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(54) **BOILER STRUCTURE**

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STRUCTURE DE CHAUDIÈRE

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• **KOMADA, Shigehide**
Yokohama-shi
Kanagawa 220-8401 (JP)

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(74) Representative: **Henkel, Breuer & Partner**

Patentanwälte
Maximiliansplatz 21
80333 München (DE)

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(73) Proprietor: **Mitsubishi Heavy Industries, Ltd.**
Tokyo 108-8215 (JP)

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(72) Inventors:

- **TAKASHIMA, Ryuhei**
Nagasaki-shi
Nagasaki 851-0392 (JP)
- **DAIMARU, Takuichiro**
Nagasaki-shi
Nagasaki 851-0392 (JP)

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Description

Technical Field

[0001] The present invention relates to a circulating firing boiler structure compatible with coal and various fuels containing sulfur.

Background Art

[0002] To reduce NOx emissions, some recent boilers for use with fuels such as coal and oil are supplied with air in multiple stages to form a reducing-combustion zone where combustion proceeds in a reducing atmosphere between a main burner and an additional-air supplying portion.

[0003] In the reducing-combustion zone, however, furnace wall surfaces are exposed to a severe corrosive environment where hydrogen sulfide, which is a corrosive component, is produced in large amounts. This necessitates maintenance such as spray coating onto furnace walls or regular replacement of furnace wall panels. Another concern is slag deposition, since the reducing-combustion zone is a region with a reducing atmosphere where the thermal load in the furnace is higher.

[0004] To cope with such problems, some known techniques are aimed at increasing the oxygen concentration by supplying air toward the wall surfaces of the furnace. According to one such technique, for example, burners are disposed at the four corners in a furnace having a rectangular cross section to form a swirling flow, with each of the burners forming an air flow that is offset toward a furnace wall (for example, see US 6,237,513B).

[0005] According to a technique disclosed for a pulverized-coal-fired boiler having burners disposed in the centers of furnace walls to produce a circulating firing flame, nozzles are provided to supply a curtain of air or a curtain of exhaust gas for deflecting the flames, thereby preventing slagging around the burners (for example, see JP H7-119923A).

[0006] EP 0915290A1 discloses a circulating firing boiler structure comprising a furnace with a substantially rectangular cross section defined by furnace walls, wherein, in each furnace wall, there are provided three burners located above each other and define a burner portion. The burners are displaced from the center of the respective furnace wall so that the fuel/air injected by the burners forms an inner circle in the furnace. Between each burner and the adjacent furnace wall there is formed, on each furnace wall, an additional air nozzle so that air is injected from these air nozzles tangentially to an outer circle concentrically with the inner circle created by the fuel/air injection from the burners. Lastly, additional-air supplying nozzles are located above the uppermost burner of each burner portion.

[0007] JP 2002-323215A discloses a soot blower configured to clean the furnace walls by ejecting a spray medium onto the furnace walls. The soot blower is dis-

posed at air supply walls of over air ports (OAP), side air ports (SAP) or interstage air ports (IAP).

Disclosure of Invention

[0008] The conventional technique of US 6,237,513B above, however, cannot effectively increase the oxygen concentration because oxygen contained in the air is consumed before it reaches a target wall surface. In addition, the flow rate at which the air is ejected must be increased to increase the oxygen concentration. This is undesirable because it leads to increased auxiliary power, including that of a compressor.

[0009] In the conventional technique of JP H7-119923A, a curtain of air or a curtain of exhaust gas must be supplied at a flow rate high enough to deflect the flames. This is similarly undesirable because it leads to increased auxiliary power, including that of a compressor.

[0010] Against such a backdrop, efficient alleviation or prevention of corrosion and slagging on furnace walls in a furnace is demanded of a circulating firing boiler structure that is compatible with coal and various fuels containing sulfur and that is configured so that fuel and combustion air supplied into the furnace from burners disposed at a plurality of positions on furnace walls forming a rectangular cross section are combusted so as to form a swirling flow.

[0011] An object of the present invention, which has been made in light of the above circumstances, is to provide a boiler structure capable of efficiently alleviating or preventing corrosion and slagging on furnace walls in a furnace.

[0012] To solve the above problems, the present invention employs a boiler structure with the features of claim 1.

[0013] A boiler structure according to the present invention is a circulating firing boiler structure configured so that fuel and combustion air supplied into a furnace from burners disposed at a plurality of positions on furnace walls forming a rectangular cross section are combusted so as to form a swirling flow. Air-supplying parts are disposed near flame-affected portions of furnace wall surfaces, where flames formed by the respective burners approach or contact, to form regions having a higher air concentration than the peripheries thereof.

[0014] With this boiler structure, in which the air-supplying parts are disposed near the flame-affected portions of the furnace wall surfaces, where the flames formed by the respective burners approach or contact, to form the regions having a higher air concentration than the peripheries thereof, the regions having a higher air concentration can be formed by supplying low-flow-rate air, which requires low auxiliary power, to regions where there is concern over corrosion or slagging on the furnace wall surfaces.

[0015] In the above invention, the regions having a higher air concentration are preferably formed so as to

cover a reducing-combustion zone inside the furnace in a vertical direction. This allows the regions having a higher air concentration to be formed by supplying air at a low flow rate in upper and lower regions where there is concern over corrosion or slagging in the furnace.

[0016] According to the invention, the air-supplying parts preferably introduce low-pressure secondary burner air from the adjacent burners through bypass routes. This avoids a significant change in structure or an increase in the number of components, thus simplifying the structure.

[0017] In the invention, the air-supplying parts are disposed around deslagger nozzles. The air-supplying parts can then form the regions having a higher air concentration on the furnace wall surfaces in regions where slagging tends to occur and can also cool the peripheries of deslagger-nozzle insertion units, which are exposed to severe thermal conditions.

[0018] According to the invention, in the circulating firing boiler structure configured so that fuel and combustion air are combusted so as to form a swirling flow, the air-supplying parts supply air at a low flow rate to the vicinities of the flame-affected portions of the furnace walls, where there is concern over corrosion or slagging, in the furnace to form the regions having a higher air concentration than the peripheries thereof. This boiler structure can therefore maintain a high oxygen concentration on and around the flame-affected portions without the need for a high auxiliary power for increasing the flow rate of the supplied air.

[0019] Accordingly, an air layer having a higher oxygen concentration is formed on and around the flame-affected portions in the furnace, so that the reducing atmosphere is partially replaced by an oxidizing atmosphere. As a result, corrosion and slagging can efficiently be alleviated or prevented. The above invention is particularly effective in alleviating slagging of coal-fired boilers and is particularly effective in improving corrosion resistance against hydrogen sulfide of boilers compatible with various fuels containing sulfur.

[0020] In addition, if the air used by the air-supplying parts is low-pressure secondary burner air introduced from the adjacent burners through bypass routes, a significant change in boiler structure or an increase in the number of components can be minimized, thus simplifying the structure.

Brief Description of Drawings

[0021]

[FIG. 1A] Fig. 1A is a horizontal sectional view of an embodiment of a boiler structure according to the present invention, showing a reducing-combustion zone in a furnace.

[FIG. 1B] Fig. 1B is a perspective view of the embodiment of the boiler structure according to the present invention, showing its schematic outline.

[FIG. 2A] Fig. 2A is a sectional view of the furnace, showing an exemplary structure of an air-supplying part disposed on a deslagger-nozzle insertion unit.

[FIG. 2B] Fig. 2B is a diagram as viewed from arrow A of Fig. 2A, showing the exemplary structure of the air-supplying part disposed on the deslagger-nozzle insertion unit.

[FIG. 3A] Fig. 3A is a horizontal sectional view of a first modification of the boiler structure according to the present invention, showing a reducing-combustion zone in a furnace.

[FIG. 3B] Fig. 3B is a perspective view of the first modification of the boiler structure according to the present invention, showing its schematic outline.

[FIG. 4A] Fig. 4A is a horizontal sectional view of a second modification of the boiler structure according to the present invention, showing a reducing-combustion zone in a furnace.

[FIG. 4B] Fig. 4B is a perspective view of the second modification of the boiler structure according to the present invention, showing its schematic outline.

[FIG. 5] Fig. 5 is a schematic longitudinal sectional view of a boiler structure that combusts fuel with combustion air supplied in multiple stages.

Explanation of Reference Signs:

[0022]

- 10: boiler
- 11: furnace
- 11a: furnace wall
- 12: burner
- 20: air-supplying part (air-supplying nozzle)
- 30: deslagger-nozzle insertion unit

Best Mode for Carrying Out the Invention

[0023] An embodiment of a boiler structure according to the present invention will now be described with reference to the drawings.

[0024] Referring to Fig. 5, a boiler 10 combusts fuel by supplying combustion air into a furnace 11 in multiple stages to reduce NO_x emissions. In the multistage supply of this case, the combustion air is supplied into the furnace 11 in two stages, that is, from burner portions Ba that are regions where a plurality of burners 12 are disposed and additional-air supplying portions Aa that are regions where additional-air supplying nozzles 13 are disposed above the burner portions Ba. In the boiler 10, specifically, as a measure against NO_x emissions, the two-stage combustion is performed in a reducing-combustion zone and a complete-combustion zone by initially supplying about 70% of the required amount of combustion air from the burner portions Ba before supplying the rest, namely, about 30%, from the additional-air supplying portions Aa.

[0025] Referring to Fig. 1A, for example, the boiler 10

described above is a swirling-combustion boiler in which the furnace 11 has a rectangular cross section. The swirling-combustion boiler 10 is configured so that fuel and combustion air supplied from the plurality of burners 12, which are disposed on furnace walls 11a, into the furnace 11 are combusted so as to form a swirling flame in the furnace 11.

[0026] In the exemplary structure of the 8-cornered furnace shown in Fig. 1A, the burners 12, which are disposed at eight positions in a horizontal cross section, supply fuel and combustion air so as to form two adjacent swirling flows in the furnace 11.

[0027] In this embodiment, the boiler 10 includes air-supplying parts 20 disposed near flame-affected portions of the furnace wall surfaces (furnace walls 11a), where flames formed by the respective burners 12 approach or contact, to form regions having a higher air concentration than the peripheries thereof. Specifically, in the horizontal cross section of the 8-cornered furnace shown in Fig. 1A, one air-supplying part 20 is provided at an appropriate position on each of the furnace walls 11a, which form, for example, a rectangle; that is, a total of four air-supplying parts 20 are provided.

[0028] The formation of the regions having a higher air concentration means formation of regions having a higher oxygen concentration. In these regions, therefore, the reducing atmosphere is replaced by an oxidizing atmosphere.

[0029] That is, the air-supplying parts 20 are provided on the furnace walls 11a in the furnace 11 to supply air at a low flow rate from sites where there is concern over corrosion or slagging, thus forming the regions having a higher air concentration than the peripheries thereof substantially along the wall surfaces. In other words, the regions having a higher air concentration than the peripheries thereof are formed not by supplying air toward the furnace walls 11a in the regions where there is concern over corrosion or slagging at a relatively high flow rate (for example, 40 m/sec or more), but by supplying air from the air-supplying parts 20 provided on the furnace walls 11a in the regions where there is concern over corrosion or slagging at a low flow rate (for example, about 10 m/sec).

[0030] For example, the air-supplying parts 20 are nozzles for forming the regions having a higher air concentration by supplying low-pressure secondary burner air introduced from the adjacent burners 12 through bypass routes into the furnace 11 at a low flow rate. In a plan view of the furnace 11, the air supplied from the air-supplying parts 20 forms the regions having a higher air concentration along the furnace walls 11a near the flame-affected portions. In addition, the air-supplying parts 20 are provided in a plurality of stages in the vertical direction of the furnace 11 to cover the reducing-combustion zone inside the furnace in the vertical direction.

[0031] In the reducing-combustion zone, not only are the wall surfaces 11a exposed to a severe corrosive environment, but also there is concern over slag deposition,

because this zone is a region where hydrogen sulfide, which is a corrosive component, is produced in large amounts and is also a reducing region where the thermal load in the furnace 11 is higher. In the reducing-combustion zone, therefore, the air-supplying parts 20 are provided in the peripheries of the portions on the furnace walls 11a where the flames approach or contact, at substantially the same heights as the burners 12. This is because the flame-affected portions of the furnace walls 11a are formed at substantially the same heights as the burners 12 since the flames are formed so as to extend from the burners 12 substantially in the horizontal direction.

[0032] In addition, the flame-affected portions of the furnace walls 11a are formed at a plurality of positions in the vertical direction because the burners 12 in the reducing-combustion zone are usually provided in a plurality of stages in the vertical direction. Accordingly, the air-supplying parts 20 are provided in the vertical direction in the number of stages that is equal to the number of stages of the burners 12, in other words, the number of stages of the flames formed in the vertical direction. This allows the regions having a higher air concentration to be formed by supplying air at a low flow rate in upper and lower regions where there is concern over corrosion or slagging in the furnace 11.

[0033] In the reducing-combustion zone, as a result, the air supplied at a low flow rate from the air-supplying parts 20 provided near the flame-affected portions, which are formed by the burners 12, of the furnace walls 11a forms the regions having a higher air concentration than the peripheries thereof, so that the air functions as an air layer in the peripheries of the flame-affected portions to insulate the furnace walls 11a from the flames. This reduces the thermal effect and so on of the flames and also makes the atmosphere partially oxidizing, thus alleviating or preventing corrosion and slagging on the furnace walls 11a in the regions where the flame-affected portions would otherwise be formed.

[0034] In addition, low-flow-rate air, which requires low auxiliary power, can be used because the air-supplying parts 20 supply the air from the vicinities of the flame-affected portions to the peripheries thereof. That is, high-pressure, high-flow-rate air does not have to be supplied using, for example, a compressor that operates with high power, unlike the case where the air is supplied toward a remote position. In particular, the use of low-pressure secondary air introduced from the burners 12 reduces the auxiliary power and also avoids a significant change in structure or an increase in the number of components, thus simplifying the structure.

[0035] Referring to Fig. 1B, the air-supplying parts 20 are provided around deslagger nozzles 31 in deslagger-nozzle insertion units 30 between the burner portions Ba and the additional-air supplying portions Aa. The deslagger-nozzle insertion units 30 are devices for removing slag deposited on the furnace walls 11a. Referring to Fig. 2A, the deslagger-nozzle insertion units 30 clean the fur-

nace walls 11a with steam ejected from the deslagger nozzles 31, which are inserted in the furnace 11.

[0036] That is, it is effective to form the regions having a higher air concentration by supplying air because the deslagger-nozzle insertion units 30 are provided at sites where there is concern over slag deposition because of the high thermal load due to the reducing atmosphere in the furnace 11.

[0037] A structure of the air-supplying parts 20 provided around the deslagger-nozzle insertion units 30 will now be described with reference to Figs. 2A and 2B.

[0038] In Fig. 2A, the deslagger nozzle 31 is attached to the deslagger-nozzle insertion unit 30 by inserting the deslagger nozzle 31 in a nozzle hole 32 extending through the furnace wall 11a. The deslagger nozzle 31 is supplied with steam to be ejected for removing slag through a steam duct 33. Reference numeral 34 in the drawing denotes a seal member provided between a nozzle body 21 of the air-supplying nozzle (air-supplying part) 20, to be described below, and the deslagger nozzle 31.

[0039] The air-supplying nozzle 20, on the other hand, has an air flow channel 22 formed of an annular space between the deslagger nozzle 31 and the nozzle hole 32, and the nozzle body 21 has a circular flange 21a at one end of its cylindrical shape and is attached to the furnace 11. The nozzle body 21 is fixed to, for example, the circumferential surface of the deslagger nozzle 31 with the seal member 34 disposed therebetween, and the flange 21a in the furnace 11 faces the furnace wall 11a so as to be substantially parallel thereto with a predetermined distance therebetween. Hence, air supplied from the nozzle body 21 into the furnace 11 collides with the flange 21a, thus flowing outward along the furnace wall 11a around the entire circumference in the circumferential direction.

[0040] The air-supplying nozzle 20 has a wind box 23 provided outside the furnace 11. The wind box 23 communicates with the nozzle body 21 in the furnace 11 through the air flow channel 22 to supply air from an air supply 24. In this case, the air supply 24 used is preferably, for example, the low-pressure secondary air introduced from the burners 12, although the primary air or compressed air may be used if necessary.

[0041] The air-supplying nozzle 20 can form a region having a higher air concentration along the furnace wall 11a of the furnace 11 in a region where slagging tends to occur and can also cool the periphery of the deslagger-nozzle insertion unit 30, which is exposed to severe thermal conditions. Accordingly, an air layer having a higher air concentration than the periphery thereof is formed around the furnace wall 11a in a region where slagging tends to occur, so that a partial oxidizing atmosphere can prevent or alleviate corrosion of the wall surface, thus extending the life of the furnace wall.

[0042] In addition, the air supplied into the nozzle body 21 of the air-supplying part 20 flows beside the circumferential surface of the deslagger nozzle 31. The air flow

can therefore cool, for example, the seal member 34, which is exposed to severe thermal conditions.

[0043] Furthermore, as the air concentration is increased in the vicinity of the furnace wall 11a, on which the air-supplying nozzle 20 is provided, the oxygen concentration is increased, thus creating an oxidizing atmosphere. The oxidizing atmosphere can alleviate slagging because the melting temperature of slag is increased thereby.

[0044] In this boiler structure, the air-supplying parts 20 are disposed near the flame-affected portions of the furnace walls 11a, where the flames formed by the respective burners 12 approach or contact, to form the regions having a higher air concentration than the peripheries thereof. Because the oxygen concentration is increased around the flame-affected portions, the reducing atmosphere is partially replaced by an oxidizing atmosphere. As a result, corrosion and slagging can be alleviated or prevented, thus extending the life of the wall surfaces. This boiler structure is particularly effective in alleviating slagging of coal-fired boilers and is particularly effective in improving corrosion resistance of boilers compatible with various fuels containing sulfur.

[0045] The optimum positions of the air-supplying parts 20 in the horizontal cross section vary depending on the conditions, including the shape of the furnace 11, the positions and number of the burners 12, and the type of swirling flame formed. That is, the regions of the flame-affected portions of the furnace walls 11a, where the flames formed by the respective burners 12 approach or contact, vary with, for example, the arrangement of the burners 12 and the type of swirling flame formed. Accordingly, the positional relationship between the burners 12 and the air-supplying parts 20 differs between different boiler structures, for example, the 8-cornered furnace shown in Figs. 1A and 1B and 4-cornered furnaces shown in Figs. 3A and 3B and Figs. 4A and 4B.

[0046] In the exemplary structure shown in Figs. 1A and 1B, the furnace 11 is rectangular, and four burners 12 are disposed on each of the two opposing long sides to form two swirling flows on the left and right. In this case, the burners 12 are tilted toward substantially the centers of the respective swirling flows, that is, toward substantially the centers of squares formed by dividing the rectangle in half, so that the two swirling flows each have a substantially oval shape.

[0047] In this case, therefore, the flame-affected portions, where the flames approach or contact, are formed near two corners and the centers of the long sides, and the air-supplying parts 20 are provided at four positions so as to cover these regions.

[0048] In an exemplary structure (first modification) shown in Figs. 3A and 3B, the furnace 11 is square, and the burners 12 are disposed at four positions offset from the centers of the respective sides to form a single swirling flow. In this case, the swirling flow is formed by the offset of the burners 12 because the burners 12 are directed toward the opposite wall surfaces. In this arrange-

ment of the burners 12, the flames flow toward the vicinities of the centers of the wall surfaces on the downstream side of the swirling flow under the effect of the flames formed on the upstream side.

[0049] In this case, therefore, the flame-affected portions are near the centers of the respective sides, and accordingly the air-supplying parts 20 are provided at four positions in the centers of the respective sides so as to cover these regions.

[0050] In an exemplary structure (second modification) shown in Figs. 4A and 4B, the furnace 11 is square, and the burners 12 are disposed at the four corners to form a single swirling flow. In this case, the flame-affected portions are near the centers of the respective sides, and accordingly the air-supplying parts 20 are provided at four positions in the centers of the respective sides so as to cover these regions.

[0051] Thus, the optimum positions of the air-supplying parts 20 may be selected on the basis of, for example, the arrangement of the burners 12.

Claims

1. A circulating firing boiler structure (10) comprising:

a furnace (11) having a rectangular cross section;

burner portions (Ba) where a plurality of burners (12) are disposed on furnace walls (11a) and are arranged so that fuel and combustion air supplied into the furnace (11) from the burners (12) are combusted so as to form a swirling flow; additional-air supplying portions (Aa) where additional-air supplying nozzles (13) are disposed above the burner portions (Ba) for supplying combustion air into the furnace (11); air-supplying parts (20) which are disposed near flame-affected portions of the furnace walls (11a), where flames formed by the respective burners (12) in operation approach or contact, and which are arranged to form regions having a higher air concentration than the peripheries thereof; and

deslagger-nozzle insertion units (30) between the burner portions (Ba) and the additional-air supplying portions (Aa) for removing slag deposited on the furnace walls (11a) with steam ejected from deslagger nozzles (31) which are inserted in the furnace (11),

wherein the air-supplying parts (20) are disposed around the deslagger nozzles (31) in the deslagger-nozzle insertion units (30).

2. The boiler structure (10) according to Claim 1, wherein the air-supplying parts (20) are disposed so that regions having a higher air concentration can be formed so as to cover a reducing-combustion

zone inside the furnace in a vertical direction.

3. The boiler structure (10) according to Claim 1 or 2, wherein the air-supplying parts (20) are arranged to introduce low-pressure secondary burner air from the adjacent burners (12) through bypass routes.

4. The boiler structure (10) according to one of Claims 1 to 3, wherein the deslagger nozzles (31) are respectively inserted in a nozzle hole (32) extending through the furnace wall (11a), and the air-supplying part (20) has an air flow channel (22) formed of an annular space between the deslagger nozzle (31) and the nozzle hole (32), and a nozzle body (21) that is attached to the furnace (11) in that it is fixed to a circumferential surface of the deslagger nozzle (31) with a seal member (34) disposed therebetween and has a circular flange (21a) at one end of its cylindrical shape that is located in the furnace (11) and faces the furnace wall (11a) with a predetermined distance therebetween.

Patentansprüche

1. Eine Zirkulationsfeuerungs-Kesselstruktur (10) mit:

einem Ofen (11) mit einem rechteckigen Querschnitt,

Brennerabschnitten (Ba), wo eine Vielzahl von Brennern (12) an Ofenwänden (11a) angeordnet und so eingerichtet sind, dass Brennstoff und Verbrennungsluft, die von den Brennern (12) in den Ofen (11) zugeführt werden, so verbrannt werden, dass sie eine Wirbelströmung bilden,

Zusatzluft-Zuführabschnitten (Aa), wo Zusatzluft-Zuführdüsen (13) über den Brennerabschnitten (Ba) zum Zuführen von Verbrennungsluft in den Ofen (11) angeordnet sind,

Luft-Zuführteilen (20), die nahe von Flammen beeinflussten Abschnitten der Ofenwände (11a) angeordnet sind, wo durch die jeweiligen Brenner (12) im Betrieb erzeugte Flammen sich annähern oder berühren, und die angeordnet sind, um Bereiche zu bilden, die eine höhere Luftkonzentration haben als deren Peripherien, und Entschlackerdüsen-Einsetzeinheiten (30) zwischen den Brennerabschnitten (Ba) und den Zusatzluft-Zuführabschnitten (Aa) zum Entfernen von Schlacke, die an den Ofenwänden (11a) abgelagert ist, mit Dampf, der aus Entschlackerdüsen (31) ausgestoßen wird, die in den Ofen (11) eingesetzt sind,

wobei die Luft-Zuführteile (20) um die Entschlackerdüsen (31) herum in den Entschlackerdüsen-Einsetzeinheiten (30) angeordnet sind.

2. Die Kesselstruktur (10) gemäß Anspruch 1, wobei die Luft-Zuführteile (20) so angeordnet sind, dass Bereiche mit einer höheren Luftkonzentration so gebildet werden können, dass sie eine reduzierende Verbrennungszone im Inneren des Ofens in einer vertikalen Richtung abdecken. 5
3. Die Kesselstruktur (10) gemäß Anspruch 1 oder 2, wobei die Luft-Zuführteile (20) angeordnet sind, um Niederdruck-Sekundärbrennerluft von den benachbarten Brennern (12) durch Bypasswege einzubringen. 10
4. Die Kesselstruktur (10) gemäß einem der Ansprüche 1 bis 3, wobei die Entschlackerdüsen (31) jeweils in ein Düsenloch (32) eingesetzt sind, das sich durch die Ofenwand (11a) erstreckt, und das Luft-Zuführteil (20) einen Luftströmungskanal (22), der aus einem ringförmigen Raum zwischen der Entschlackerdüse (31) und dem Düsenloch (32) gebildet ist, und einen Düsenkörper (21), der an dem Ofen (11) angebracht ist, indem er an einer Umfangsoberfläche der Entschlackerdüse (31) mit einem Dichtungselement (34), das dazwischen angeordnet ist, befestigt ist, und einen kreisförmigen Flansch (21a) an einem Ende seiner zylindrischen Form besitzt, der sich in dem Ofen (11) befindet und der Ofenwand (11a) mit einer vorbestimmten Distanz dazwischen zugewandt ist, aufweist. 20 25 30

Revendications

1. Structure (10) de chaudière à brûlage circulant comportant : 35
 - un four (11) ayant une section transversale rectangulaire ;
 - des parties (Ba) de brûleur où une pluralité de brûleurs (12) sont disposés sur des parois (11a) de four et sont agencés de sorte que du combustible et de l'air de combustion fournis dans le four (11) depuis les brûleurs (12) sont mis en combustion de manière à former un flux tourbillonnant ; 40
 - des parties (Aa) d'alimentation en air supplémentaire où des buses (13) d'alimentation en air supplémentaire sont disposées au-dessus des parties (Ba) de brûleur pour fournir de l'air de combustion dans le four (11) ; 45
 - des parties (20) d'alimentation en air qui sont disposées à proximité de parties affectées par les flammes des parois (11a) de four, où des flammes formées par les brûleurs (12) respectifs en fonctionnement s'approchent ou viennent en contact, et qui sont agencées pour former des régions ayant une concentration en air plus 50 55

grande que dans leur périphérie ; et des unités (30) d'insertion de buse-décrasseur entre les parties (Ba) de brûleur et les parties (Aa) d'alimentation en air supplémentaire pour éliminer les scories déposées sur les parois (11a) de four avec de la vapeur éjectée des buses (31) formant décrasseurs qui sont insérées dans le four (11), dans laquelle les parties (20) d'alimentation en air sont disposées autour des buses (31) formant décrasseurs dans les unités (30) d'insertion buse-décrasseur.

2. Structure (10) de chaudière suivant la revendication 1, dans laquelle les parties (20) d'alimentation en air sont disposées de sorte que des régions ayant une concentration en air plus élevée peuvent être formées de manière à recouvrir une zone de réduction de combustion à l'intérieur du four suivant une direction verticale.
3. Structure (10) de chaudière suivant la revendication 1 ou 2, dans laquelle les parties (20) d'alimentation en air sont disposées pour introduire de l'air de brûleur secondaire à basse pression à partir des brûleurs (12) adjacents par l'intermédiaire de routes de dérivation.
4. Structure (10) de chaudière suivant l'une des revendications 1 à 3, dans laquelle les buses (31) formant décrasseurs sont insérées respectivement dans un trou (32) de buse s'étendant à travers la paroi (11a) de four, et la partie (20) d'alimentation en air a un canal (22) de passage d'air formé d'un espace annulaire entre la buse (31) formant décrasseur et le trou (32) de buse, et un corps (21) de buse qui est fixé au four (11) en ce qu'il est fixé à une surface circonférentielle de la buse (31) formant décrasseur avec un élément (34) d'étanchéité disposé entre eux et a un rebord (21a) circulaire à une extrémité de sa forme cylindrique qui est située dans le four (11) et fait face à la paroi (11a) de four à une distance déterminée à l'avance de celle-ci.

FIG. 1A

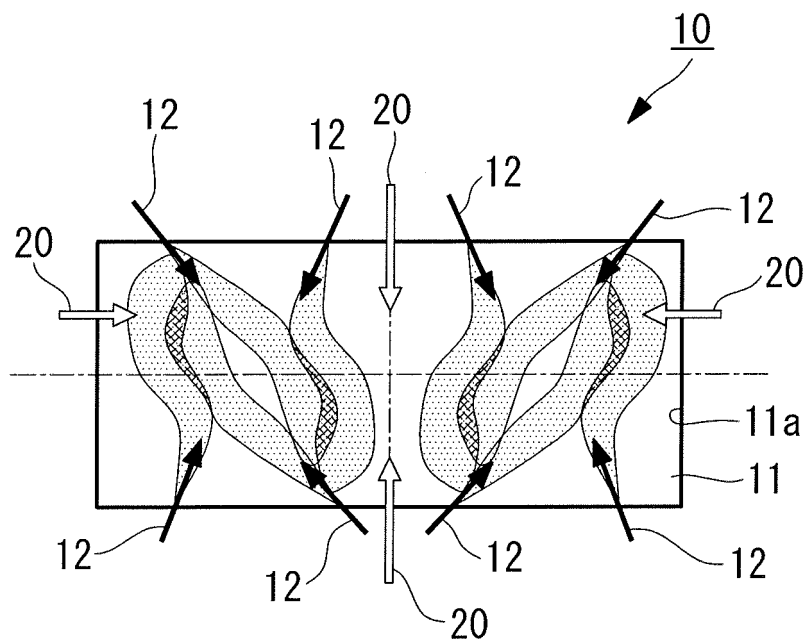


FIG. 1B

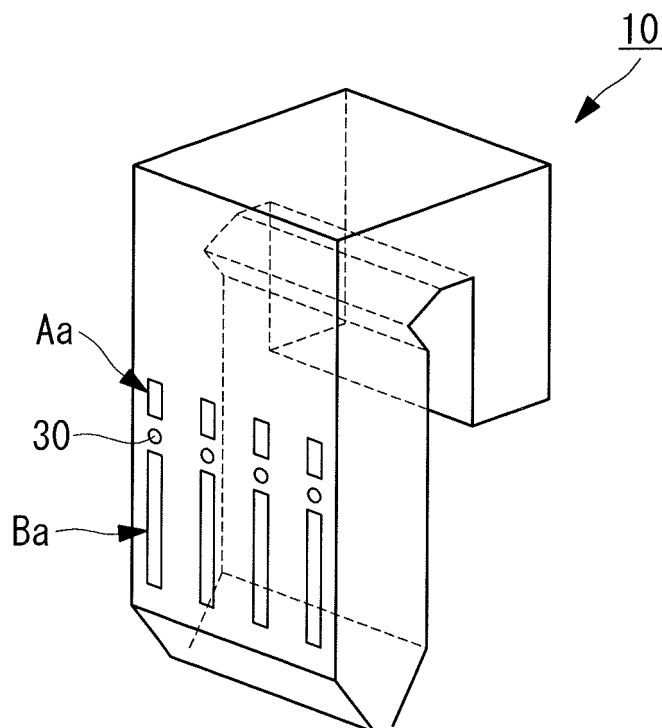


FIG. 2A

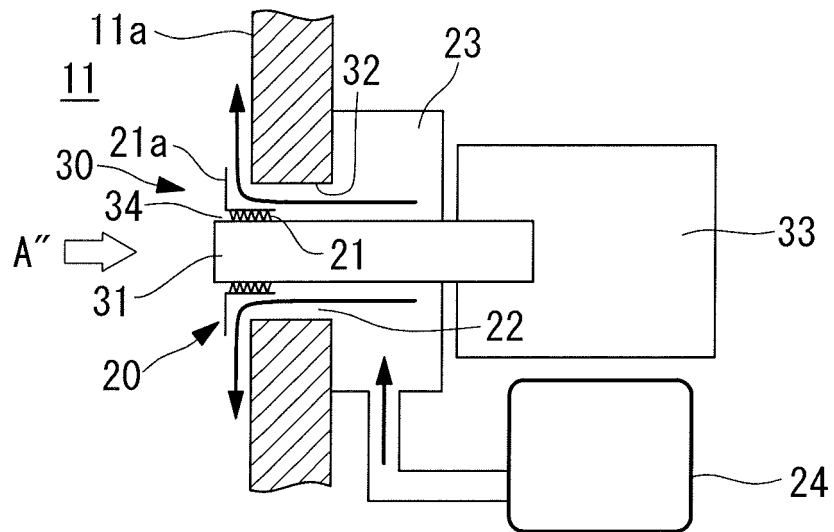


FIG. 2B

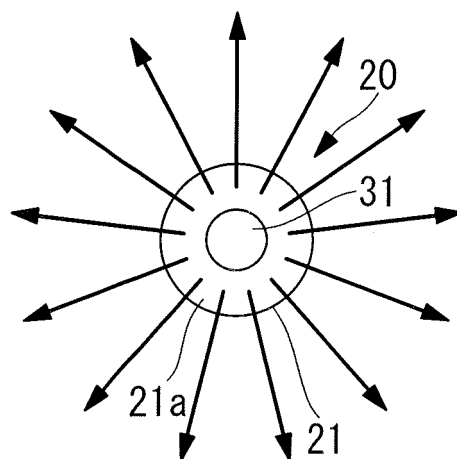


FIG. 3A

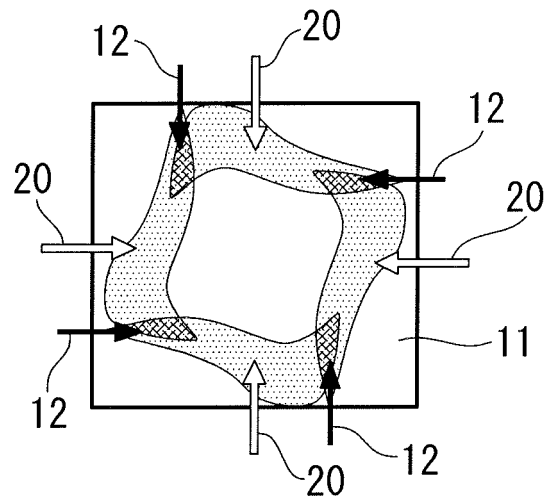


FIG. 3B

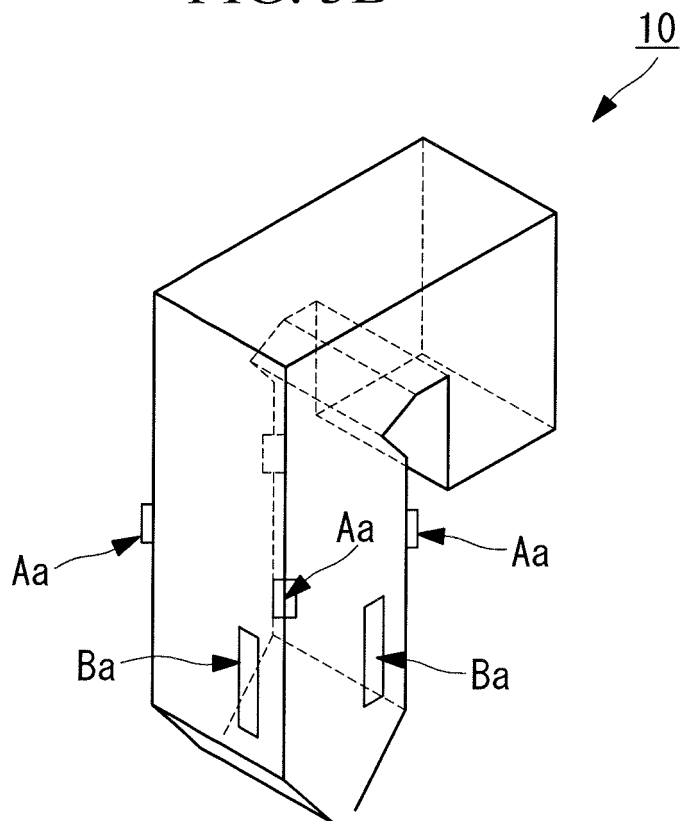


FIG. 4A

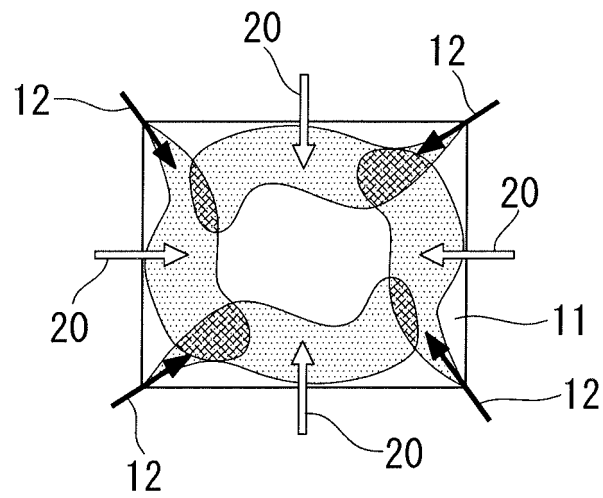


FIG. 4B

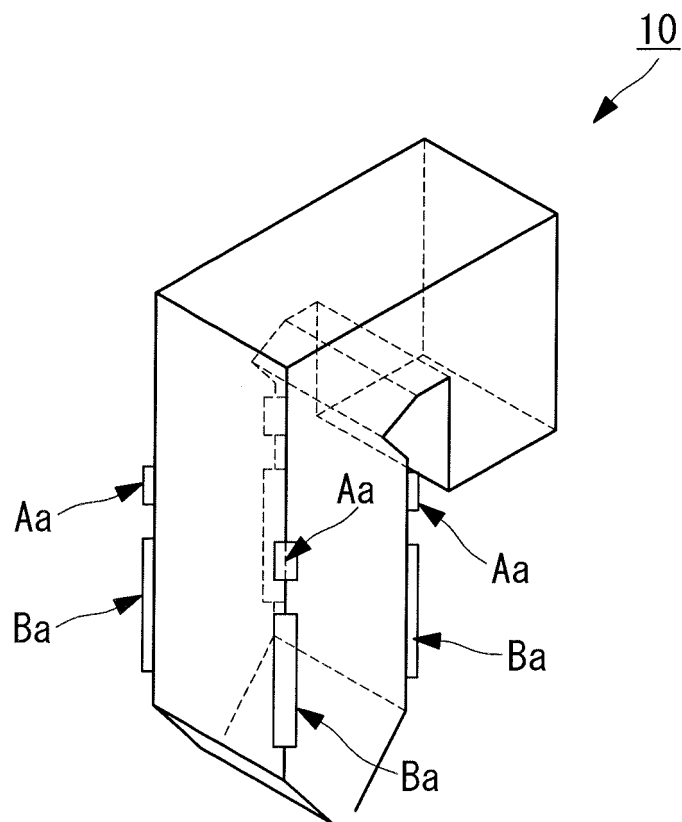
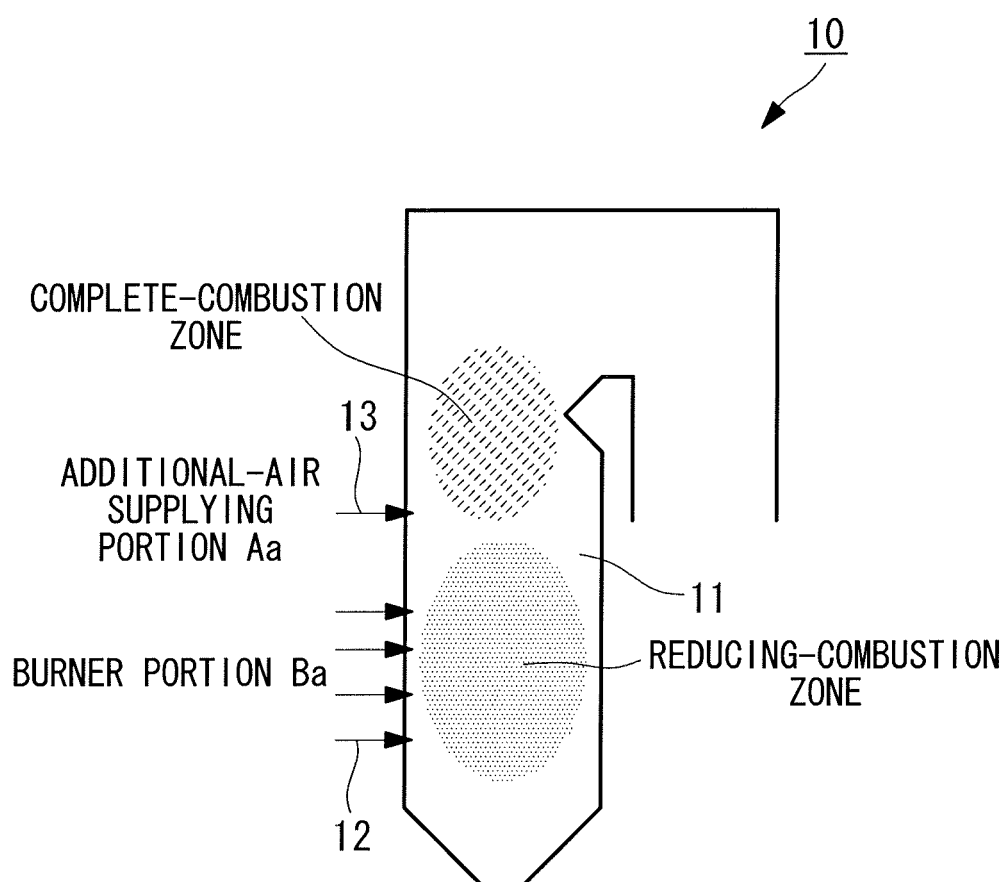


FIG. 5



REFERENCES CITED IN THE DESCRIPTION

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