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(54) **HYDROGEN COMBUSTION BURNER ASSEMBLY FOR A GAS COOKING ASSEMBLY AND GAS COOKING APPLIANCE HAVING A HYDROGEN COMBUSTION BURNER ASSEMBLY**

(57) There is described a hydrogen combustion burner assembly (3) for a gas cooking appliance (1) and configured to combust hydrogen. The hydrogen combustion burner assembly (3) comprises a main body (7) having an inlet opening (10) configured to be connected to a hydrogen supply, a flow channel (11) being in fluidic connection with the inlet opening (10) and configured to receive the hydrogen from the hydrogen supply and through the inlet opening (10); an enrichment chamber (12) being in fluidic connection with the flow channel (11) and being configured to receive the hydrogen through the flow channel (11) and to allow for the formation of a hydrogen atmosphere within the enrichment chamber (12) and a plurality of outlet channels (13) being in fluidic connection with the enrichment chamber (12) and an outer atmosphere (14) and configured to allow for the outflow of the hydrogen from the enrichment chamber (12).

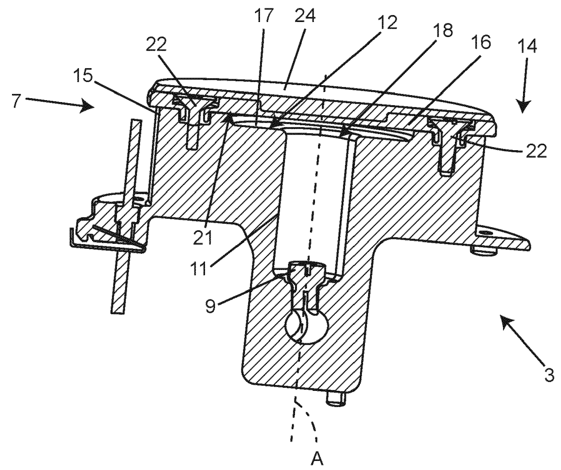

Figure 5

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Description

[0001] The present invention relates to a hydrogen combustion cooking assembly for a gas cooking appliance, preferentially a gas cooking hob, more preferentially particular a gas cooking hob configured to heat cooking vessels by means of the combustion of hydrogen.

[0002] Advantageously, the present invention also relates to a gas cooking appliance, preferentially a gas cooking hob, configured to heat cooking vessels by means of the combustion of hydrogen.

[0003] Gas cooking hobs for the thermal treatment of food products are commonly known. Typically gas cooking hobs comprise one or more heating zones, each comprising a gas combustion burner assembly, which allows the controlled burning of the gas such as e.g. natural gas, liquified petroleum gas, town gas or the like.

[0004] A typical gas combustion burner assembly comprises:

- a main body having an open space and an injection nozzle arranged in the open space and configured to control injection of the gas into the open space; and
- a crown arranged on top of the main body in a distanced manner so as to create an air inlet allowing to introduce primary air into the open space and having a plurality of outlet openings allowing the outlet of the air-gas mixture to be burned created within the open space.

[0005] The crown is furthermore designed so as to create a Venturi effect such that the air entering through the air inlet is mixed with the gas.

[0006] Even though the known gas cooking hobs work satisfyingly well, an interest is seen in the sector to further reduce the ecological impact of the preparation of food products.

[0007] EP-A-2146144 discloses a hydrogen combustion burner assembly which is configured to burn a hydrogen-oxygen mixture fed into the hydrogen combustion burner assembly. In order to avoid that the mixture may be subject to a further increase in the oxygen concentration, which may lead to a putatively hazardous gas mixture, the risk of mixture with air within the hydrogen combustion burner assembly is mitigated by providing for a main portion of the hydrogen combustion burner assembly being formed as a single piece. The main portion is fixedly connected to a supply source providing the hydrogen-oxygen mixture in an airtight-manner and comprises outlet channels allowing for the outflow of the hydrogen-oxygen mixture.

[0008] However, already the operation with a hydrogen-oxygen mixture is critical within a household as the typical user is not trained in the handling of putatively explosive hydrogen-oxygen gas mixtures. Indeed, in the case of a further enrichment in the oxygen content, the hydrogen-oxygen mixture turns out to become putatively explosive.

[0009] Additionally, the hydrogen combustion burner assembly of EP-A-2146144 comes along with a challenging production process.

[0010] According to the present invention, there is provided a hydrogen combustion burner assembly according to the respective independent claims.

[0011] Preferred non-limiting embodiments are claimed in the claims directly or indirectly depending on the independent claim.

[0012] Additionally, there is provided a gas cooking appliance according to claims 14 or 15.

[0013] In addition, according to the present invention there is provided a hydrogen combustion burner assembly for a gas cooking appliance, preferentially a gas cooking hob, and configured to combust hydrogen, preferentially hydrogen in gaseous form. The hydrogen combustion burner assembly comprises a main body having an inlet opening configured to be connected to a hydrogen supply, a flow channel being in fluidic connection with the inlet opening and configured to receive the hydrogen from the hydrogen supply and through the inlet opening, an enrichment chamber being in fluidic connection with the flow channel and being configured to receive the hydrogen through the flow channel and to allow for the formation of a hydrogen atmosphere within the enrichment chamber and a plurality of outlet channels being in fluidic connection with the enrichment chamber and an outer atmosphere and configured to allow for the outflow of the hydrogen from the enrichment chamber.

[0014] By having the hydrogen combustion burner assembly, it is possible to rely on the generation of heat by burning hydrogen, which is more sustainable than the burning of the hydrocarbon gases (e.g. methane, propane, butane) as currently known in the art. By providing for the flow channel and the enrichment chamber it is possible to obtain the required hydrogen atmosphere. While the burning of the gases typically used requires a significant amount of oxygen, this is not the case when relying on the burning of hydrogen for which the so-called secondary air is required; i.e. the air being provided from the outer atmosphere and adjacent to the outlet channels. Additionally, the hydrogen combustion burner assembly also avoids the mixture with primary air (air being introduced into the burner assembly), which could lead to a putatively dangerous hydrogen-oxygen mixture (oxyhydrogen).

[0015] Preferentially, in use, the hydrogen atmosphere within the enrichment chamber may comprise at least 80% in volume of hydrogen, more preferentially at least 85% in volume of hydrogen, even more preferentially at least 90% of hydrogen, most preferentially at least 95% of hydrogen, even most preferentially substantially 100% hydrogen.

[0016] By having a hydrogen combustion burner assembly, which allows such concentration of hydrogen within the enrichment chamber it is possible to optimize the combustion process and to avoid any risk of the formation of putatively explosive oxyhydrogen.

[0017] Preferentially, the hydrogen supply may be configured to supply pure hydrogen (i.e. the gas being fed by the hydrogen supply may deliver a gas having at least 95%, preferentially at least 98%, more preferentially at least 99%, in volume of hydrogen).

[0018] According to some preferred non-limiting embodiments, the main body may further comprise an injection nozzle being in fluidic connection with the inlet opening and the flow channel and being configured to control injection of the hydrogen into the flow channel.

[0019] Preferentially, the injection nozzle may be at least partially arranged within the flow channel.

[0020] According to some preferred non-limiting embodiments, the hydrogen combustion burner assembly may further comprise a cover arranged on the main body such to delimit in cooperation with the main body itself the plurality of outlet channels and the enrichment chamber.

[0021] In this way, it is possible to easily produce and assemble the hydrogen combustion burner assembly. It is also possible to easily execute maintenance work on the hydrogen combustion burner assembly.

[0022] Preferentially, the cover may be removably arranged on the main body.

[0023] This gives the possibility to easily execute maintenance activities as the cover can be removed. This allows e.g. to easily assess the flow channel.

[0024] Alternatively, the cover may be non-removably arranged on the main body. This guarantees that the cover may not be misplaced on the main body at any moment, which could lead to the formation of unwanted fluidic connections between the outer atmosphere and enrichment chamber.

[0025] Preferentially, the main body comprises an abutment surface and the cover comprises an engagement surface engaging with the abutment surface in a substantially air-tight manner, preferentially in an air-tight manner.

[0026] In this manner, one guarantees a controlled outflow of the hydrogen and substantially no unwanted fluidic connections between the outer atmosphere and the enrichment chamber may occur. Furthermore, one guarantees that no hazardous hydrogen-oxygen mixtures may form.

[0027] Preferentially, the abutment surface may comprise a plurality of surface portions and the main body may comprise a plurality of elongated grooves, each one at least partially defining a respective outlet channel and each one being interposed between two respective surface portions.

[0028] This allows to easily manufacture the hydrogen combustion burner assembly.

[0029] Preferentially, the hydrogen combustion burner assembly may further comprise one or more fastening elements fixing the cover onto the main body. In this way, one can ensure the desired air-tightness. Additionally, one ensures that no putative hazardous hydrogen-oxygen mixtures may form.

[0030] Preferentially, the one or more fastening elements may also be configured to exert a pressing force onto the cover towards and onto the main body.

[0031] This allows to further improve the air-tightness and to further reduce the risk of the formation of putative hazardous hydrogen-oxygen mixtures.

[0032] Preferentially, the one or more fastening elements may be configured to be removable such to allow for the removal of the cover. In this way, it is possible to access e.g. the flow channel and/or the injection nozzle for maintenance work.

[0033] More preferentially, the one or more fastening elements may be removable only by a technically-trained person. In this way, one guarantees that a common user may remove the cover and may successively operate the hydrogen combustion burner assembly in an undesired and putatively dangerous manner.

[0034] According to some possible non-limiting embodiments, the hydrogen combustion burner assembly may also comprise a sensor device for detecting a correct placement of the cover onto the main body.

[0035] Preferentially, the sensor device may be configured to signal an incorrect placement of the cover and such that any hydrogen delivery to the respective flow channel may be interrupted.

[0036] Preferentially, the hydrogen combustion burner assembly may further comprise an auxiliary cover placed onto the cover. The auxiliary cover allows to improve the aesthetical appearance as e.g. the fastening elements may be covered.

[0037] According to some preferred non-limiting embodiments, each outlet channel presents a rectilinear shape.

[0038] Such a solution allows an easy manufacturing process.

[0039] According to some preferred non-limiting embodiments, a length of each outlet channel may range between 8 mm to 18 mm, preferentially between 10 mm to 15 mm.

[0040] The Applicant has found that outlet channels having such lengths come along with improved flow and safety properties. E.g. the risk of a return of flame is significantly reduced. Moreover, an efficient heat-conduction and an effective temperature decrease into a direction towards the enrichment chamber is guaranteed.

[0041] According to some preferred non-limiting embodiments, each outlet channel may have a width ranging between 0,3 mm to 0,8 mm, preferentially ranging between 0,4 mm to 0,6 mm.

[0042] This allows on the one side to improve the flow and burning characteristics on the other side allowing to realize the outlet channels in an industrial process. Moreover, such outlet channels contribute to an optimized heat-conduction.

[0043] According to some preferred non-limiting embodiments, the outlet channels of the plurality of outlet channels may be arranged equally spaced from one another about a central axis of the main body.

[0044] In this way, one ensures excellent and homogenous flame properties.

[0045] According to some preferred non-limiting embodiments, each outlet channel of the plurality of outlet channels may equal the other outlet channels of the plurality of outlet channels.

[0046] Such a solution allows to further facilitate the manufacturing process.

[0047] In addition, according to the present invention there is provided a gas cooking appliance, preferentially a gas cooking hob, for the heating of cooking vessels by means of the combustion of hydrogen comprising one or more heating zones, each heating zone being configured to heat at least one cooking vessel at a time and having at least one hydrogen combustion burner assembly.

[0048] Preferentially, each heating zone may comprise a support structure for carrying the at least one cooking vessel and being configured such that a distance between the cooking vessel and the respective hydrogen combustion burner assembly may be in a range from 5 mm to 15 mm.

[0049] This allows a more efficient heating process.

[0050] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a schematic sketch of a gas cooking appliance according to the present invention, with parts removed for clarity;
- Figure 2 is a perspective view of a detail of the gas cooking appliance of Figure 1, with parts removed for clarity;
- Figure 3 is a partially exploded perspective view of the detail of Figure 2, with parts removed for clarity;
- Figure 4 is an enlarged perspective view of a portion of the detail of Figure 2 , with parts removed for clarity; and
- Figure 5 is a sectioned view of the detail of Figure 2, with parts removed for clarity.

[0051] With particular reference to Figure 1, number 1 indicates as a whole a gas cooking appliance for the thermal treatment, in particular for the heating and/or cooking, of food products.

[0052] In the specific example, reference is made to a gas cooking hob 1, but alternatively gas cooking appliance could also be a gas stove.

[0053] In more detail, gas cooking hob 1 is configured to heat cooking vessels containing food products by combustion of hydrogen, preferentially of hydrogen in gaseous form.

[0054] The food product to be thermally treated may be a single ingredient or a mixture of ingredients. It should also be noted that the food product to be treated may vary throughout the overall thermal treatment process; i. e. it may be possible to add or remove ingredients to the food product during the thermal treatment. In addition or alternatively, it may also possible that portions of the food product may disappear during the thermal treatment process (e.g. by means of evaporation or the like) and/or portions of the food product may be subjected to physical and/or chemical transformations.

[0055] Gas cooking hob 1 comprises one or more heating zones 2, each one configured to receive a cooking vessel containing the food product to be thermally treated and configured to heat the respective cooking vessel and/or the food product present within the respective cooking vessel, by the combustion of hydrogen, in particular hydrogen in gaseous form.

[0056] Preferentially, each cooking zone 2 may comprise at least one, preferentially exactly one, hydrogen combustion burner assembly 3.

[0057] Each hydrogen combustion burner assembly 3 is configured to allow the combustion of the hydrogen (in gaseous form) in a controlled manner.

[0058] Preferentially, gas cooking hob 1 may also comprise a control unit 4 configured to control, preferentially to selectively control, operation of each heating zone 2, preferentially the respective hydrogen combustion burner assembly(ies) 3. In the example shown, control unit 4 comprises one or more control buttons 5, each one operatively connected to one respective heating zone 2 and being configured to allow a user to selectively control the respective heating zone 2, preferentially by adjusting a flow rate of the hydrogen to be burned and/or turning on the respective heating zone 2. Alternatively and/or in addition, control unit 4 may comprise digital input means for selectively controlling each heating zone 2.

[0059] According to some preferred non-limiting embodiments, control unit 4 may comprise one or more control valves, each one configured to control the hydrogen flow to one respective hydrogen combustion burner assembly 3.

[0060] The cooking vessel may be of any kind. The cooking vessel could be a pot, a kettle, a pan, a plate, a bowl or the like. The cooking vessel may or may not comprise a respective lid.

[0061] In the specific case shown, gas cooking hob 1 comprises a plurality of heating zones 2, in particular five. gas cooking hob 1 could, however, comprise only one heating zone 2, two, three, four or even more heating zones.

[0062] Preferentially, each heating zone 2 may comprises a support structure (not shown) configured to carry the at least one cooking vessel. According to some possible embodiments, the respective support structures of each heating zone 2 may be separatable from other or some or all of the respective support structures may be realized in a single piece.

[0063] According to some preferred non-limiting embodiments, gas cooking hob 1 may also comprise a housing structure 6 and each hydrogen combustion burner assembly 3 may be fitted to and/or carried by housing structure 6. Additionally, housing structure 6 may also comprise the one or more support structures.

[0064] In the following, we describe the structure and function of a single hydrogen combustion burner assembly 3, which corresponds to the structure and function of the others.

[0065] With particular reference to Figure 2 to 5, hydrogen combustion burner assembly 3 comprises a main body 7.

[0066] Preferentially, hydrogen combustion burner assembly 3 may also comprise an injection nozzle 9 arranged within main body 7 and configured to control the flow of hydrogen within main body 7.

[0067] Preferentially, main body 7 may be formed as a single piece.

[0068] Main body 7 comprises an inlet opening 10 configured to be connected to a hydrogen supply and a flow channel 11 being in fluidic connection with inlet opening 10 and configured to receive the hydrogen from the hydrogen supply and through inlet opening 10.

[0069] Preferentially, the hydrogen supply may be configured to supply pure hydrogen (i.e. the gas being fed by the hydrogen supply may deliver a gas having at least 95%, preferentially at least 98%, more preferentially at least 99%, in volume of hydrogen).

[0070] Injection nozzle 9 may be in fluidic connection with inlet opening 10 and flow channel 11 and is configured to control injection of the hydrogen into flow channel 11. Preferentially, injection nozzle 9 may be at least partially arranged within flow channel 11.

[0071] Main body 7 also comprises an enrichment chamber 12 being in fluidic connection with flow channel 11 and being configured to receive the hydrogen through flow channel 11 and to allow for the formation of a hydrogen atmosphere within enrichment chamber 12 itself and a plurality of outlet channels 13 being in fluidic connection with enrichment chamber 12 and an outer atmosphere 14, preferentially being an air atmosphere, and configured to allow for the outflow of the hydrogen from enrichment chamber 12.

[0072] In particular, main body 7 and enrichment chamber 12 are designed such that the atmosphere within enrichment chamber 12 can, in use, contain substantially only the hydrogen injected into flow channel 11, preferentially by injection nozzle 9.

[0073] Preferentially, in use, the hydrogen atmosphere within the enrichment chamber may comprise at least 80% in volume of hydrogen, more preferentially at least 85% in volume of hydrogen, even more preferentially at least 90% of hydrogen, most preferentially at least 95% of hydrogen, even most preferentially substantially 100% hydrogen.

[0074] Preferentially, the hydrogen source may be configured to supply pure hydrogen (i.e. the hydrogen source may deliver a hydrogen gas having at least 95%, preferentially at least 98%, more preferentially at least 99%, in volume of hydrogen; any contaminations are neglectable).

[0075] In particular, hydrogen combustion burner assembly 3 is void of any aperture, which, in use, could allow to introduce air into flow channel 11 and/or enrichment chamber 12. Accordingly, in use, enrichment chamber 12 only contains the hydrogen injected into flow channel 11, preferentially by injection nozzle 9.

[0076] Additionally, hydrogen combustion burner assembly 3 is void of any means generating a Venturi effect within main body 7.

[0077] Preferentially, main body 7 may be designed such that the hydrogen is injected into flow channel 11, flows within flow channel 11 and directly into enrichment chamber 12 and from enrichment chamber 12 through outlet channels 13 into outer atmosphere 14 within which the hydrogen is burnt.

[0078] Preferentially, each outlet channel 13 may extend from an inlet to an outlet portion and such that the hydrogen flows from enrichment chamber 12 through the respective inlet into outlet channel 13 and through the respective outlet out of inlet channel 13 and into outer atmosphere 14.

[0079] In more detail, main body 7 may comprise a ring-shaped collar 15 laterally and/or radially delimiting enrichment chamber 12, and preferentially may also comprise a plurality of elongated grooves, each groove may at least partially define one respective outlet channel 13.

[0080] Preferentially, main body 7 and/or collar 15 may comprise a central axis A. More preferentially, central axis A may also comprise a central axis of flow channel 11.

[0081] Collar 15 may laterally and/or radially delimit enrichment chamber 15 into a direction perpendicular to central axis A.

[0082] According to some preferred non-limiting embodiments, outlet channels 13, preferentially the respective grooves, may be equally spaced apart from one another about central axis A.

[0083] Moreover, the openings of channels 13 are peripherally arranged, and preferentially equally spaced about central axis A.

[0084] Furthermore, collar 15 may comprise a plurality of sections and each groove may be interposed between two respective sections. Or in other words, each groove may define two respective sections being divided by the respective groove.

[0085] With particular reference to Figures 3 and 5, hydrogen combustion burner assembly 3 may further comprise a cover 16 arranged on main body 7, preferentially collar 15, such to delimit in cooperation with main body 7, preferentially collar 15, the plurality of outlet channels 13.

[0086] Preferentially, cover 16 may be arranged onto main body 7, preferentially collar 15, in an air-tight manner; i.e. no unwanted fluidic connection between outer atmosphere 14 and enrichment chamber 12 may occur and hydrogen may only flow from enrichment chamber 12 to outer atmosphere 14 through outlet channels 13. This is also important in order to avoid the formation of a potentially hazardous hydrogen-oxygen mixture.

[0087] Preferentially, cover 16 may delimit together with main body 7 enrichment chamber 12, preferentially into a direction parallel to central axis A. In more detail, main body 7 may comprise a base 17 facing cover 16.

[0088] More specifically, base 17 may comprise an aperture 18 and flow channel 11 merges into aperture 18. In other words, flow channel 11 may be connected to base 17 at aperture 18. In use, the hydrogen flows from flow channel 11 through aperture 18 into enrichment chamber 12.

[0089] Preferentially, flow channel 11 may have a circular cross-section.

[0090] Preferentially, flow channel 11 may be delimited by a lateral wall and a base wall opposed to aperture 18. More preferentially, injection nozzle 9 may be fixed on the base wall.

[0091] Even more preferentially, injection nozzle 9 may provide for the only fluidic connection between flow channel 11 and inlet opening 10.

[0092] Additionally, flow channel 11 may have an opening merging into aperture 18.

[0093] According to some non-limiting embodiments, cover 16 may be removably arranged on main body 7, preferentially collar 15.

[0094] Alternatively, cover 16 may be non-removably arranged on main body 7, preferentially collar 15.

[0095] In further detail, main body 7, preferentially collar 15, may comprise an abutment surface 19. Preferentially, abutment surface 19 may comprise a plurality of surface portions 20. More preferentially, surface portions 20 may not be connected between one another.

[0096] More specifically, each section of collar 15 may comprise a respective surface portion 20.

[0097] Moreover, each outlet channel 13, preferentially the respective groove, may be interposed between two respective surface portions 20.

[0098] According to some preferred non-limiting embodiments, abutment surface 19 may lie on a first plane perpendicular to central axis A. In particular, each surface portion 20 may be perpendicular to central axis A.

[0099] Preferentially, engagement surface 21 may lie on a second plane perpendicular to central axis A.

[0100] According to some preferred non-limiting embodiments, abutment surface 19, preferentially surface portions 20, and engagement surface 21 may be planar.

[0101] According to some non-limiting embodiments, cover 16 may engage with abutment surface 19 in an airtight manner, in particular such that the only fluidic connections between enrichment chamber 12 and outer atmosphere 14 may be defined by outlet channels 13. Additionally, the formation of putatively hazardous hydrogen-oxygen mixtures is avoided.

[0102] According to some preferred non-limiting embodiments, hydrogen combustion burner assembly 3 may comprise one or more fastening elements 22, in the specific case shown four, fixing cover 16 onto main body 7, preferentially collar 15.

[0103] Fastening elements 22 can be chosen from the group of screws, bolts, rivets, or the like.

[0104] Preferentially, fastening elements 22 may be configured to non-permanently fix cover 16 to main body 7, preferentially collar 16. In other words, fastening elements 22 may be configured to removably fix cover 16 to main body 7, preferentially collar 16.

[0105] Most preferentially, fastening elements 22 may be removable by only by a technically-trained person. In this way, one guarantees that a common user may not remove the cover and may successively operate the hydrogen combustion burner assembly in an undesired and putatively dangerous manner.

[0106] E.g. fastening elements 22 may be removable only by means of a specific tool only available to a technically-trained person.

[0107] Alternatively, fastening elements 22 and therewith also cover 16 may not be removable.

[0108] Preferentially, fastening elements 22 may also be configured to exert a pressing force onto cover 16 towards and onto main body 7, preferentially collar 16 and/or abutment surface 19.

[0109] Preferentially, main body 7, preferentially collar 15, may comprise a respective seat 23 for each fastening element 22. For example, each fastening element 22 may comprise a threading and the respective seat 23 a counter-threading.

[0110] According to some preferred non-limiting embodiments, fastening elements 22 may be equally spaced about central axis A.

[0111] Hydrogen combustion burner assembly 3 may further comprise an auxiliary cover 24 placed, preferentially freely (i.e. without any fastening means) placed onto cover 16.

[0112] With particular reference to Figures 3 and 4, each outlet channel 13 presents a rectilinear shape.

[0113] Preferentially, a respective length of each outlet channel 13 may range between 8 mm to 18 mm, preferentially between 10 mm to 15 mm. More preferentially, the respective length of each outlet channel 13 corresponds to the respective length of the other outlet channels 13.

[0114] According to some preferred non-limiting embodiments, each outlet channel 13 may have a width ranging between 0,3 mm to 0,8 mm, preferentially ranging between 0,4 mm to 0,6 mm. Preferentially, the width of each outlet channel 13 may correspond to the width of the other outlet channels 13.

[0115] Preferentially, each outlet channel 13 may have a constant width along its full extension.

[0116] According to some preferred non-limiting embodiments, each outlet channel 13 may equal the other outlet channels 13. In other words, all outlet channels 13 are identical.

[0117] According to some possible non-limiting embodiments, each hydrogen combustion burner assembly 3 may also comprise a sensor device, preferentially operatively coupled to control unit 4, and being configured to detect a correct placement of cover 16 onto main body 7, preferentially collar 15.

[0118] Preferentially, the sensor device may be configured to signal an incorrect placement of cover 16 and such that any hydrogen delivery to flow channel 11, preferentially also to injection nozzle 9, may be interrupted, preferentially by control unit 4.

[0119] According to some preferred non-limiting embodiments, control unit 4 may comprise a flame safety device associated to each heating zone 2, preferentially so as to interrupt the hydrogen flow to the respective hydrogen combustion burner assembly 3 if a temperature of the respective hydrogen combustion burner assembly 3 is, during use, below a threshold temperature.

[0120] The flame safety device may comprise one or more respective temperature sensors 25, each one associated with one respective hydrogen combustion burner assembly 3 configured to detect a temperature of the respective hydrogen combustion burner assembly 3. Control unit 4 may be configured to selectively control the control valves in dependence of the detected temperatures. In particular, control unit 4 may be configured to close the respective control valve if the detected temperature associated with the respective hydrogen combustion burner assembly 3 is below the threshold temperature.

[0121] According to some preferred non-limiting embodiments, each hydrogen combustion burner assembly 3 may also comprise an ignition device 26, preferentially being operatively connected to control unit 4, and configured to ignite the hydrogen exiting from the respective hydrogen combustion burner assembly 3 and through the respective outlet channels 13.

[0122] According to some preferred non-limiting embodiments, each support structure may be configured such that a distance between the cooking vessel and the respective hydrogen combustion burner assembly 3 may be in a range from 5 mm to 15 mm.

[0123] In particular, the distance between the cooking vessel and the respective hydrogen combustion burner assembly 3 may be defined as the distance between a bottom surface of the cooking vessel and the respective outlets of the respective outlet channels 13 in a direction parallel to the respective central axis A.

[0124] Clearly, changes may be made to gas cooking appliance 1 and/or hydrogen combustion burner assembly 3 without, however, departing from the scope of the present invention.

List of Reference Signs

[0125]

1	Gas cooking hob
2	Heating zone
3	hydrogen combustion burner assembly
4	Control unit
5	Control button
6	Housing structure
7	Main body
9	Injection nozzle
10	Inlet opening
11	Flow channel
12	Enrichment chamber
13	Outlet channel
14	Outer atmosphere
15	Ring-shaped collar
16	Cover
17	Base
18	Aperture
19	Abutment surface
20	Surface portion
21	Engagement surface
22	Fixing element
23	Seat
24	Auxiliary cover
25	Temperature sensor
26	Ignition device
A	central axis

Claims

1. Hydrogen combustion burner assembly (3) for a gas cooking appliance (1) and configured to combust hydrogen; the hydrogen combustion burner assembly (3) comprises a main body (7) having:

   - an inlet opening (10) configured to be connected to a hydrogen supply;
   - a flow channel (11) being in fluidic connection with the inlet opening (10) and configured to receive the hydrogen from the hydrogen supply and through the inlet opening (10);
   - an enrichment chamber (12) being in fluidic connection with the flow channel (11) and being configured to receive the hydrogen through the flow channel (11) and to allow for the formation of a hydrogen atmosphere within the enrichment chamber (12); and
   - a plurality of outlet channels (13) being in fluidic connection with the enrichment chamber (12) and an outer atmosphere (14) and configured to allow for the outflow of the hydrogen from the enrichment chamber (12).

2. Hydrogen combustion burner assembly according to claim 1, and further comprising a cover (16) arranged on the main body (7) such to delimit in cooperation with the main body (7) itself the plurality of

outlet channels (13) and the enrichment chamber (12).

3. Hydrogen combustion burner assembly according to claim 2, wherein the cover (16) is removably or non-removably arranged on the main body (7).

4. Hydrogen combustion burner assembly according to claim 2 or 3, wherein the main body (7) comprises an abutment surface (19) and the cover (16) comprises an engagement surface (21) engaging with the abutment surface (19) in a substantially air-tight manner.

5. Hydrogen combustion burner assembly according to claim 4, wherein the abutment surface (19) comprises a plurality of surface portions (20);
wherein the main body (7) comprises a plurality of elongated grooves, each one at least partially defining a respective outlet channel (13) and each one being interposed between two respective surface portions (20).

6. Hydrogen combustion burner assembly according to any one of claims 2 to 5, further comprising one or more fastening elements (22) fixing the cover (16) onto the main body (7).

7. Hydrogen combustion burner assembly according to claim 6, wherein the one or more fastening elements (22) are also configured to exert a pressing force onto the cover (16) towards and onto the main body (7).

8. Hydrogen combustion burner assembly according to any one of claims 2 to 7, further comprising an auxiliary cover (24) placed onto the cover (16).

9. Hydrogen combustion burner assembly according to any one of the preceding claims, wherein each outlet channel (13) presents a rectilinear shape.

10. Hydrogen combustion burner assembly according to any one of the preceding claims, wherein a length of each outlet channel (13) ranges between 8 mm to 18 mm; and/or Wherein each outlet channel (13) has a width ranging between 0,3 mm to 0,8 mm.

11. Hydrogen combustion burner assembly according to any one of the preceding claims, wherein the main body (7) further comprises an injection nozzle (9) being in fluidic connection with the inlet opening (10) and the flow channel (11) and configured to control injection of the hydrogen into the flow channel (11).

12. Hydrogen combustion burner assembly, wherein the outlet channels (13) are arranged equally spaced from one another about a central axis (A) of the main body (7).

13. Hydrogen combustion burner assembly according to any one of the preceding claims, wherein each outlet channel (13) of the plurality of outlet channels (13) equals the other outlet channels (13) of the plurality of outlet channels (13).

14. Gas cooking appliance for the heating of cooking vessels by means of combustion of hydrogen comprising one or more heating zones (2), each heating zone (2) being configured to heat at least one cooking vessel at a time and having at least one hydrogen combustion burner assembly (3) according to any one of the preceding claims.

15. Gas cooking appliance according to claim 14, wherein each heating zone comprises a support structure for carrying the at least one cooking vessel; wherein the support structure is configured such that a distance between the cooking vessel and the respective hydrogen combustion burner assembly (3) is in a range from 5 mm to 15 mm.

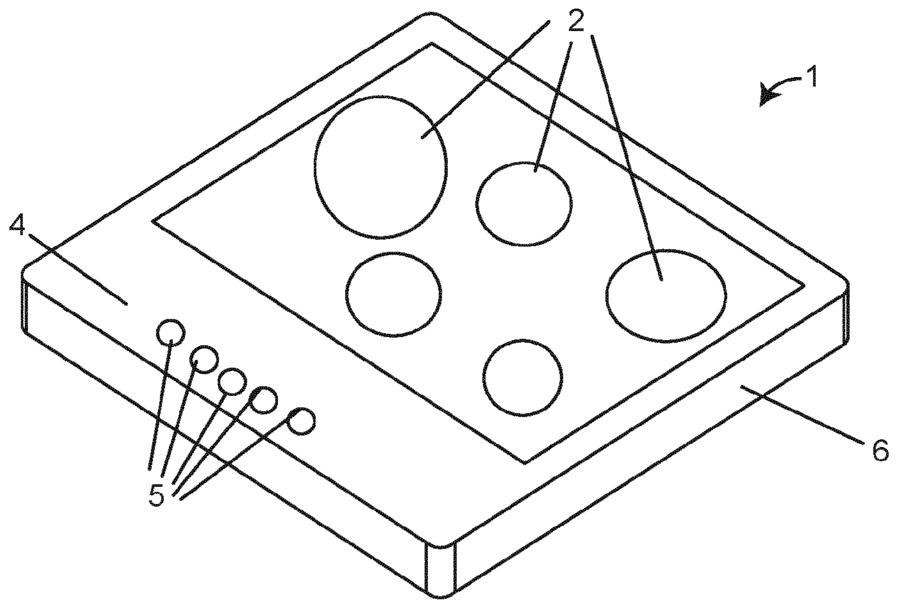

Figure 1

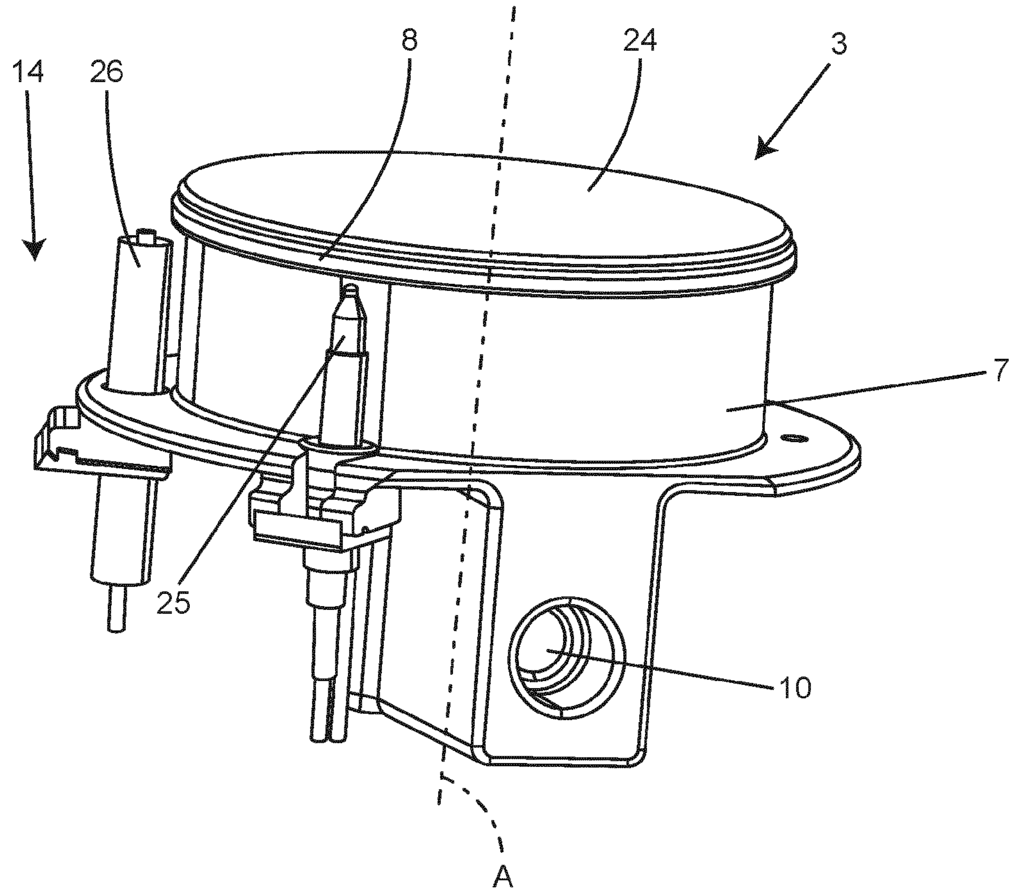

Figure 2

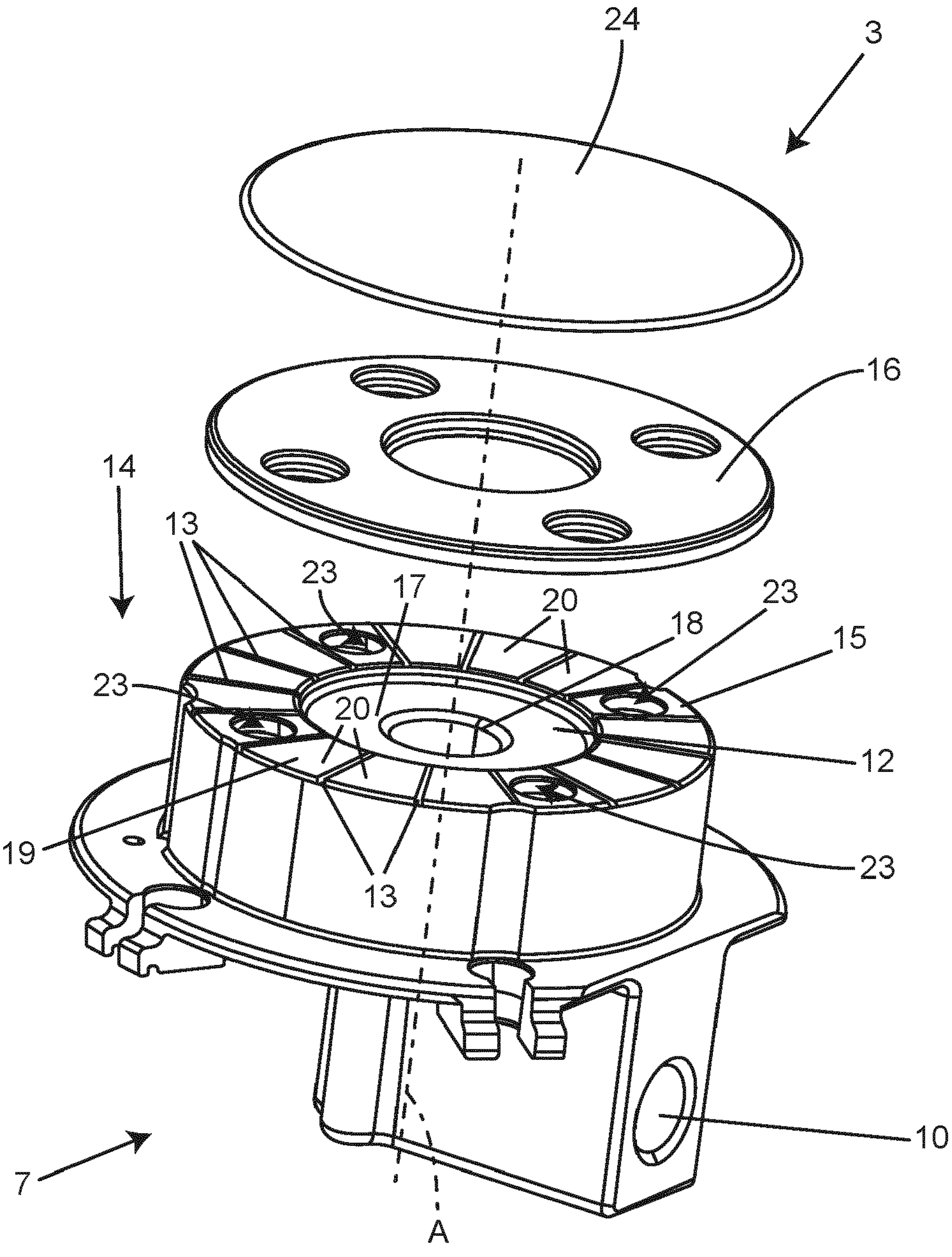

Figure 3

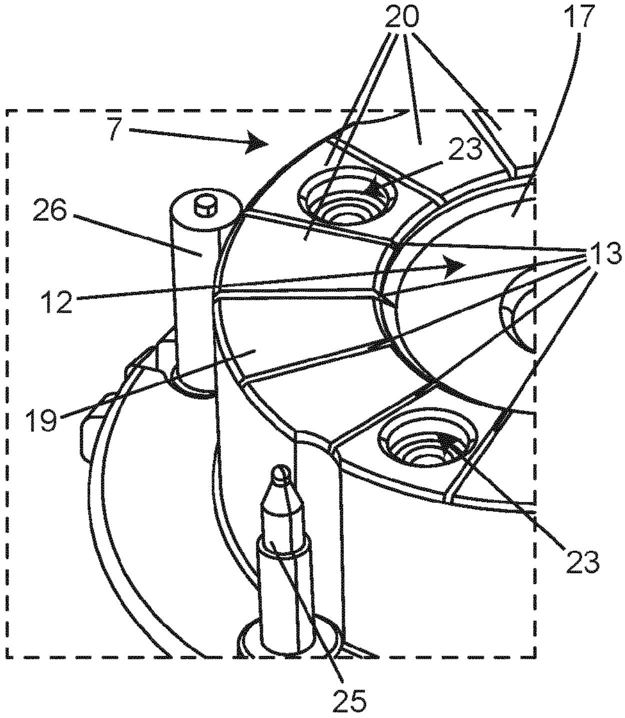

Figure 4

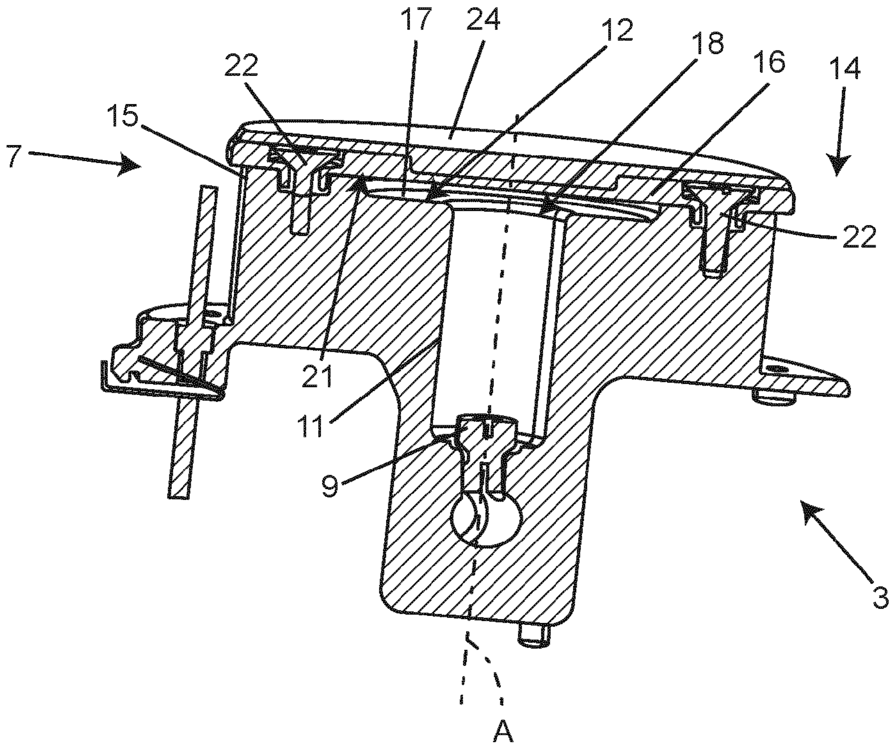

Figure 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 4856

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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F24C
F23C

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
Munich	7 June 2023	Gavriliu, Costin

CATEGORY OF CITED DOCUMENTS

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