



US 20200200437A1

(19) **United States**(12) **Patent Application Publication****VAN ZUTPHENT et al.**(10) **Pub. No.: US 2020/0200437 A1**(43) **Pub. Date: Jun. 25, 2020**(54) **PREMIX GAS BURNER****Publication Classification**(71) Applicant: **BEKAERT COMBUSTION
TECHNOLOGY B.V.**, Assen (NL)(51) **Int. Cl.**
F24H 8/00 (2006.01)
F23D 14/02 (2006.01)
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OOSTRA**, Anderen (NL)(52) **U.S. Cl.**
CPC **F24H 8/00** (2013.01); **F23D 14/02**
(2013.01); **F23D 2213/00** (2013.01); **F23D
14/14** (2013.01); **F23D 14/145** (2013.01)(73) Assignee: **BEKAERT COMBUSTION
TECHNOLOGY B.V.**, Assen (NL)(21) Appl. No.: **16/630,142**(22) PCT Filed: **Jul. 4, 2018**(86) PCT No.: **PCT/EP2018/068039**

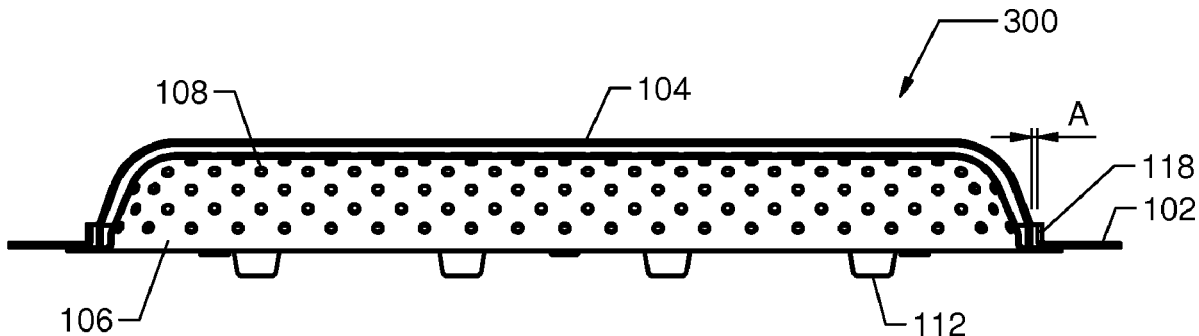
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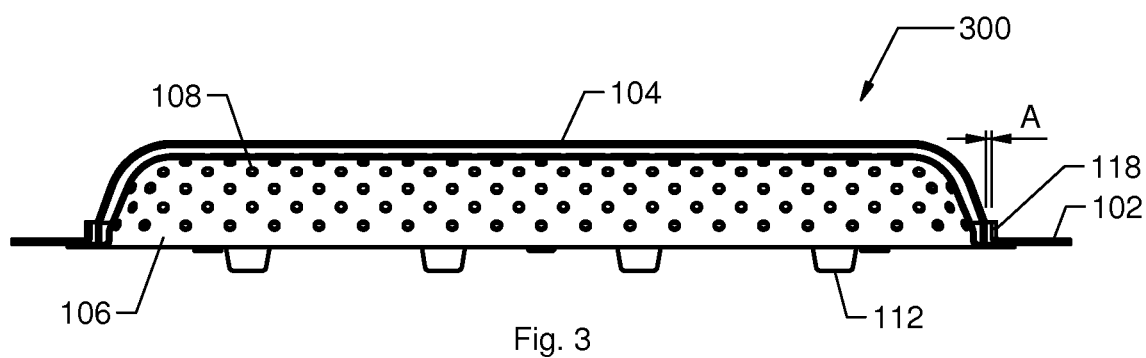
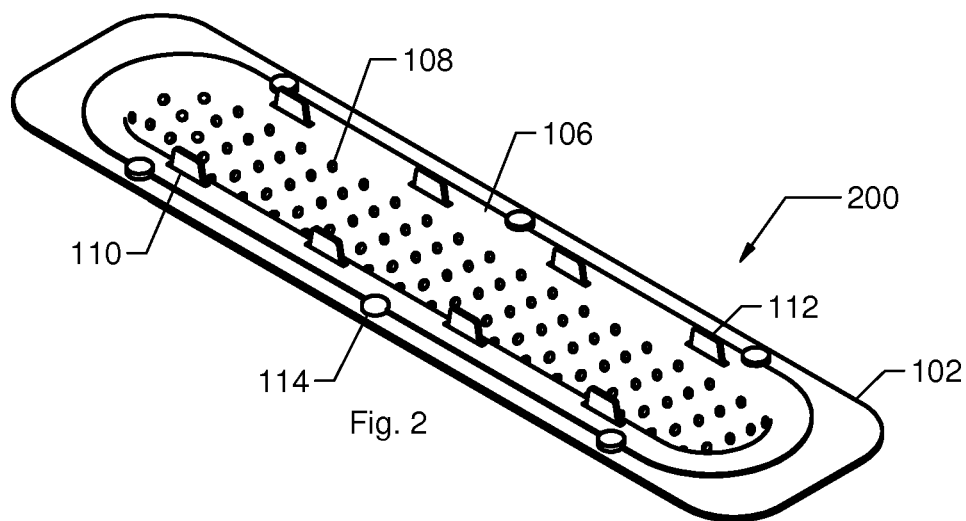
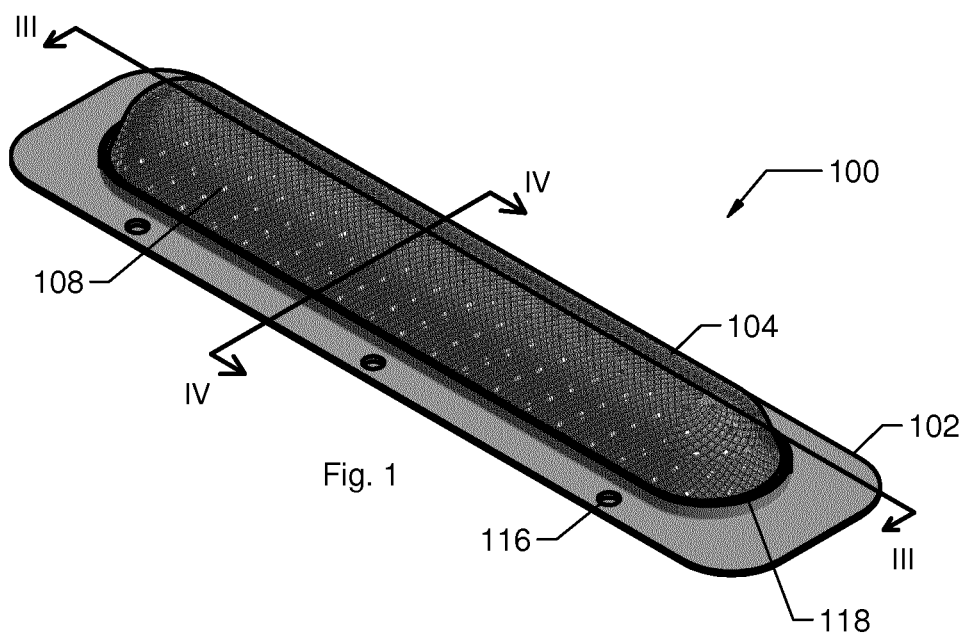
(2) Date: **Jan. 10, 2020**(30) **Foreign Application Priority Data**

Jul. 13, 2017 (EP) 17181111.0

(57) **ABSTRACT**

A premix gas burner comprises a metal plate structure, a burner deck and a shaped distributor plate. The metal plate structure is provided for mounting the premix gas burner in a heating appliance. The burner deck comprises a woven wire mesh on the outer surface of which premix gas is combusted after the premix gas has flown through the woven wire mesh. The shaped distributor plate comprises perforations. When the burner is in use the premix gas flows through the perforations of the shaped distributor plate before the premix gas flows through the woven wire mesh. One or more than one slot or notch shaped opening is provided in the shaped distributor plate. The woven wire mesh comprises a circumferential edge comprising at least one tab. The tab or tabs is/are inserted through a slot or notch shaped opening in the shaped distributor plate.





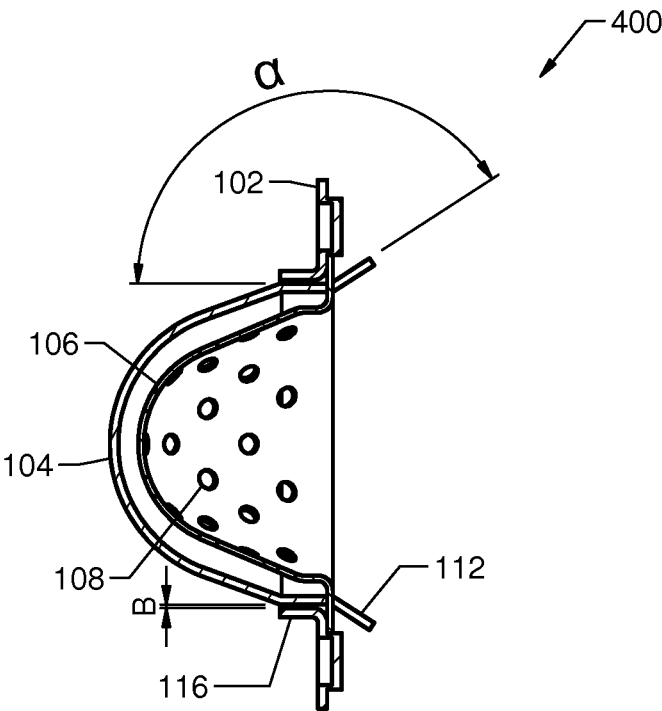


Fig. 4

PREMIX GAS BURNER

TECHNICAL FIELD

[0001] The invention relates to the field of premix gas burners, more particularly to surface stabilized premix gas burners comprising a woven wire mesh as burner deck.

Background Art

[0002] Surface stabilized premix gas burner having a woven wire mesh burner deck are known.

[0003] U.S. Pat. No. 5,474,443A discloses a premix gas burner with a hemispherical burner deck out of a woven wire mesh.

[0004] US2005/172915 shows a premix gas burner having a woven wire mesh combustion surface comprising rigidizing ribs.

DISCLOSURE OF INVENTION

[0005] The first aspect of the invention is a premix gas burner comprising a metal plate structure for mounting the premix gas burner in a heating appliance (e.g. in a condensing boiler), a burner deck and a shaped distributor plate. The burner deck comprises—and preferably consists out of—a woven wire mesh on the outer surface of which premix gas is combusted after the premix gas has flown through the woven wire mesh. The shaped distributor plate comprises perforations. When the burner is in use the premix gas flows through the perforations of the shaped distributor plate before the premix gas flows through the woven wire mesh. One or more than one slot or notch shaped opening is provided in the shaped distributor plate. The woven wire mesh comprises a circumferential edge. The circumferential edge of the woven wire mesh comprises at least one tab. Preferably, the circumferential edge of the woven wire mesh comprises a plurality of tabs. The tab or tabs is/are each inserted through a slot or notch shaped opening in the shaped distributor plate.

[0006] The woven wire mesh burner deck of surface stabilized premix gas burners gets hot when the burner is in use. The woven wire mesh burner deck needs to be able to cope with the stresses induced by the thermal expansion associated with the high temperature when the burner is in use and by the shrinkage when the burner is not in use. If this is not the case, early mechanical failure of the burner deck will occur. Thanks to the provision of the tab or tabs at the circumference of the woven wire mesh burner—tab or tabs which are inserted through slot or notch shaped openings in the shaped distributor plate—a certain amount of movement of the woven wire mesh relative to the shaped distributor plate is possible when the woven wire mesh expands when warming up or shrinks when cooling down. Therefore surprisingly, the premix gas burner of the invention is very well suited to withstand thermal expansion and shrinkage, resulting in a long lifetime of the premix gas burner.

[0007] Preferred tabs have a largest width between 4 and 20 mm; more preferably between 6 and 12 mm. Preferred tabs have a largest height between 3 and 6 mm.

[0008] Preferably, the woven wire mesh has a thickness between 0.6 and 1.3 mm. As an example, a woven wire mesh of 0.9 mm thickness can be advantageously used in the invention.

[0009] In a preferred embodiment, the shaped distributor plate and the metal plate structure are welded to each other.

[0010] In a preferred embodiment, the shaped distributor plate and the metal plate structure are fixed to each other by mechanical connecting means; e.g. by bolts, rivets or by a slot and tongue connection.

[0011] Preferably, at least one tab is bent such that an included angle less than 180° is provided between the tab inserted through the slot or notch and the section of the woven wire mesh at the other side of the opening. Preferably all tabs are bent such that an included angle less than 180° is provided between the tab through the slot or notch and the section of the woven wire mesh at the other side of the slot or notch. More preferably, the included angle is less than 150° , even more preferably less than 120° . Preferably, the included angle is more than 30° , even more preferably more than 60° , even more preferably more than 90° . Embodiments wherein at least one tab is bent ensure that the woven wire mesh is better held in place in applications where the burner is used with the burner deck facing downwards; and contribute to the realization of a longer lifetime of the burner deck and the burner.

[0012] In a preferred embodiment, the burner deck is provided in a convex shape. It is meant that when the burner is in operation, the flames of the burner are anchored onto the convex side of the burner deck. More preferably, the full surface of the burner deck is provided in a convex shape; meant is that when the burner is in operation, the full surface of the burner deck at the side of which the flames are anchored has a convex shape.

[0013] Preferably, the burner deck has a double curved surface. Where a surface is at a point on it double curved, there is at that point no direction in which the radius of curvature at that point is infinite. As an example, a cylindrical burner is a burner that has a single curved surface.

[0014] Preferably, all zones of the shaped distributor plate provided with perforations are provided at a distance from the woven wire mesh. It is meant that no perforation makes contact with the woven wire mesh, but that the perforation is positioned at a distance from the woven wire mesh. Such embodiments contribute to the ability to produce burners that have a long lifetime.

[0015] In a preferred embodiment, the circumference of the burner deck has the shape of a rectangle of which the two short sides are rounded. More preferably, the short sides of the rectangle are continuously rounded. Preferably tabs are only provided along the two long sides of the rectangular shape of the circumference of the burner deck. Meant is that no tabs are provided along the—possibly continuously—rounded short sides. Burners according to this embodiment are even better suited for long lifetime use, as the absence of tabs along the short sides allows better thermal expansion of the woven wire mesh in its length direction.

[0016] In a preferred embodiment in which the circumference of the burner deck has the shape of a rectangle of which the two short sides are rounded, the metal plate structure comprises an upstanding ridge at the two short sides of the rectangular burner deck. The distance between the upstanding ridge at the two short sides and the burner deck is at least 0.5 mm when the burner is cold. Preferably, this distance is at least 1 mm, more preferably at least 1.2 mm, and as an example 1.35 mm when the burner is cold. The presence of the upstanding ridge synergistically adds to achieve a burner with a longer lifetime. The upstanding ridge has proven to present a barrier preventing flame flashback into the burner.

[0017] Preferably, the metal plate structure has a central opening. The burner deck and the shaped distributor plate are provided inserted through and extending through the central opening. More preferably, the metal plate structure comprises an upstanding ridge around the central opening. The ridge extends in the direction in which the burner deck extends through the central opening of the metal plate structure. The presence of the upstanding ridge synergistically adds to achieve a burner with a longer lifetime. The upstanding ridge has proven to present a barrier preventing flame flashback into the burner.

[0018] In a preferred embodiment wherein an upstanding ridge is provided along the two long sides of the burner deck, the distance between the upstanding ridge at the two long sides and the burner deck is less than 0.5 mm.

[0019] In a preferred embodiment wherein an upstanding ridge is provided along the full circumference of the burner deck, the distance between the upstanding ridge at the two long sides and the burner deck is less than 0.5 mm.

[0020] In a preferred embodiment, the woven wire mesh does not comprise ribs nor embossments.

[0021] In a preferred embodiment, the woven wire mesh comprises ribs and/or embossments.

[0022] The second aspect of the invention is a condensing boiler comprising a premix gas burner as in any embodiment of the first aspect of the invention.

BRIEF DESCRIPTION OF FIGURES IN THE DRAWINGS

[0023] FIGS. 1-4 show a premix gas burner according to the invention.

MODE(S) FOR CARRYING OUT THE INVENTION

[0024] FIG. 1 shows a view 100 onto the burner deck of a premix gas burner according to the invention. FIG. 2 shows a bottom view 200 of the premix gas burner of FIG. 1. FIG. 3 shows the view 300 onto a cross section along III-III of the premix gas burner of FIG. 1. FIG. 4 shows the view 400 onto a cross section along IV-IV of the premix gas burner of FIG. 1.

[0025] The premix gas burner comprises a metal plate structure 102 for mounting the premix gas burner in a heating appliance (e.g. in a condensing boiler), a burner deck 104 and a shaped distributor plate 106. The shaped distributor plate 106 is shown in FIGS. 2-4; the perforations 108 of the shaped distributor plate are visible in FIG. 1 through the burner deck 104. The burner deck and the shaped distributor plate are provided inserted through and extending through the central opening in the metal plate structure.

[0026] The full surface of the burner deck is provided in a convex shape. The burner 104 consists out of a woven wire mesh on the outer surface of which premix gas is combusted after the premix gas has flown through the woven wire mesh. In the example, the woven wire mesh is 0.9 mm thick. The shaped distributor plate comprises perforations 108. When the burner is in use the premix gas flows through the perforations of the shaped distributor plate before the premix gas flows through the woven wire mesh.

[0027] The circumference of the burner deck has the shape of a rectangle of which the two short sides are continuously rounded.

[0028] A plurality of slots 110 is provided in the shaped distributor plate. The circumferential edge of the woven wire mesh comprises a plurality of tabs 112. The tabs 112 are inserted through slots 110. Tabs 112 are only provided along the two long sides of the rectangular shape of the circumference of the burner deck; no tabs are provided along the continuously rounded short sides.

[0029] In the exemplary gas premix burner, the shaped distributor plate 106 and the metal plate structure 102 are fixed to each other by rivets 114 through holes 116 in the metal plate structure and the shaped distributor plate.

[0030] In FIGS. 2 and 3, the tabs 112 are shown after insertion into the slots 110. FIG. 4 shows the tabs 112 after bending them. The tabs are bent such that an included angle α less than 180° is provided between the tab inserted through the slot and the section of the woven wire mesh at the other side of the slot.

[0031] The metal plate structure 102 comprises an upstanding ridge 118 along the full circumference of the burner deck. In the exemplary burner, the distance A between the upstanding ridge at the two short sides and the burner deck is 1.35 mm when the burner is cold. The distance B between the upstanding ridge along the two long sides and the burner deck is less than 0.35 mm.

1. Premix gas burner comprising
 - a metal plate structure for mounting the premix gas burner in a heating appliance;
 - a burner deck, wherein the burner deck comprises—and preferably consists out of—a woven wire mesh on the outer surface of which premix gas is combusted after the premix gas has flown through the woven wire mesh; and
 - a shaped distributor plate, wherein the shaped distributor plate comprises perforations, wherein when the burner is in use the premix gas flows through the perforations of the shaped distributor plate before the premix gas flows through the woven wire mesh;
- wherein one or more than one slot or notch shaped opening is provided in the shaped distributor plate;
- wherein the woven wire mesh comprises a circumferential edge;
- wherein the circumferential edge of the woven wire mesh comprises at least one tab—and preferably a plurality of tabs—;
- wherein the tab or tabs is/are inserted through a slot or notch shaped opening in the shaped distributor plate.
2. Premix gas burner as in claim 1; wherein the shaped distributor plate and the metal plate structure are welded to each other.
3. Premix gas burner as in claim 1; wherein the shaped distributor plate and the metal plate structure are fixed to each other by mechanical connecting means; e.g. by bolts, rivets or by a slot and tongue connection.
4. Premix gas burner as in claim 1, wherein the burner deck has a double curved surface.
5. Premix gas burner as in claim 1, wherein at least one tab; and preferably all tabs; is bent such that an included angle less than 180° is provided between the tab inserted through the slot or notch and the section of the woven wire mesh at the other side of the slot or notch.
6. Premix gas burner as in claim 1, wherein the burner deck is provided in a convex shape; preferably wherein the burner deck is provided in a convex shape over the full surface of the burner deck.

7. Premix gas burner as in claim 1, wherein all zones of the shaped distributor plate provided with perforations are provided at a distance from the woven wire mesh.

8. Premix gas burner as in claim 1, wherein the circumference of the burner deck has the shape of a rectangle of which the two short sides are—preferably continuously—rounded.

9. Premix gas burner as in claim 8, wherein tabs are only provided along the two long sides of the rectangular shape of the circumference of the burner deck.

10. Premix gas burner as in claim 8,

wherein the metal plate structure comprises an upstanding ridge at the two short sides of the rectangular burner deck;

wherein the distance between the upstanding ridge at the two short sides and the burner deck is at least 0.5 mm when the burner is cold.

11. Premix gas burner as in claim 1, wherein the metal plate structure has a central opening; wherein the burner deck and the shaped distributor plate are inserted through and extending through the central opening.

12. Premix gas burner as in claim 11; wherein the metal plate structure comprises an upstanding ridge around the central opening; wherein the ridge extends in the direction in which the burner deck extends through the central opening of the metal plate structure.

13. Premix gas burner as in claim 8; wherein the distance between the upstanding ridge at the two long sides and the burner deck is less than 0.5 mm.

14. Condensing boiler comprising a premix gas burner as in claim 1.

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