GAS BURNER COMPRISING A BURNER HEAT

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ABSTRACT
Gas burner (1) comprising a mixing chamber (5); a burner head (19) provided with a plurality of openings (22) in fluidic communication with the outside, the burner head (19) constituting part of the wall of the mixing chamber (5), the burner head (19) comprises: a central hole (18); a first zone (23) comprising openings of a dimension of between 0.8 and 1 mm; a second zone (25) surrounding the first zone (23) and comprising openings of a dimension of between 0.8 and 1.5 mm; a solid annular intermediate zone (31) situated between the first and the second zone (25); the burner head further comprising an annular shoulder (21).
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TECHNICAL FIELD

[0001] The present invention relates to a gas burner for a grill or kitchen recipient and a portable stove comprising the gas burner.

BACKGROUND

[0002] According to the state of the technique, the burner comprises a mixing chamber and a mixer. A flow of a gas/air mixture is injected into the chamber by means of the mixer.

[0003] The flow of the gas/air mixture exits the chamber at the burner head. The burner head constitutes a part of the wall of the chamber. A plurality of openings comprised in the burner head partitions the flow into a plurality of streams.

[0004] A lighting device, provides sufficient energy for initiating a combustion of the gas/air mixture outside the chamber at the openings of the burner head. A continuous flow of gas/air mixture allows stabilizing the flame.

[0005] The speed of the flow must be enough for the flame not to penetrate into the mixing chamber. In fact, if the flow speed is lower than the speed of flammability, the flame rises up the flow. The combustion must be as complete as possible in order to limit the formation of incomplete combustion products, in particular carbon monoxide.

[0006] However, the length of the flame requires that the positioning of the cooking recipient should be at a distance of the order of 20 mm from the burner head. The distance is necessary for ensuring a combustion reaction producing minimum carbon monoxide. However, the cooking recipient does not entirely recover the heat produced by combustion, part of the heat being dissipated into the outside environment.

[0007] In addition, the distance of the order of 20 mm between the burner head and the cooking recipient offers a windage.

[0008] A device for protecting against the wind or a wind break is often required in order to limit the effect of wind gusts. Portable stoves without wind breaks are inoperative from a wind speed of the order of 3 m/s.

BRIEF SUMMARY

[0009] The purpose of the present invention aims to resolve all or part of the aforementioned drawbacks.

[0010] To this end, the present invention relates to a gas burner comprising:

[0011] a mixing chamber,

[0012] a burner head provided with a plurality of openings in fluid communication with the outside, the burner head constituting part of the wall of the mixing chamber,

[0013] the gas burner being characterized in that the burner head includes:

[0014] a central hole,

[0015] a first area with a width between 2 and 20 mm, comprising openings the dimension of which is between 0.3 and 2 mm, the distance separating the openings is between 0.5 and 3.5 mm,

[0016] a second area with a width between 2 and 20 mm, the second area surrounding the first area and comprising openings the dimension of which is between 0.3 and 2 mm, the distance separating the openings is between 0.5 and 3.5 mm,

[0017] a solid intermediate annular area, located between the first and second area, with a width between 2 and 20 mm,

[0018] the burner head further comprising an annular shoulder.

[0019] The flames generated at the burner head create a suction phenomenon. Thus, secondary air, coming from the outside, is made to move from the central hole towards the burner head. The secondary air participates in the combustion reaction and limits the production of carbon monoxide.

[0020] The spatial distribution of the openings and shape of the burner head generate flames of limited length. Thus a cooking recipient may be positioned at a minimum distance in the range of 10 to 15 mm from the burner head without modifying the combustion reaction as the presence of the central hole and intermediate area allow sufficient flame oxygenation.

[0021] The small distance between the cooking recipient and the burner head limits heat leakage. Thus the quantity of heat recovered by the cooking recipient is optimized with respect to the quantity of consumed gas.

[0022] The small distance between the cooking recipient and the burner head also ensures that the wind does not blow out the flame.

[0023] According to an aspect of the invention, the first and/or second area comprise(s) openings the dimensions of which range between 0.8 and 1.5 mm, the distance separating the openings ranging between 1.5 and 2.5 mm.

[0024] It is worth noting that the size of the openings and the distance separating the openings may be different between the first area and the second area.

[0025] According to an aspect of the invention, the first area has a width ranging between 3 and 15 mm.

[0026] According to an aspect of the invention, the second area has a width ranging between 5 and 15 mm.

[0027] According to an aspect of the invention, the intermediate area has a width ranging between 5 and 15 mm.

[0028] According to an aspect of the invention, at least part of the openings has an axis oriented according to an angle ranging between 0 and 10° with respect to an axis of the central hole.

[0029] According to an aspect of the invention at least part of the openings of the second area is disposed on an upper surface of the shoulder.

[0030] According to an aspect of the invention, at least part of the openings of the second area is disposed on an internal surface of the shoulder.

[0031] The annular shoulder of the burner head has a protective role against the wind with regard to the flames generated by the openings located in the first area.

[0032] According to an aspect of the invention, the periphery of the burner head has a peripheral wall forming a crown the edge of which is disposed beyond the surface of the shoulder in an extension direction of the flame.

[0033] The crown protects the base of the flames from the wind. The risk of extinguishing the flames by blowing is thereby reduced.

[0034] According to an aspect of the invention, the crown comprises a radial surface having openings the dimension of which ranges between 1 and 2.5 mm, the openings being in fluid communication with the outside.

[0035] According to an aspect of the invention, the burner comprises a flange surrounding the radial surface of the
crown. The distance separating the flange from the radial surface ranges between 0.5 and 2 mm.

[0036] According to an aspect of the invention, the space located between the flange and the radial surface is an annular peripheral chamber. The annular peripheral chamber is in fluid communication with the outside through an annular slit. The annular slit adjoins the edge of the crown.

[0037] According to an aspect of the invention, the flange comprises an upper rim. The upper rim defines the outer peripheral end of the slit. The rim is slanted in the direction of the edge of the crown in such a manner as to partially close the peripheral chamber.

[0038] According to an aspect of the invention the width of the slit ranges between 0.7 and 1.3 mm.

[0039] Part of the flow of the gas/air mixture exits the mixing chamber by the openings of the peripheral surface, transits by the peripheral chamber and reaches the outside by the annular slit.

[0040] The part of the flow of the mixture ignites at the slit, causing a peripheral flame. The peripheral flame protects the flames generated at the burner head from the wind.

[0041] According to an aspect of the invention, the gas burner includes three secured parts:

[0042] a lower part of a mixer and the mixing chamber (A),

[0043] the mixer including a tubular duct having an inlet and an outlet defining an area for the circulation of a flow of gas/air mixture; a Venturi effect structure is comprised in the circulation area in such a manner as to increase the speed of the flow,

[0044] an upper part of the mixer and the mixing chamber (B),

[0045] the burner head (C).

[0046] According to an aspect of the invention pertaining to a first embodiment, the three secured parts (A), (B) and (C) are made of deep drawn steel sheet, the burner head (C) being also punched; the three parts (A), (B) and (C) being cramped and/or welded.

[0047] According to an aspect of the invention the flange is comprised in the upper part of the mixer and mixing chamber (B).

[0048] According to an aspect of the invention, the mixer tangentially opens into the mixing chamber.

[0049] The mixer opens onto a tangent of the mixing chamber. The flow of the gas/air mixture is distributed homogeneously in the mixing chamber. Thus, the openings of the burner head are equally supplied with gas/air.

[0050] According to an aspect of the invention, the mixer is tangentially connected in the mixing chamber, the tubular duct of the mixer extending inside the mixing chamber.

[0051] The tangential connection of the mixer in the mixing chamber maintains the flow of gas/air mixture at sufficient speed while limiting the head losses at the connection.

[0052] The extension of the tubular duct of the mixer inside the mixing chamber guides the flow in order to obtain a homogenous distribution of the gas/air mixture in the chamber.

[0053] According to an aspect of the invention, a portable stove includes at least a gas burner of the type in which a cup, having a central opening surrounds the burner head. The cup includes a shoulder at the periphery of the burner head and an elevated edge with respect to the burner head around the shoulder.

[0054] The shoulder has a hollow shape and collects projections coming from the cooking recipient or the outside. This disposition facilitates cleaning the portable stove. The elevated edge around the shoulder is an additional protection against the wind by limiting blowing risks.

[0055] According to an aspect of the invention, the cup includes means for fixing to the portable stove alternatively allowing to secure it and detach it.

[0056] The fact that the cup is dismantlable also facilitates cleaning the burner.

[0057] According to an aspect of the invention the portable stove includes, a support for a cooking recipient intended for supporting a cooking recipient, the support including fins surrounding the burner.

[0058] The fins are:

[0059] convex shaped facing the burner head and concave facing the outside,

[0060] separated by openings.

[0061] The openings and the convex shape of the fins facing the burner head facilitate the discharge of smoke produced by the combustion of the gas/air mixture. The concave shape of the external face of the fins protects the burner head from the wind.

BRIEF DESCRIPTION OF THE DRAWINGS

[0062] Anyway, the invention will be better understood with the following description with reference to the accompanying schematic drawings representing, by way of non limiting example, an embodiment example of this gas burner.

[0063] FIG. 1 is a perspective view of a gas burner.

[0064] FIG. 2 is a perspective view of a lower part (A) and an upper part (B) of a mixer and a mixing chamber of the gas burner, according to a first embodiment.

[0065] FIG. 3 is a perspective view of a lower part (A) and an upper part (B) of a mixer and a mixing chamber of the gas burner, according to a second embodiment.

[0066] FIG. 4 is a perspective view of a cooking recipient and a gas burner in operation.

[0067] FIG. 5 is a perspective view of a portable stove comprising the gas burner and a cup.

[0068] FIG. 6 is a perspective view of a portable stove comprising the gas burner, the cup and a support for a cooking recipient.

[0069] FIG. 7 is a longitudinal sectional view of the burner.

[0070] FIG. 8 is a detail of the sectional view of the burner.

DETAILED DESCRIPTION

[0071] According to an embodiment, a gas burner 1 includes a mixer 3 and a mixing chamber 5. The mixer 3 includes a tubular duct 7 provided with a circulation area 9 between an inlet 11 and an outlet 15. A Venturi effect structure 16 is disposed in the circulation area 9.

[0072] The mixing chamber 5 includes a wall forming a surface of revolution around an axis 17. The swept surface of the surface of revolution is at a distance from the axis 17, in such a manner that a central hole 18 crosses the mixing chamber 5, as illustrated on FIGS. 1 to 6.

[0073] The outlet 15 of the tubular duct 7 tangentially opens into the mixing chamber 5, as illustrated on FIG. 2.

[0074] According to a second embodiment, illustrated on FIG. 3, the tubular duct 7 penetrates tangentially and extends in the mixing chamber 5 in such a manner that the outlet 15 is in fluid communication with the inside of the chamber 5.
According to the first and second embodiment, the burner 1 comprises a lower part (A) and an upper part (B) made of deep drawn sheet steel or aluminum. A burner head 19 constitutes a part (C) of the wall of the mixing chamber 5, as illustrated on FIG. 1.

The burner head 19 includes a shoulder 21. As illustrated on FIG. 1, the shoulder 21 is annular and located in the periphery of the mixing chamber 5 in such manner as to define an overhang from the burner head 19 in the extension direction of the flame.

The burner head 19 includes a plurality of openings 22 in fluid communication with the outside.

A first area 23 of the burner head 19 surrounds the central hole 18 and comprises openings 22 the dimension of which is between 0.8 and 1.5 mm. The distance separating the openings of the first area is between 1.5 and 2.5 mm. The first area 23 is an annular surface partly comprised in a plane which is perpendicular to the axis 17 or slanted by an angle of at least 10° in such a manner as to have an overhang from the periphery of the area 23 in the extension direction of the flame.

An area width is defined as the difference of length between a maximum radius of the area, and a minimum radius of the area, with respect to the axis 17. The width of the first area D1 is between 3 and 15 mm.

A second area 25 surrounds the first area 23 and comprises openings 22 the dimension of which is between 0.8 and 1.5 mm. The distance separating the openings of the second area is between 1.5 and 2.5 mm. The width of the second area D2 is between 5 and 15 mm.

The second area 25 comprises an internal annular surface 27 around the axis 17. The internal surface 27 is slanted by an angle of 50 to 60° with respect to a plane perpendicular to the axis 17 in such a manner as to have an overhang from the periphery of the internal surface 27 in the extension direction of the flame.

The internal surface 27 constitutes the edge of the annular shoulder 21.

The second area 25 comprises an upper annular surface 29 surrounding the internal surface 27. The upper surface 29 is slanted by an angle of 0 to 10° with respect to a plane which is perpendicular to the axis 17 in such a manner as to have an overhang from the periphery of the upper surface 29 in the extension direction of the flame.

An intermediate area 31 is located between the first area 23 and the second area 25. The intermediate area 31 is an annular surface according to a plane which is perpendicular to the axis or slanted by an angle of at least 10° in such a manner as to have an overhang from the periphery of the intermediate area 31 in the extension direction of the flame.

The surface of the intermediate area is solid, by solid is meant without an opening. The width of the intermediate area D3 being between 5 and 15 mm.

The periphery of the burner head 19 has a peripheral wall forming a crown 32 which is disposed beyond the surface of the shoulder 21 in the extension direction of the flame, such as illustrated in FIG. 1.

FIG. 8 has a detail 52 of FIG. 7.

As illustrated on FIG. 8, the crown 32 has a radial surface 53. The upper part of the mixer and the mixing chamber (B) comprises a flange 55 surrounding the radial surface 53. The distance separating the flange 55 from the radial surface 53 is 1.5 mm.

An annular peripheral chamber 57 is located between the flange 55 and the radial surface 53. An annular slit 59 adjoins the edge 32 of the crown.

The flange 55 has an upper rim 61. The rim 61 is slanted in the direction of the edge 32 of the crown in such a manner as to partially close the peripheral chamber 57. The width of the slit is 0.9 mm.

As illustrated on FIGS. 7 and 8, the radial surface 53 has round openings 63 with a diameter of 1.5 mm putting the mixing chamber 5 and the peripheral chamber 57 in fluid communication.

As shown on FIGS. 5 and 6, the burner is included within a portable stove 33, in such a manner that the burner head 19 is in fluid communication with the outside.

A cup 35, having a central opening surrounds the burner head, as illustrated by FIGS. 5 and 6. The cup 35 has a shoulder 37 in such a manner that the shoulder 37 forms a throat 39 set back with respect to the burner head 19. The throat 39 is oriented in the opposite direction to the extension direction of the flame, as illustrated on FIG. 5.

The throat 39 is surrounded by an elevated edge 41 with respect to the burner head 19 in the extension direction of the flame.

A support for a cooking recipient 43 includes means for fixing to the portable stove 33. The support 43 is positioned on the portable stove 33 in such a manner as to surround the burner head.

The support 43 extends in the extension direction of the flame in such a manner as to leave an overhang with respect to the burner head 19. The support 43 is intended to maintain a cooking recipient 45 at a minimum distance of 10 mm from the burner head.

The support 43 comprises fins 47 of convex shape facing the burner head and concave shape on the opposite face. The support has openings 48 between the fins. The fins 47 make the connection between a lower crown 49 and an upper crown 51, the lower crown 49 and the upper crown 51 being comprised in the support 43.

The cooking recipient 45 is intended to rest on the upper crown 51 and the lower crown 49 is secured to the portable stove.

The gas burner 1 according to the present invention creates flames that have a reduced length, allowing a distance of the order of 10 to 15 mm minimum between the cooking recipient 45 and the burner head 19.

A flow of a gas/air mixture is injected at the inlet 11 of the mixer 3. The speed of the flow of the gas/air mixture increases when passing through the Venturi effect structure 16.

The flow of the gas/air mixture penetrates tangentially in the mixing chamber 5. The flow is then distributed in the chamber 5 while forming a swirl. The flow exits the chamber 5 by the openings 22 of the burner head 19 by decomposing into a plurality of streams.

The arrangement of openings 22 of the first area 23 and second area 25 conditions the formation of a plurality of flames of reduced size.

The combustion reaction causing the flames is initiated by an input of intermittent energy, such as a spark. Once the reaction initiated, the flames stabilize outside the burner 1 at the openings 22. As illustrated by FIG. 4, the flames move away from the burner according to the axis 17.
[0104] The speed of the streams of the gas/air mixture exiting the mixing chamber is substantially equal to the speed of flammability. Thus, the flame stabilizes at the burner head.

[0105] The shoulder 21 of the burner head 19 and the fact that the intermediate area 31 is without an opening 22 promotes the addition of secondary air to the gas/air mixture coming from the chamber 5.

[0106] The secondary air comes from the outside and is suctioned through the central hole 18. The suction is caused by the circulation of the gas/air mixture exiting the chamber 5.

[0107] The elevated edge 41 of the cap 35 has a protective role against the wind by limiting the risks of the flame from being blown out.

[0108] The fins 47 of the support 43 by their convex shape facing the burner head, facilitate the discharge of the burnt gases from combustion by the openings 22.

[0109] The concave shape of the external faces of the fins 47 limits the penetration of the wind into the area delimited by the support 43.

[0110] As it is known per se, the invention is not limited to the sole embodiment of this device, described above by way of example, but on the contrary it encompasses all variants.

1. A gas burner comprising:
   a mixing chamber,
   a burner head provided with a plurality of openings in fluid communication with an outside, the burner head constituting part of a wall of the mixing chamber, wherein the burner head includes:
   a central hole,
   a first area disposed around the central hole with a width between 2 and 20 mm, comprising openings a dimension of which is between 0.3 and 2 mm, a distance separating the openings being between 0.5 and 3.5 mm,
   a second area with a width between 2 and 20 mm, the second area surrounding the first area and comprising openings a dimension of which is between 0.3 and 2 mm, a distance separating the openings being between 0.5 and 3.5 mm,
   a solid intermediate annular area, located between the first and second area, with a width between 2 and 20 mm, the burner head further comprising an annular shoulder (21).

2. The gas burner according to claim 1, wherein the first and/or second area comprise(s) openings the dimensions of which range between 0.8 and 1.5 mm, the distance separating the openings being between 1.5 and 2.5 mm.

3. The gas burner according to claim 1, wherein the first area has a width ranging between 3 and 15 mm.

4. The gas burner according to claim 1, wherein the second area has a width ranging between 5 and 15 mm.

5. The gas burner according to claim 1, wherein the intermediate area has a width ranging between 5 and 15 mm.

6. The gas burner according to claim 1, wherein at least a part of the openings of the second area is disposed on an upper surface of the shoulder.

7. The gas burner according to claim 1, wherein at least a part of the openings of the second area is disposed on an internal surface of the shoulder.

8. The gas burner according to claim 1, wherein the periphery of the burner head has a peripheral wall forming a crown the edge of which is disposed beyond the surface of the shoulder in an extension direction of the flame.

9. The gas burner according to claim 8, wherein the crown comprises a radial surface having openings a dimension of which is between 1 and 2.5 mm, the openings being in fluid communication with the outside.

10. The gas burner according to claim 9 comprising a flange surrounding the radial surface of the crown, a distance separating the flange from the radial surface being between 0.5 and 2 mm.

11. The gas burner according to claim 10, wherein a space located between the flange and the radial surface is an annular peripheral chamber,
   the annular peripheral chamber is in fluid communication with the outside through an annular slit, the annular slit adjoining the edge of the crown.

12. The gas burner according to claim 11, wherein the flange comprises an upper rim,
   the upper rim defining the outer peripheral end of the slit and the rim being slanted in a direction of the edge of the crown in such a manner as to partially close the peripheral chamber.

13. The gas burner according to claim 1, including three secured parts:
   a lower part of a mixer and of the mixing chamber,
   the mixer including a tubular duct having an inlet and an outlet delimiting an area for the circulation of a flow of gas/air mixture; a Venturi effect structure is comprised in a circulation area in such a manner as to increase the speed of the flow,
   an upper part of the mixer and of the mixing chamber, the burner head.

14. The gas burner, according to claim 13, wherein the mixer tangentially opens into the mixing chamber.

15. The gas burner, according to claim 13, wherein the mixer is tangentially connected in the mixing chamber, the tubular duct of the mixer extending inside the mixing chamber.