(19) DANMARK

(10) **DK/EP 3739264 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***F 23 G 5/44 (2006.01)*** ***F 23 L 9/02 (2006.01)*** ***F 23 M 9/02 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2021-08-30**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-06-02**

(86) Europæisk ansøgning nr.: **19174199.0**

(86) Europæisk indleveringsdag: **2019-05-13**

(87) Den europæiske ansøgnings publiceringsdag: **2020-11-18**

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

(73) Patenthaver: **Doosan Lentjes GmbH, Daniel-Goldbach-Straße 19, 40880 Ratingen, Tyskland**

(72) Opfinder: **KRÜLL, Ferdinand, Dr., Mörsenbroicher Weg 199, 40470 Düsseldorf, Tyskland**
KARPINSKI, Andreas, Käthe-Kollwitz-Weg 13, 44285 Wuppertal, Tyskland

(74) Fuldmægtig i Danmark: **Orsnes Patent ApS, Sentvedvej 23, 5853 Ørbæk, Danmark**

(54) Benævnelse: **Forbrændingsanlæg til fast materiale og fremgangsmåde til udskiftning af dets dyseindsats**

(56) Fremdragne publikationer:
EP-A1- 0 498 014
GB-A- 795 252
GB-A- 2 077 892
US-A- 4 911 744

DESCRIPTION

[0001] The present invention relates to an incineration plant for solid material such as waste or biomass, the incineration plant having a combustion material inlet through which the solid material is to be introduced, a combustion chamber into which the solid material is introduced and in which the solid material is combusted, whereby flue gases are produced, a combustion grate with which the solid material and combusted solid material can be conveyed through the combustion chamber, a primary air supply below the top of the combustion grate, at least one nozzle arranged above the combustion grate with which a gaseous medium such as secondary air, tertiary air and/or an oxygen poor carrier gas can be provided, the nozzle having a gas inlet and a gas outlet.

[0002] The incineration plant usually comprises a combustion grate arranged within a lower section of the combustion chamber with which the solid material and combusted solid material can be conveyed through the combustion chamber from the combustion material inlet to a slag container. Primary air is usually supplied from below the combustion grate to the solid material arranged on the combustion grate, so that the solid material arranged on the combustion grate is combusted with the primary air.

[0003] Additionally, nozzles are provided above the combustion grate with which secondary air, tertiary air for afterburning or an oxygen poor carrier gas can be provided to the flue gases.

[0004] At least one empty pass may be arranged downstream of the combustion chamber extending vertically or horizontally, wherein the flue gases flow from the combustion chamber through the at least one empty pass to a heat recovery steam generator. In particular, two, three or more parallel empty passes may be embodied.

[0005] The heat recovery steam generator downstream of the empty pass may be arranged (in sections) vertically and/or horizontally, wherein also an oblique orientation is possible.

[0006] The walls of the combustion chamber, the empty pass(es) and the heat generator are usually equipped with heat exchangers (i.e. tubes), wherein the heat exchange medium of the heat exchangers is in particular provided to one common boiler drum.

[0007] The flue gas purification device downstream of the heat recovery steam generator may comprise elements for dedusting, scrubbing and/or desulfurization (such as SCR or SNCR) of the flue gas. A chimney may by arranged downstream of the flue gas purification device.

[0008] Usually there are multiple nozzles arranged above the combustion grate for providing secondary air, tertiary air and/or an oxygen poor carrier gas, wherein the nozzles of specific gaseous medium are connected with its inlets to a common supply. The nozzles are also secured to a wall of the combustion chamber. If the nozzles are to be replaced due to wear or in order to provide a different flow behavior to the provided gaseous medium, the whole nozzle

needs to be disconnected from the central supply and from the wall. Accordingly, there is a great effort to replace a respective nozzle.

[0009] An incineration plant for solid material with the features of the preamble of claim 1 is known from EP 0 498 014 A1. GB 795 252 A discloses a furnace chamber having firing means for the combustion of an ash-containing fuel, wherein the furnace chamber has a nozzle for supplying secondary air. The nozzle comprises a secondary air discharge duct with a circular air discharge passage terminating at the inner surface of a wall of the furnace chamber. A nozzle insert is mounted at the outlet end of the air discharge passage. The nozzle insert is connected to the air discharge passage with welds arranged at the inner wall surface of the air discharge passage.

[0010] In view of this, it is an object of the present invention to provide an incineration plant, in which the effort for maintaining or exchanging a nozzle is reduced.

[0011] This object is achieved by an incineration plant with the features of the independent claim and by a method for maintaining the incineration plant. Preferred embodiments of the invention are described in the sub claims and in the whole description, wherein single features of the preferred embodiments can be combined with each other in a technically meaningful manner.

[0012] The object is achieved in particular in that the gas inlet is embodied by a nozzle pipe, preferably being connected to a common supply line for the gaseous medium and being connected to a wall of the combustion chamber, and in that the gas outlet is embodied by an (separate) outlet insert, the outlet insert being at least partly inserted into the nozzle pipe, wherein the outlet insert is connected to the nozzle pipe by a welded joint. In order that the welded joint is easily accessible, it is arranged on the outside of the nozzle pipe.

[0013] The invention also suggests a method for replacing an outlet insert of a nozzle in an incineration plant in particular in an incineration plant according to the invention, comprising the following steps:

- destroying a welded joint between the used outlet insert of the nozzle and a nozzle pipe, the welded joint being arranged on the outside of the nozzle pipe,
- removing the used outlet insert out of the nozzle pipe,
- inserting a new outlet insert into the nozzle pipe,
- welding the new outlet insert to the nozzle pipe.

[0014] With other words, the present invention suggests to provide a nozzle in an incineration plant which is made of multiple parts, wherein a nozzle pipe, in particular having a constant (inner and/or outer) diameter, connects the nozzle to a common supply for gaseous medium and to a wall of the combustion chamber, and wherein the outlet insert, comprising elements for providing the desired flow properties to the gaseous medium, is at least partially and

interchangeably arranged in the nozzle pipe. Furthermore, a welded connection is provided between the nozzle pipe and the outlet insert, which welded connection is in particular provided at such a location, that the welded connection can be destroyed, at least when the incineration plant is shout down. This way, the outlet insert can be easily exchanged, wherein the new outlet insert can be connected by welding to the nozzle pipe. Accordingly, it is not only possible to provide an outlet insert that provides the same flow property to the gaseous medium but it may also be possible to provide an outlet insert that provides a different flow property than the used outlet insert.

[0015] The outer diameter of the section of the outlet insert inserted into the nozzle pipe is of the same dimension/size as the inner diameter of the nozzle pipe.

[0016] While it is principally sufficient that the outlet insert has a constant inner diameter which is smaller than the inner diameter of the nozzle pipe, it is preferred that the outlet insert comprises at least one element which provides a desired flow property to the gaseous medium.

[0017] For example, the inner diameter of the outlet insert may decrease along its extension from the inlet side to the outlet side and may optionally increase after a minimum diameter is reached.

[0018] The outlet insert may also comprise a swirling part, such as a helically extending guiding part in its inner flow cross section, with which a swirl can be provided to the gaseous medium.

[0019] The outlet insert may also comprise a deflecting part, with which the flow of the gaseous medium is at least partially deflected, so that the main direction of the gaseous medium stream leaving the outlet insert is inclined to the axial direction of the nozzle pipe.

[0020] It is also possible that the outlet insert comprises a diverting element, with which the flow of the gaseous medium is diverted in two, three or more sub flows, wherein the main directions of the sub flows are inclined to each other.

[0021] Preferably, the welded joint is accessible from the combustion chamber, so that it can be manually destroyed during maintenance of the incineration plant, when the incineration plant is shout down.

[0022] In one embodiment, it can be provided that the outlet insert has a flange which abuts against an end face of the nozzle pipe, wherein the welded joint is provided between the flange and an outer circumference of the end face of the nozzle pipe. This way the welded joint is easily accessible but it does not affect the flow properties which are provided from the outlet insert to the gaseous medium.

[0023] In order that the nozzle pipe is fixed to a wall of the incineration plant it is suggested

that the nozzle pipe is arranged partly in an inner wall delimiting the combustion chamber, wherein the nozzle pipe protrudes into the combustion chamber and wherein the welded joint is arranged on a section of the nozzle pipe that extends into the combustion chamber.

[0024] The invention and the technical background will now be explained with regard to the figures, which show an exemplary embodiment of the invention. The figures show schematically

Figure 1:
a side view of a part of an incineration plant and
Figure 2:
a nozzle of the incineration plant having a nozzle pipe and an outlet insert.

[0025] The incineration plant comprises a combustion chamber 2 with a combustion material inlet 1, through which solid combustion material such as waste can be introduced in the combustion chamber 2. At the bottom of the combustion chamber 2 a combustion grate 3 is embodied, with which the solid material and combusted material (i.e. ashes) can be transported towards a slag outlet 4.

[0026] Primary air for the combustion of the solid material is provided from below the combustion grate 3. The flue gases produced in the combustion chamber 2 are supplied into vertically extending empty passes 5. Downstream of the empty passes 5 a horizontally extending heat recovery steam generator 6 is arranged.

[0027] In the heat recovery steam generator 6 a superheater heat exchanger 7, an evaporator heat exchanger 8 and an economizer heat exchanger 9 are arranged, which are all connected to one common boiler drum 10.

[0028] In figure 2 a nozzle for providing a gaseous medium, such as secondary air, tertiary air and/or an oxygen poor carrier gas into the combustion chamber 2 is depicted.

[0029] The combustion chamber 2 is delimited by a wall 15. The nozzle comprises a nozzle pipe 11 and an outlet insert 12. The nozzle pipe 11 is connected on the left side to a common supply of gaseous medium (not shown). The nozzle pipe 11 extends through the wall 15 into the combustion chamber 2.

[0030] The outlet insert 12 is inserted into the nozzle pipe 11, wherein the outlet insert 12 comprises a flange 13, which abuts against an end face of the nozzle pipe 11.

[0031] The outlet insert 12 is connected to the nozzle pipe 11 by a welded joint 13, which is arranged at an outer circumference of the nozzle pipe 11 and behind the flange 14.

[0032] The outlet insert 12 can be easily exchanged by destroying the welded joint 13, so that

afterwards the outlet insert 12 can be removed from the nozzle pipe 11. After inserting a new outlet insert 12, the new outlet insert 12 can be connected to the nozzle pipe 11 by welding.

[0033] While the depicted embodiment of the outlet insert 12 only has a slightly smaller inner diameter than the inner diameter of the nozzle pipe 11, the outlet insert 12 may also have different elements (such as diverters, swirlers or similar) in order to affect the flow properties of the provided gaseous medium.

Reference sings

[0034]

1 combustion material inlet
2 combustion chamber
3 combustion grate
4 slag outlet
5 empty pass
6 heat recovery steam generator
7 superheater heat exchanger
8 evaporator heat exchanger
9 economizer heat exchanger
10 boiler drum
11 nozzle pipe
12 outlet insert
13 welded joint
14 flange
15 wall

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP0498014A1 [0009]
- GB795252A [0009]

Patentkrav

1. Forbrændingsanlæg til fast materiale med
- et forbrændingsmaterialeindløb (1), hvorigennem fast materiale kan indføres,
- et forbrændingskammer (2), hvor det faste materiale indføres, og hvor det faste materiale forbrændes,
- en forbrændingsrist (3), hvormed det faste materiale og det forbrændte faste materiale kan transporteres gennem forbrændingskammeret (2),
- en primær lufttilførsel under toppen af forbrændingsristen (3),
- mindst en dyse anbragt over forbrændingsristen (3), med hvilken der kan tilvejebringes et gasformigt medium, idet dysen har et gasindløb og et gasudløb,

kendetegnet ved at

gasindløbet er udformet af et dyserør (11), og gasudløbet er udformet af en udløbsindsats (12), hvor udløbsindsatsen (12) i det mindste delvist er indsat i dyserøret (11), hvor udløbsindsatsen (12) er forbundet til dyserøret (11) ved hjælp af en svejset samling (13), idet den svejsede samling (13) er anbragt på ydersiden af dyserøret (11).

2. Forbrændingsanlæg ifølge krav 1, hvor den svejsede samling (13) er tilgængelig fra forbrændingskammeret (2).

3. Forbrændingsanlæg ifølge et af de foregående krav, hvor udløbsindsatsen (12) har en flange (14), der støder op til en endeflade af dyserøret (11), hvor den svejsede samling (13) er tilvejebragt mellem flangen (14) og en ydre omkreds af dyserørets (11) endeflade.

4. Forbrændingsanlæg ifølge et af de foregående krav, hvor dyserøret (11) er anbragt i en væg (15), der afgrænser forbrændingskammeret (2), hvor dyserøret (11) stikker ind i forbrændingskammeret (2) og den svejsede samling (13) er anbragt på et afsnit af dyserøret (11), der strækker sig ind i forbrændingskammeret (2).

5. Forbrændingsanlæg ifølge et af de foregående krav, hvor den svejsede samling (13) er udformet af mindst et af følgende:
- en kontinuerlig svejsesøm,
- flere svejseperler,
- flere svejsepunkter.

6. Forbrændingsanlæg ifølge et af de foregående krav, hvor udløbsindsatsen (12) omfatter mindst et af følgende:
- en multipel udløbsdel,
- en afbøjningsdel,
- en hvirveldel.

7. Forbrændingsanlæg ifølge et af de foregående krav, der yderligere har
- en tom passage (5) nedstrøms forbrændingskammeret (2),
- en varmegenvindingsdampgenerator (6) nedstrøms for den tomme passage (5)
- en røggasrensningsanordning nedstrøms for varmegenvindingsdampgeneratoren (6).

8. Fremgangsmåde til udskiftning af en udløbsindsats (12) af en dyse i et forbrændingsanlæg, der omfatter følgende trin:
- ødelæggelse af en svejset samling (13) mellem dysens brugte udløbsindsats (12) og et dyserør (11), idet den svejsede samling (13) er anbragt på ydersiden af dyserøret (11),
- Fjernelse af den brugte udløbsindsats (12) ud af dyserøret (11),
- Indsætning af en ny udløbsindsats (12) i dyserøret (11),
- Svejsning af den nye udløbsindsats (12) til dyserøret (11).

DRAWINGS

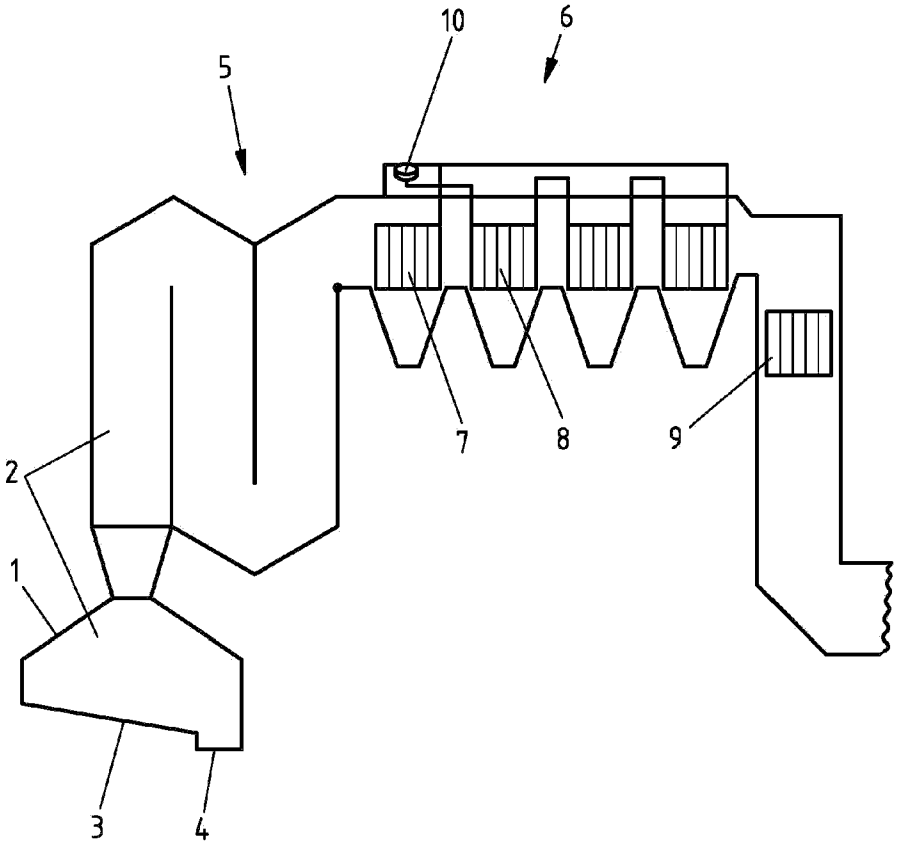


FIG.1

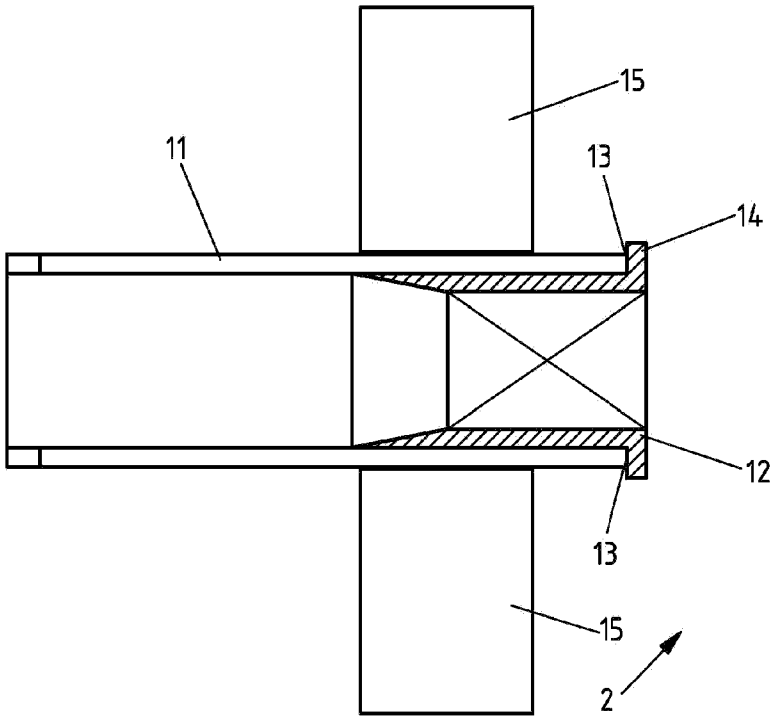


FIG.2