reheat burner 107 in the reheat furnace 108. With its heat exchanged with the reheater 109, the gas further flows, and is output from a gas outlet 110. The reheat boiler is thus operated efficiently. In Fig. 6, the numeral 111 indicates a water drum, the numeral 112 indicates a steam drum, the numerals 113, 114 indicate headers, and the numeral 115 indicates a wall tube.

[0004] US 3956898 A discloses a reheat boiler arranged for operation in a marine reheat power plant and it includes a main boiler, a reheat furnace, and a reheater provided on an upper side of the reheat furnace. A supplemental reheat burner and an air supply for the burners is provided on the same side of the reheat furnace.

DISCLOSURE OF INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0005] The conventional marine reheat boiler 100 includes the reheat burner 107 on a front wall side of the reheat furnace 108, but not on a rear wall side of the reheat furnace 108. Because of this configuration, as illustrated in Fig. 7, large temperature unevenness of the combustion gas arises between the front wall side (indicated by the letter X in Fig. 7) and the rear wall side (indicated by the letter Y in Fig. 7) of the reheat furnace 108 on the outlet side thereof (indicated by the letter B in Fig. 6).

[0006] Temperature unevenness of the combustion gas on the outlet side of the reheat furnace 108 (that is, on the inlet side of the reheater 109) deteriorates heat conductivity of the reheat furnace 108 and the reheater 109, and may also cause high-temperature corrosion of reheater tubes and strength drops of support members in the reheater 109. The letter A in Fig. 7 indicates where the reheat burner is provided, and the letter C indicates the outlet portion of the reheater 109.

[0007] In view of the above problems, an object of the present invention is to provide a reheat boiler and a gas temperature controlling method of a reheat boiler that change gas flow patterns of a reheat burner to reduce temperature unevenness of combustion gas on the outlet side of a reheat furnace.

MEANS FOR SOLVING PROBLEM

[0008] The present invention provides a reheat boiler with the features of claim 1 and a gas temperature controlling method of a reheat boiler with the features of claim 5. According to an aspect of the present invention, a reheat boiler that includes a main boiler in which combustion gas produced by combustion in a burner flows through a super heater and an evaporation tube bank from a furnace, a reheat furnace with a reheat burner provided downstream of the evaporation tube bank, and a reheater provided on an upper side of the reheat furnace, includes a combustion air supply portion that is provided at a position opposite to the reheat burner in the reheat furnace to supply a part of combustion air.

[0009] Advantageously, in the reheat boiler, at least two stages of such combustion air supply portions are provided in a height direction of the reheat furnace.

[0010] Advantageously, in the reheat boiler, a part of the combustion air is supplied to the combustion air supply portion by a rate of 50% or less.

[0011] Advantageously, in the reheat boiler, at least two stages of such combustion air supply portions are provided in a height direction of the reheat furnace, and each stage of the combustion air supply portions supplies a different volume of the combustion air.

[0012] According to another aspect of the present invention, a gas temperature controlling method of the above mentioned reheat boiler includes: supplying a part of the combustion air into the reheat furnace from a position opposite to the reheat burner to reduce temperature unevenness of the combustion gas on an outlet side of the reheat furnace.

EFFECT OF THE INVENTION

[0013] According to the present invention, by providing the combustion air supply portion at a position opposite to the reheat burner in the reheat furnace to supply a part of the combustion air to the reheat furnace, flow patterns of gas discharged from the reheat burner can be changed. Therefore, temperature unevenness of the combustion gas on the outlet side of the reheat furnace is reduced.

BRIEF DESCRIPTION OF DRAWINGS

[0014]

[Fig. 1A] Fig. 1A is a schematic of the configuration of a reheat furnace and a reheater included in a reheat boiler according to a first embodiment of the present invention.

[Fig. 1B] Fig. 1B is a sectional view seen in a direction perpendicular to the vertical direction of the reheat furnace illustrated in Fig. 1A.

[Fig. 2] Fig. 2 is a schematic of the configuration of the reheat boiler according to the first embodiment of the present invention.

[Fig. 3] Fig. 3 is an illustrative view of the temperature distribution of combustion gas at the outlet of the reheat furnace.

[Fig. 4] Fig. 4 is a schematic of the configuration of a reheat boiler according to a second embodiment of the present invention, extracting its reheat furnace and reheater alone.

[Fig. 5] Fig. 5 is an illustrative view of the temperature distribution of combustion gas near the outlet of the reheat furnace.

[Fig. 6] Fig. 6 is a schematic of an exemplary configuration of a conventional reheat boiler.

[Fig. 7] Fig. 7 is an illustrative view of the temperature distribution near the outlet of a conventional reheat furnace.

EXPLANATIONS OF LETTERS OR NUMERALS

[0015]

10A, 10B:	reheat boiler
11, 11b-1 to 11b-3:	combustion air
12, 12-1 to 12-3:	combustion air supply portion
101:	burner
102:	furnace
103:	front tube bank
104:	super heater (SH)
105:	evaporation tube bank (rear tube bank)
106:	main boiler
107:	reheat burner
108:	reheat furnace
109:	reheater
110:	gas outlet
111:	water drum
112:	steam drum
113, 114:	header
115:	wall tube

BEST MODE (S) FOR CARRYING OUT THE INVENTION

[0016] The present invention will be described in detail with reference to the accompanying drawings.

First Embodiment

[0017] A reheat boiler according to an embodiment of the present invention will now be described with reference to some drawings.

[0018] The reheat boiler according to the present embodiment has a similar configuration to that of a conventional reheat boiler as illustrated in Fig. 6 and has an air supply portion provided to a reheat furnace; therefore, like elements have like reference numerals, and repeated descriptions will be omitted.

[0019] Fig. 1A is a schematic of the configuration of the reheat furnace and a reheater included in the reheat boiler according to the first embodiment of the present invention, and is a sectional view along the line I-I in Fig. 2. Fig. 1B is a sectional view seen in a direction perpendicular to the vertical direction of the reheat furnace illustrated in Fig. 1A. Fig. 2 is a schematic of the configuration of the reheat boiler according to the first embodiment of the present invention.

[0020] In Figs. 1A and 1B, the letter X represents a front wall side of the reheat furnace, and the letter Y represents a rear wall side of the reheat furnace.

[0021] Referring to Figs. 1A, 1B, and 2, this reheat boiler 10A according to the present embodiment includes, like the configurations of conventional reheat boilers as illustrated in Fig. 6, the main boiler 106 configured to make combustion gas originating from combustion in the burner 101 flow from the furnace 102 and pass through the SH 104 and the evaporation tube bank 105, the reheat furnace 108 in which the combustion gas is reburned with the reheat burner 107, and the reheater 109 through which the reburned combustion gas passes. Referring to Figs. 1A and 1B, the reheat boiler 10A also includes a combustion air supply portion 12 provided at a position opposite to the reheat burner 107 in the reheat furnace 108 to supply a part of combustion air 11 to be supplied to the reheat burner 107 as combustion air 11b. According to the present invention, the combustion air 11a refers to combustion air that is a part of the combustion air 11 and is supplied to the reheat burner 107, while the combustion air 11b refers to combustion air that is another part of the combustion air 11 remaining after being allocated to the reheat burner 107 and is supplied to the combustion air supply portion 12.

[0022] By providing the combustion air supply portion 12 at the position opposite to the reheat burner 107 in the reheat furnace 108, combustion gas 107a discharged from the reheat burner 107 and the combustion air 11b supplied through the combustion air supply portion 12 collide head-on with each other, which facilitates mixing of the combustion gas 107a with the combustion air 11b. Consequently, temperature unevenness of the combustion gas 107a at the outlet of the reheat furnace 108 can be reduced.

[0023] Fig. 3 is an illustrative view of the temperature distribution of the combustion gas at the outlet of the reheat furnace illustrated in Fig. 1A. As indicated in Fig. 3, by providing the combustion air supply portion 12 at the position opposite to the reheat burner 107 in the reheat furnace 108 and supplying the combustion air 11b into the reheat furnace 108, the temperature distribution of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Figs. 1A and 2) falls within a range from 600 to 800 degrees Celsius, for example. With the average temperature being kept about 700 degrees Celsius, this range is narrower than the temperature distribution of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Figs. 6 and 7) included in the conventional reheat boiler 100 as indicated in Fig. 7.

[0024] By thus supplying the combustion air 11 into the reheat furnace 108 from the position opposite to the reheat burner 107, temperature unevenness near the outlet of the reheat furnace 108 can be suppressed compared with the temperature of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Figs. 6 and 7) included in the conventional reheat boiler as indicated in Fig. 7.

[0025] In the reheat boiler 10A according to the present embodiment, the combustion air 11b that remains after subtracting the combustion air 11a to be supplied to the reheat burner 107 from the combustion air 11 is supplied through the combustion air supply portion 12 preferably by a rate of 50% or less. This is because allocating a majority of the combustion air 11 to the combustion air 11b will cause incomplete combustion of fuel in the reheat burner 107.

[0026] In the reheat boiler 10A according to the present embodiment, the combustion gas 107a is first burned with the combustion air 11a supplied into the reheat burner 107 and then with the combustion air 11b supplied through the combustion air supply portion 12 in a step-by-step manner. Burning the combustion gas 107a in two stages with the combustion air 11a and the combustion air 11b can suppress the formation of NO_x.

[0027] In the reheat boiler 10A according to the present embodiment, the air volume of the combustion air 11b supplied through the combustion air supply portion 12 is adjusted with, for example, a damper or other air volume adjusters.

[0028] In the reheat boiler 10A according to the present embodiment, by supplying the combustion air 11b into the reheat furnace 108 through the combustion air supply portion 12 provided at the position opposite to the reheat burner 107 in the reheat furnace 108, the flow patterns of the combustion gas 107a discharged from the reheat burner 107 can be changed. Accordingly, temperature unevenness of the combustion gas 107a on the outlet side of the reheat furnace 108 can be reduced. This configuration prevents heat conductivity drops of the reheat furnace 108 and the reheater 109 and also prevents high-temperature corrosion of reheater tubes and strength drops of support members in the reheater 109.

Second Embodiment

[0029] A reheat boiler according to a second embodiment of the present invention will now be described with reference to Figs. 4 and 5.

[0030] Fig. 4 is a schematic of the configuration of the reheat boiler according to the second embodiment of the present invention, extracting its reheat furnace and reheater alone.

[0031] The reheat boiler according to the present embodiment has a similar configuration to that of the reheat boiler according to the first embodiment; therefore, like elements have like reference numerals, and repeated descriptions will be omitted.

[0032] Referring to Fig. 4, this reheat boiler 10B according to the present embodiment includes three-staged combustion air supply portions 12-1 to 12-3 disposed at intervals in the height direction of the reheat furnace 108 and at positions opposite to the reheat burner 107 in the reheat furnace 108.

[0033] By supplying the combustion air 11b-1 to 11b-3 into the reheat furnace 108 through the air supply portions 12-1 to 12-3, the mixture degrees of combustion gas with the combustion air 11b-1 to 11b-3 can be adjusted desirably, whereby the temperature distribution of the combustion gas near the outlet of the reheat furnace 108 can be controlled.

[0034] In the boiler 10B according to the present embodiment, the flow rates of the combustion air 11b-1 to 11b-3 supplied through the air supply portions 12-1 to 12-3, respectively, are adjustable thereby. By adjusting the flow rates of the combustion air 11b-1 to 11b-3 supplied into the reheat furnace 108, the mixture degrees of the combustion gas 107a with the combustion air 11b-1 to 11b-3 can be adjusted, whereby the temperature distribution near the outlet of the reheat furnace 108 can be controlled. For example, by making the air volume of the combustion air 11b-1 relatively large and the air volumes of the combustion air 11b-2 and the combustion air 11b-3 even, the temperature distribution near the outlet of the reheat furnace 108 can be smoothed.

[0035] Fig. 5 is an illustrative view of the temperature distribution of the combustion gas near the outlet of the reheat furnace illustrated in Fig. 4. By adjusting the flow rates of the combustion air 11b-1 to 11b-3 supplied through the combustion air supply portions 12-1 to 12-3 as illustrated in Fig. 4, temperature unevenness of the combustion gas 107a on the outlet side of the reheat furnace 108 can be reduced as indicated in Fig. 5.

[0036] By thus supplying the combustion air 11b into the reheat furnace 108 in multiple stages, the temperature distribution of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Fig. 4) falls within a range from 620 to 780 degrees Celsius, for example. With the average temperature being kept about 700 degrees Celsius, this range is narrower than the temperature distribution of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Fig. 6) included in the conventional reheat boiler 100 as indicated in Fig. 7.

[0037] This configuration can achieve a smoother temperature distribution than the temperature distribution of the combustion gas 107a near the outlet of the reheat furnace 108 (indicated by the letter B in Fig. 2) included in the reheat boiler 10A according to the first embodiment as indicated in Fig. 3.

[0038] By thus supplying the combustion air 11b-1 to 11b-3 into the reheat furnace 108 from the positions opposite to the reheat burner 107 and finely adjusting the air volumes of the combustion air 11b-2 and the combustion air 11b-3, temperature unevenness near the outlet of the reheat furnace 108 can be suppressed.

[0039] Fine adjustment of the flow rates of the combustion air 11b-1 to 11b-3 can in turn adjust temperature, retention time, and other conditions of an area where reduction takes place, thereby suppressing the formation of NO_x. For example, making the flow rate of the combustion air 11b-1 small and the flow rate of the combustion air 11b-3 large to cause a shortage of air in the reheat furnace 108 can suppress the formation of NO_x.

[0040] Accordingly, in the reheat boiler 10B according to the present embodiment, by delivering the combustion air 11b-1 to 11b-3 through the combustion air supply portions 12-1 to 12-3 disposed at intervals in the height direction and at the positions opposite to the reheat burner 107 in the reheat furnace 108 and finely adjusting the flow rates of the combustion air 11b-1 to 11b-3 supplied into the reheat furnace 108, the gas flow patterns from the reheat burner 107 can be changed. Consequently, temperature unevenness of the combustion gas 107a on the outlet side of the reheat furnace 108 can be further reduced. This configuration prevents heat conductivity drops of the reheat furnace 108 and the reheater 109 and also prevents high-temperature corrosion of the reheater tubes and strength drops of the support members in the reheater 109.

[0041] The mixture degrees of the combustion gas 107a with the combustion air 11b-1 to 11b-3 can be finely adjusted, whereby the temperature distribution at the outlet of the reheat furnace 108 can be controlled. Furthermore, fine adjustment of the air volumes of the combustion air 11b-1 to 11b-3 can in turn adjust conditions of an area where reduction takes place in the reheat furnace 108, thereby suppressing the formation of NO_x.

[0042] While three stages of the combustion air supply portions 12-1 to 12-3 are disposed at intervals in the height direction of the reheat furnace 108 in the reheat boiler 10B according to the present embodiment, the present invention is not limited thereto. Three or more stages of such air supply portions 12 may be provided.

[0043] With the reheat boilers 10A and 10B according to the present invention, by supplying a part 11b of the combustion

air into the reheat furnace 108 from the position(s) opposite to the reheat burner 107 in the reheat furnace 108, the flow patterns of the combustion gas are changed, whereby temperature unevenness of the combustion gas on the outlet side of the reheat furnace 108 can be reduced. Therefore, they are applicable for marine boilers; however, the present invention is not limited thereto.

INDUSTRIAL APPLICABILITY

[0044] As described above, the reheat boilers and methods for adjusting the temperature of gas output from a reheat boiler according to the present invention can change the flow patterns of combustion gas by supplying a part of combustion air into a reheat furnace through at least one combustion air supply portion disposed at intervals in the height direction of the reheat furnace and at position(s) opposite to a reheat burner in the reheat furnace. Therefore, they are applicable for marine reheat boilers intended to reduce temperature unevenness of the combustion gas on the outlet side of the reheat furnace.

Claims

1. A reheat boiler (10A;10B) that includes
a main boiler (106) in which combustion gas produced by combustion in a burner (101) flows through a super heater (104) and an evaporation tube bank (105) from a furnace (102),
a reheat furnace (108) with a reheat burner (107) provided downstream of the evaporation tube bank (105), and
a reheater (109) provided on an upper side of the reheat furnace (108), **characterized in that**
the reheat boiler (10A;10B) comprises:

   a combustion air supply portion (12;12-1,12-2,12-3) that is provided at a position opposite to the reheat burner (107) in the reheat furnace (108) to supply a part of combustion air (11b;11b-1,11b-2,11b-3) such that it collides head-on with combustion gas (107a) discharged from the reheat burner (107).

2. The reheat boiler (10A;10B) according to claim 1, wherein at least two stages of such combustion air supply portions (12;12-1,12-2,12-3) are provided in a height direction of the reheat furnace (108).

3. The reheat boiler (10A;10B) according to claim 1, wherein the part of the combustion air (11b;11b-1,11b-2,11b-3) is supplied to the combustion air supply portion (12;12-1,12-2,12-3) by a rate of 50% on less of the total combustion air supplied to the reheat furnace through the reheat burner and the combustion air supplied portion.

4. The reheat boiler (10A;10B) according to claim 1, wherein at least two stages of such combustion air supply portions (12;12-1,12-2,12-3) are provided in a height direction of the reheat furnace (108), and each stage of the combustion air supply portions (12;12-1,12-2,12-3) supplies a different volume of the combustion air.

5. A gas temperature controlling method of a reheat boiler (10A;10B) that includes a main boiler (106) in which combustion gas produced by combustion in a burner (101) flows through a super heater (104) and an evaporation tube bank (105) from a furnace (102), a reheat furnace (108) with a reheat burner (107) provided downstream of the evaporation tube bank (105), and a reheater (109) provided on an upper side of the reheat furnace (108), the method comprising:

   supplying a part of the combustion air (11b;11b-1,11b-2,11b-3) into the reheat furnace (108) through a combustion air supply portion (12;12-1,12-2,12-3) from a position opposite to the reheat burner (107) such that it collides head-on with combustion gas (107a) discharged from the reheat burner (107) to reduce temperature unevenness of the combustion gas on an outlet side of the reheat furnace (108).

6. The gas temperature controlling method of a reheat boiler (10A;10B) according to claim 5, wherein the part of the combustion air (11b;11b-1,11b-2,11b-3) is supplied at at least two stages in a height direction of the reheat furnace (108).

7. The gas temperature controlling method of a reheat boiler (10A;10B) according to claim 5, wherein the part of the combustion air (11b;11b-1,11b-2,11b-3) is supplied by a rate of 50% or less of the total combustion air supplied to the reheat furnace through the reheat burner and the combustion air supply portion.

8. The gas temperature controlling method of a reheat boiler (10A;10B) according to claim 5, wherein the part of the combustion air (11b;11b-1,11b-2,11b-3) is supplied at at least two stages in a height direction of the reheat furnace (108) and a different volume of the combustion air is supplied at each stage.

Patentansprüche

1. Ein Boiler vom Zwischenerhitzertyp (10A;10B), der aufweist
einen Hauptboiler (106), in dem durch Verbrennung in einem Brenner (101) erzeugtes Verbrennungsgas von einem Ofen (102) durch einen Überhitzer (104) und ein Verdampferrohrbündel (105) strömt,
einen Zwischenerhitzerofen (108) mit einem Zwischenerhitzerbrenner (107), der stromab des Verdampferrohrbündels (105) vorgesehen ist, und
einen Zwischenerhitzer (109), der an einer oberen Seite des Zwischenerhitzerofens (108) vorgesehen ist,
dadurch gekennzeichnet, dass
der Zwischenerhitzerboiler (10A;10B) aufweist:

einen Verbrennungsluft-Zuführabschnitt (12;12-1,12-2,12-3), der an einer Position gegenüber dem Zwischenerhitzerbrenner (107) in dem Zwischenerhitzerofen (108) vorgesehen ist, um einen Teil von Verbrennungsluft (11b;11b-1,11b-2,11b-3) so zuzuführen, dass er frontal mit Verbrennungsgas (107a) kollidiert, das von dem Zwischenerhitzerbrenner (107) ausgetragen wird.

2. Der Zwischenerhitzerboiler (10A;10B) gemäß Anspruch 1, wobei mindesten zwei Stufen von solchen Verbrennungsluft-Zuführabschnitten (12;12-1,12-2,12-3) in einer Höhenrichtung des Zwischenerhitzerofens (108) vorgesehen sind.

3. Der Zwischenerhitzerboiler (10A;10B) gemäß Anspruch 1, wobei der Teil der Verbrennungsluft (11b;11b-1,11b-2,11b-3) zu dem Verbrennungsluft-Zuführabschnitt (12;12-1,12-2,12-3) mit einer Rate von 50% oder weniger der gesamten Verbrennungsluft, die dem Zwischenerhitzerofen über den Zwischenerhitzerbrenner und den Verbrennungsluft-Zuführabschnitt zugeführt wird, zugeführt wird.

4. Der Zwischenerhitzerboiler (10A;10B) gemäß Anspruch 1, wobei mindestens zwei Stufen von solchen Verbrennungsluft-Zuführabschnitten (12;12-1,12-2,12-3) in einer Höhenrichtung des Zwischenerhitzerofens (108) vorgesehen sind, und jede Stufe der Verbrennungsluft-Zuführabschnitte (12;12-1,12-2,12-3) ein unterschiedliches Volumen der Verbrennungsluft zuführt.

5. Ein Verfahren zum Steuern einer Gastemperatur eines Zwischenerhitzerboilers (10A;10B), der einen Hauptboiler (106), in dem durch Verbrennung in einem Brenner (101) erzeugtes Verbrennungsgas von einem Ofen (102) durch einen Überhitzer (104) und ein Verdampferrohrbündel (105) strömt, einen Zwischenerhitzerofen (108) mit einem Zwischenerhitzerbrenner (107), der stromab des Verdampferrohrbündels (105) vorgesehen ist, und einen Zwischenerhitzer (109), der an einer oberen Seite des Zwischenerhitzerofens (108) vorgesehen ist, aufweist, wobei das Verfahren aufweist:

Zuführen eines Teils der Verbrennungsluft (11b;11b-1,11b-2,11b-3) in den Zwischenerhitzerofen (108) durch einen Verbrennungsluft-Zuführabschnitt (12;12-1,12-2,12-3) von einer Position gegenüber dem Zwischenerhitzerbrenner (107) derart, dass sie frontal mit Verbrennungsgas (107a) kollidiert, das von dem Zwischenerhitzerbrenner (107) ausgetragen wird, um eine Temperatur-Ungleichmäßigkeit des Verbrennungsgases an einer Auslassseite des Zwischenerhitzerofens (108) zu verringern.

6. Das Gastemperatur-Steuerverfahren eines Zwischenerhitzerboilers (10A;10B) gemäß Anspruch 5, wobei der Teil der Verbrennungsluft (11b;11b-1,11b-2,11b-3) an mindestens zwei Stufen in einer Höhenrichtung des Zwischenerhitzerofens (108) zugeführt wird.

7. Das Gastemperatur-Steuerverfahren eines Zwischenerhitzerboiler (10A;10B) gemäß Anspruch 5, wobei der Teil der Verbrennungsluft (11b;11b-1,11b-2,11b-3) mit einer Rate von 50% oder weniger der gesamten Verbrennungsluft, die dem Zwischenerhitzerofen durch den Zwischenerhitzerbrenner und den Verbrennungsluft-Zuführabschnitt zugeführt wird, zugeführt wird.

8. Das Gastemperatur-Steuerverfahren eines Zwischenerhitzerboilers (10A;10B) gemäß Anspruch 5, wobei der Teil

der Verbrennungsluft (11b;11b-1,11b-2,11b-3) an mindestens zwei Stufen in einer Höhenrichtung des Zwischenerhitzerofens (108) zugeführt wird und an jeder Stufe ein unterschiedliches Volumen der Verbrennungsluft zugeführt wird.

Revendications

1. Chaudière (10A, 10B) de resurchauffe qui comprend
une chaudière (106) principale dans laquelle du gaz de combustion produit par combustion dans un brûleur (101) passe dans un surchauffeur (104) et dans une rampe (105) de tubes d'évaporation à partir d'un four (102),
un four (108) de resurchauffe ayant un brûleur (107) de resurchauffe prévu en aval de la rampe (105) de tubes d'évaporation et
un resurchauffeur (109) prévu d'un côté supérieur du four (108) de resurchauffe, **caractérisée en ce que**
la chaudière (10A, 10B) de resurchauffe comprend :

   un tronçon (12, 12-1, 12-2, 12-3) d'alimentation en air de combustion, qui est prévu en une position opposée au brûleur (107) de resurchauffe dans le four (108) de resurchauffe pour fournir une partie de l'air (11b, 11b-1, 11b-2, 11b-3) de combustion de manière à ce qu'elle entre en collision de plein fouet avec du gaz (107a) de combustion évacué du brûleur (107) de resurchauffe.

2. Chaudière (10A, 10B) de resurchauffe suivant la revendication 1, dans laquelle il est prévu, dans une direction en hauteur de la chaudière (108) de resurchauffe, au moins deux étages de tronçons (12, 12-1, 12-2, 12-3) d'alimentation en air de combustion de ce genre.

3. Chaudière (10A, 10B) de resurchauffe suivant la revendication 1, dans laquelle la partie de l'air (11b, 11b-1, 11b-2, 11b-3) de combustion est envoyée au tronçon (12, 12-1, 12-3) d'alimentation en air de combustion à un taux inférieur ou égal à 50 % de l'air de combustion total envoyé à la chaudière de resurchauffe en passant par le brûleur de resurchauffe et par le tronçon d'alimentation en air de combustion.

4. Chaudière (10A, 10B) de resurchauffe suivant la revendication 1, dans laquelle il est prévu dans une direction en hauteur du four (108) de resurchauffe au moins deux étages de tronçons (12, 12-1, 12-3) d'alimentation en air de combustion de ce genre et chaque étage des tronçons (12, 12-1, 12-2, 12-3) d'alimentation en air de combustion fournit un volume différent de l'air de combustion.

5. Procédé de réglage de la température des gaz d'une chaudière (10A, 10B) de resurchauffe, qui comprend une chaudière (106) principale dans laquelle du gaz de combustion produit par combustion dans un brûleur (101) passe dans un surchauffeur (104) et dans une rampe (105) de tubes d'évaporation à partir d'un four (102), un four (108) de resurchauffe ayant un brûleur (107) de resurchauffe prévu en aval de la rampe (105) de tubes d'évaporation et un resurchauffeur (109) prévu d'un côté supérieur du four (108) de resurchauffe, le procédé comprenant :

   envoyer une partie de l'air (11b, 11b-1, 11b-2, 11-3) de combustion dans le four (108) de resurchauffe en passant par un tronçon (12, 12-1, 12-3) d'alimentation en air de combustion à partir d'une position opposée au brûleur (107) de resurchauffe de manière à ce qu'elle heurte de plein fouet du gaz (107a) de combustion évacué de la chaudière (107) de resurchauffe pour réduire l'inégalité de température du gaz de combustion d'un côté de sortie du four (108) de resurchauffe.

6. Procédé de réglage de la température des gaz d'une chaudière (10A, 10B) de resurchauffe suivant la revendication 5, dans lequel on envoie la partie de l'air (11b, 11b-1, 11b-2, 11-3) de combustion à au moins deux étages dans une direction en hauteur du four (108) de resurchauffe.

7. Procédé de réglage de la température des gaz d'une chaudière (10A, 10B) de resurchauffe suivant la revendication 5, dans lequel on envoie la partie de l'air (11b, 11b-1, 11b-2, 11-3) de combustion à un taux inférieur ou égal à 50 % de l'air de combustion total envoyé à la chaudière de resurchauffe en passant par le brûleur de resurchauffe et par le tronçon d'alimentation en air de combustion.

8. Procédé de réglage de la température des gaz d'une chaudière (10A, 10B) de resurchauffe suivant la revendication 5, dans lequel on envoie la partie de l'air (11b, 11b-1, 11b-2, 11-3) de combustion à au moins deux étages dans une direction en hauteur du four (108) de resurchauffe et on envoie un volume différent de l'air de combustion à chaque étage.

FIG.1A

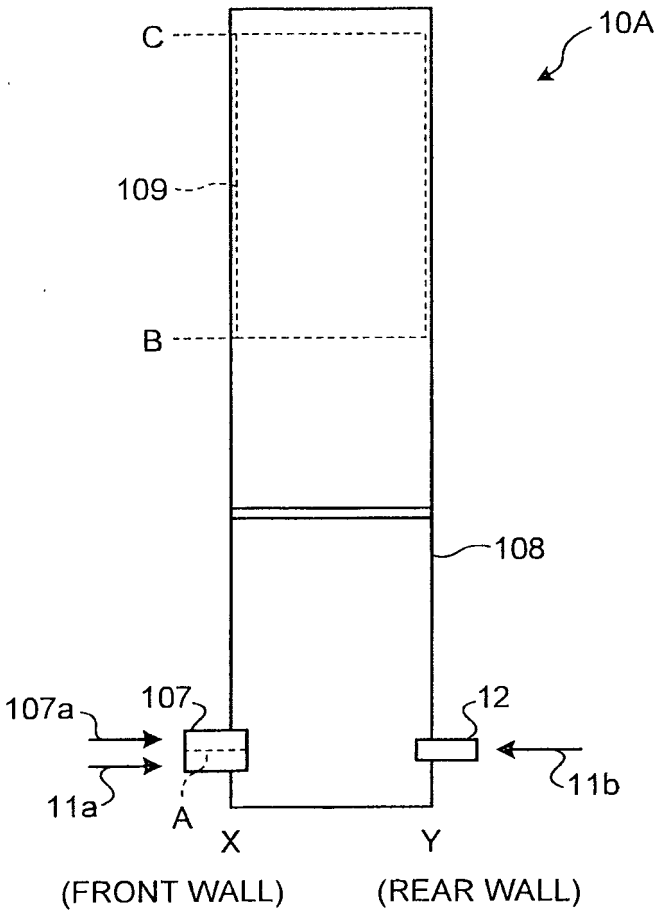

C
10A
109
B
108
107a
107
12
11a
A
11b
X
Y
(FRONT WALL)
(REAR WALL)

FIG.1B

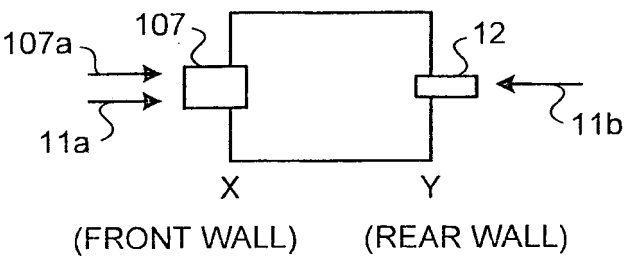

107a
107
12
11a
11b
X
Y
(FRONT WALL)
(REAR WALL)

FIG.2

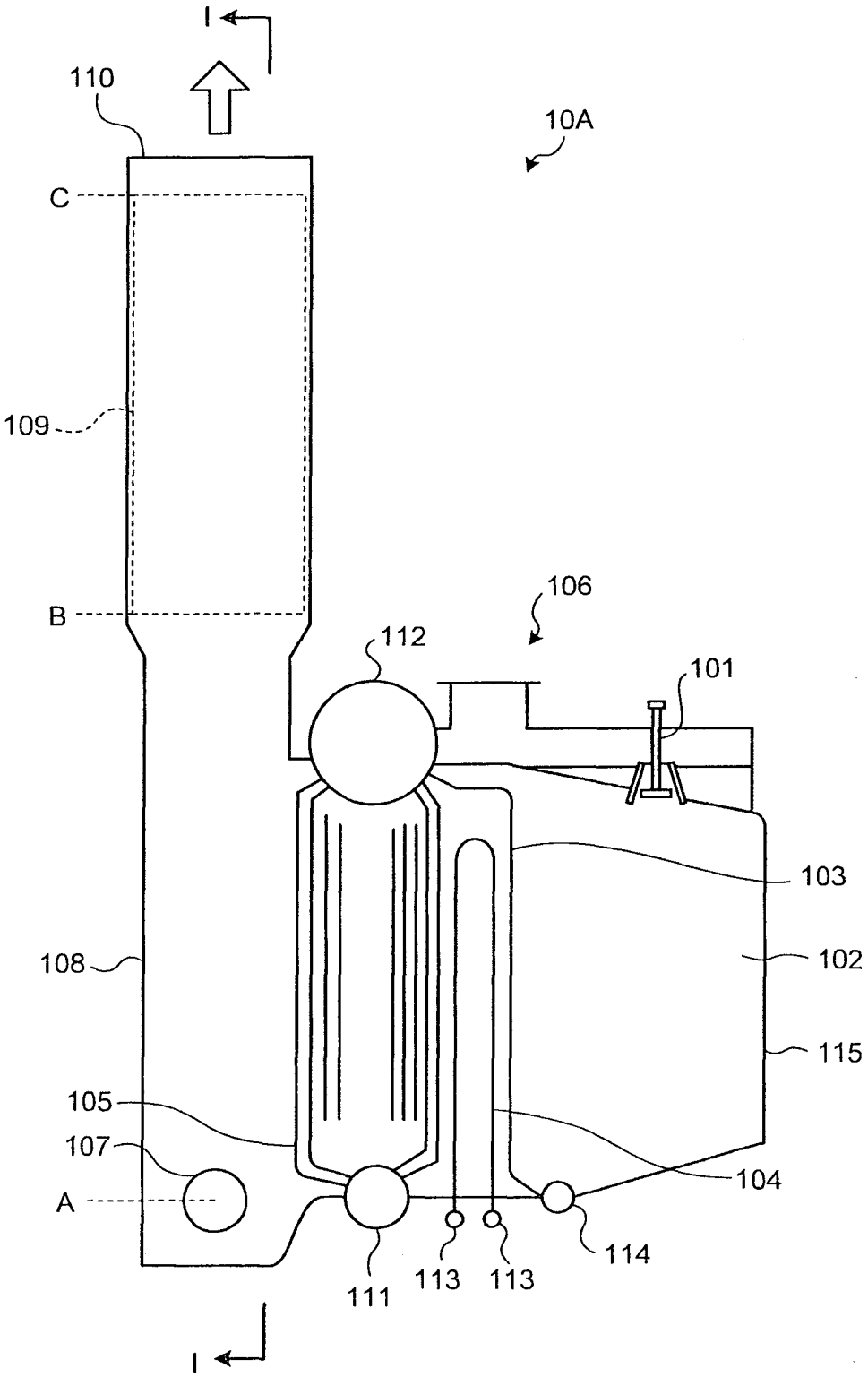

I
110
10A
C
109
B
106
112
101
103
102
108
115
105
107
104
A
114
111
113
113
I

FIG.3

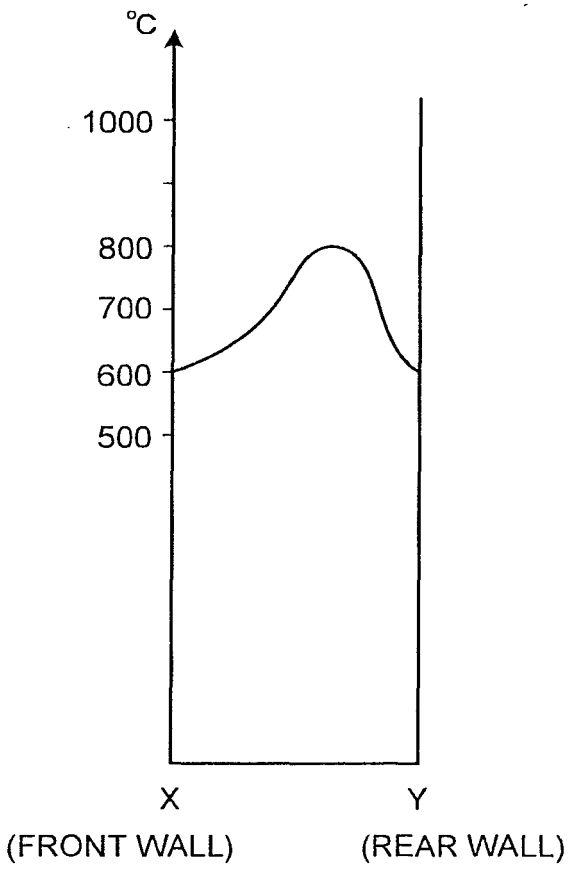


FIG.4

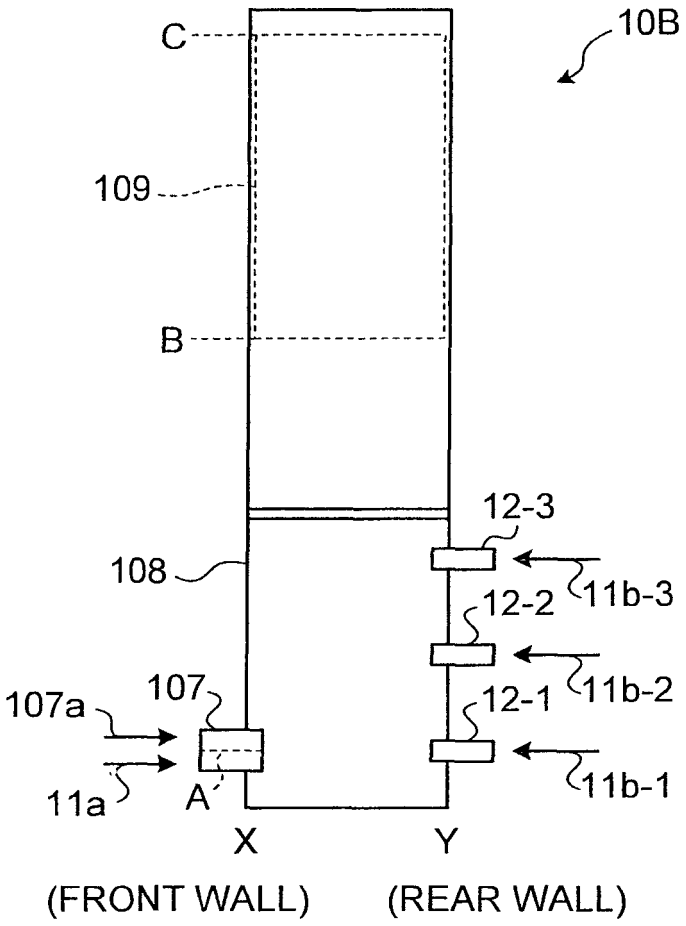

C
10B
109
B
12-3
108
11b-3
12-2
11b-2
107
107a
12-1
11b-1
11a
A'
X
Y
(FRONT WALL)
(REAR WALL)

FIG.5

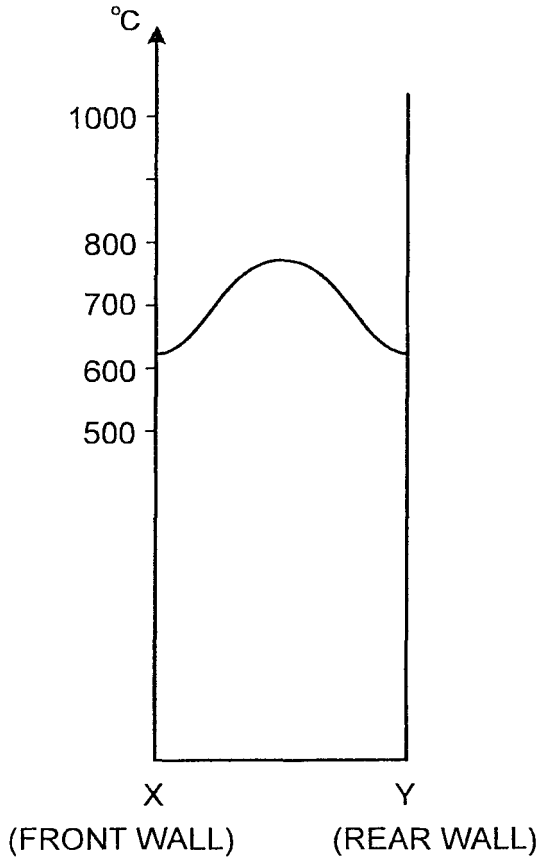


FIG.6

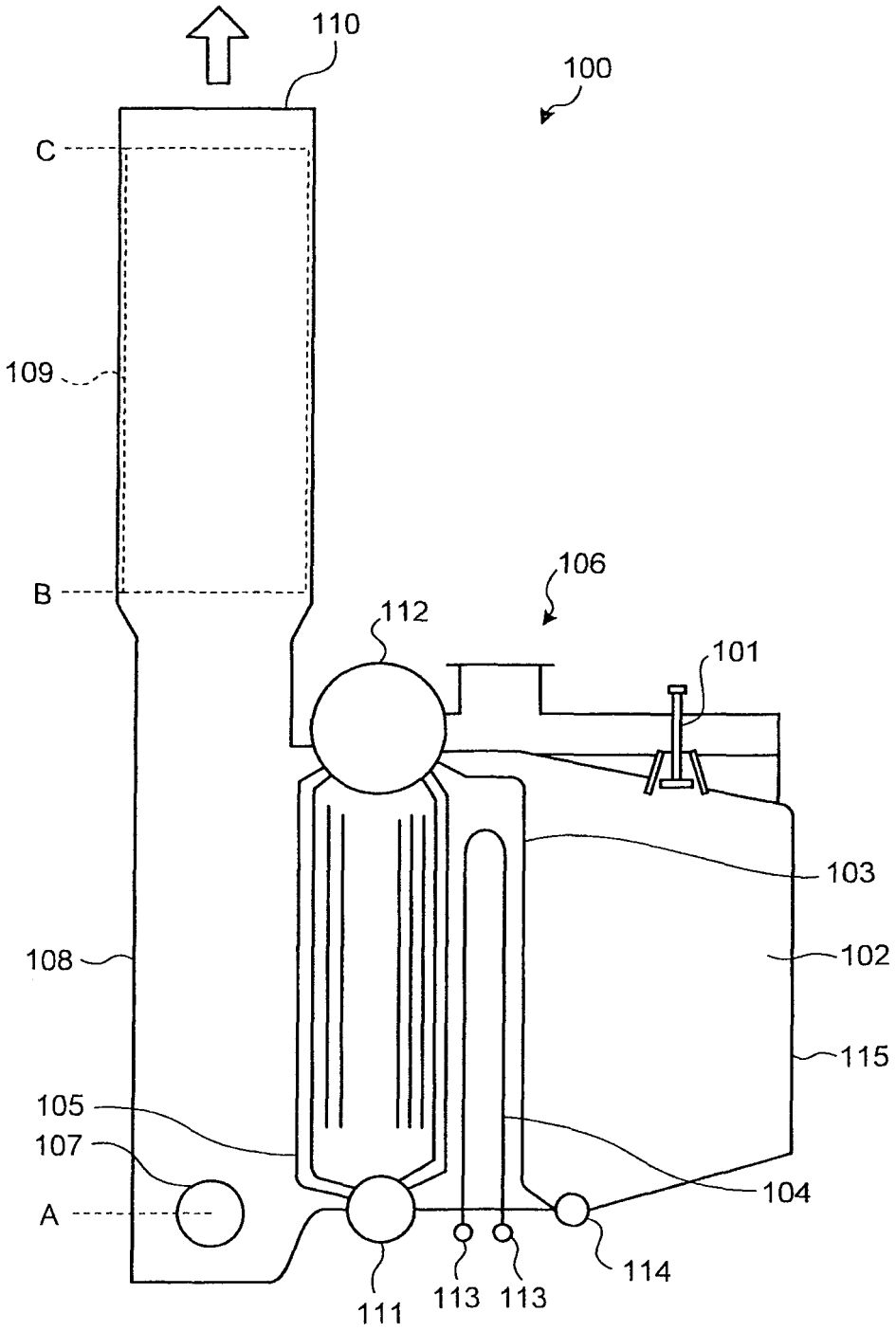
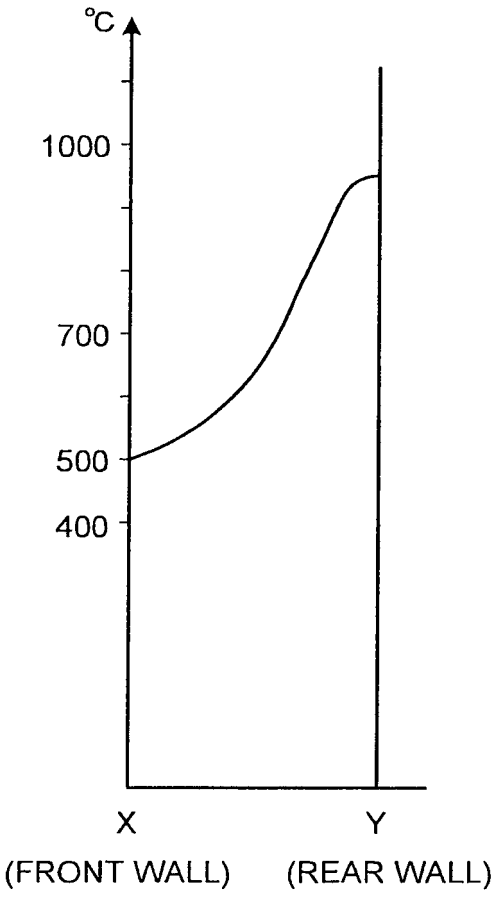

110
100
C
109
B
106
112
101
103
108
102
115
105
107
104
A
114
111
113
113

FIG.7



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- JP 2002243106 A **[0002]**
- US 3956898 A **[0004]**