

DESCRIPTION

【Invention Title】

CONCENTRIC BURNER

【Technical Field】

5 The present invention relates to a concentric burner preferably used in gas stoves.

【Background Art】

In the related art, a concentric burner was proposed. The concentric burner includes an inner burner and an outer burner. The inner burner has an inner burner body, an inner burner cap that is seated on the inner burner body and forms a mixed gas chamber between the inner burner cap and the inner burner body, and a plurality of inner burner flame ports formed in the side wall of
10 the inner burner cap. The inner burner flame ports are spaced apart from each other in a circumferential direction of the inner burner cap. The outer burner has a ring-shaped outer burner body, a ring-shaped outer burner cap that is seated on the outer burner body and forms a mixed gas chamber between the outer burner cap and the outer burner body, and a plurality of outer burner
15 flame ports formed in the side wall of the outer burner cap. The outer burner flame ports are spaced apart from each other in a circumferential direction of the outer burner cap.

When operating the concentric burner, mixed gas jetted from the inner burner flame ports or mixed gas jetted from the outer burner flame ports is ignited by an ignition plug, thus producing

flame, and the flame is transferred to the other flame ports. To realize the flame transfer between the inner burner flame ports and the outer burner flame ports, a flame transfer slit is formed in the top wall of the outer burner cap. Here, the flame transfer slit extends radially outward from the inner circumference of the top wall of the outer burner cap, and the outside end of the flame transfer slit opens in the outer circumferential surface of the side wall of the outer burner cap (for example, referring to patent document 1).

In the related art concentric burner, the entire length of the flame transfer slit passes over the mixed gas chamber of the outer burner. Accordingly, the related art concerning a concentric burner is problematic in that an excessive amount of mixed gas is discharged from a radial directional middle portion of the flame transfer slit, and an insufficient amount of mixed gas is discharged from the outside end of the flame transfer slit, so the size of the flame produced from the outside end of the flame transfer slit is reduced, and the burner may fail to efficiently transfer flame between the flame transfer slit and the outer burner flame ports.

Document of Related Art

(Patent Document 1) Japanese Patent Laid-open Publication No. 2005-164058

【Disclosure】

【Technical Problem】

Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art, and is intended to provide a concentric burner that is configured such
5 that the burner has an improved flame transfer performance.

【Technical Solution】

In order to accomplish the above object, the present invention provides a concentric burner, including: an inner burner having an inner burner body, an inner burner cap seated on the inner burner body and forming a mixed gas chamber between the inner burner cap and the inner
10 burner body, and a plurality of inner burner flame ports formed in a side wall of the inner burner cap in such a way that the inner burner flame ports are spaced apart from each other in a circumferential direction of the inner burner cap; an outer burner having a ring-shaped outer burner body, a ring-shaped outer burner cap seated on the outer burner body and forming a mixed gas chamber between the outer burner cap and the outer burner body, and a plurality of outer burner
15 flame ports formed in a side wall of the outer burner cap in such a way that the outer burner flame ports are spaced apart from each other in a circumferential direction of the outer burner cap; and a flame transfer slit formed in a top wall of the outer burner cap in such a way that the flame transfer slit extends radially outward from an inner circumference of the top wall of the outer burner cap,

and an outside end of the flame transfer slit opens in an outer circumferential surface of the side wall of the outer burner cap, wherein a radial directional middle portion of the flame transfer slit is formed as a flame transfer groove portion that is closed at the bottom facing the mixed gas chamber of the outer burner.

5 In the present invention, the flame transfer groove portion that is formed in the middle portion of the flame transfer slit does not directly communicate with the mixed gas chamber, so the amount of mixed gas discharged from the middle portion of the flame transfer slit is reduced, and the amount of mixed gas discharged from the outside end of the flame transfer slit is increased. Accordingly, the size of the flame produced from the outside end of the flame transfer slit is
10 increased and the flame transfer performance of the concentric burner is improved.

 Further, in the present invention, a protrusion may be formed in the lower surface of the top wall of the outer burner cap by protruding downward from a portion corresponding to the flame transfer groove portion. In this case, the current of mixed gas that flows along the lower surface of the top wall of the outer burner cap is divided into radial inside and outside currents by
15 the protrusion, so mixed gas can be jetted from the outside end of the flame transfer slit, with a directional component added to the mixed gas and causing the mixed gas to be radially directed outward. Accordingly, the flame transfer performance of the concentric burner is further improved.

Further, when the protrusion is formed in the burner as described above, a depression may be formed in the inner circumferential surface of the side wall of the outer burner cap by being depressed outward in a radial direction at a location corresponding to the protrusion, wherein the radial outside end of the protrusion may be placed in the depression such that opposite
5 circumferential gaps and a radial gap are defined between the protrusion and the depression, and the outside end of the flame transfer slit may be configured to communicate with the radial gap.

In this case, mixed gas flows radially outward from the opposite circumferential gaps that are defined between the depression and the protrusion to the radial gap that is defined between the depression and the protrusion. Accordingly, the directional component that causes the mixed gas
10 to be radially directed outward is effectively added to the mixed gas discharged from the outside end of the flame transfer slit which communicates with the radial gap, so the function of transferring the flame between the flame transfer slit and the outer burner flame ports can be efficiently improved. Further, in the present invention, the amount of mixed gas discharged from the outside end of the flame transfer slit can be effectively controlled by controlling the amount of
15 opposite circumferential gaps defined between the depression and the protrusion. Therefore, the present invention can prevent combustion error, such as lifting of flames or yellow flames, caused by an excessive increase in the amount of discharged mixed gas.

Further, the flame transfer groove portion may be configured such that the bottom of the

flame transfer groove portion is depressed into the protrusion to a depth so that the bottom of the flame transfer groove portion is placed below the lower surface of the top wall with the exception of the protrusion. In this case, mixed gas can be introduced into the flame transfer groove portion through opposite ends thereof, so the amount of mixed gas discharged from the flame transfer
5 groove portion is not excessively reduced, but a small-sized flame is continuously produced from the flame transfer groove portion. Accordingly, the present invention can prevent a flame transfer error from being generated around the middle portion of the flame transfer slit due to a sudden extinguishment.

Further, in the present invention, a bevel part may be formed in a predetermined portion of
10 an outside edge of the top wall of the outer burner cap such that the bevel part is inclined outward and downward in the radial direction at a location at which an outside part of the flame transfer slit is formed. In this case, the present invention can improve the flame transfer performance at a location between the middle portion of the flame transfer slit and the outside end of the flame transfer slit.

15 **【Description of Drawings】**

FIG. 1 is a perspective view of a concentric burner according to an embodiment of the present invention;

FIG. 2 is a sectional view of the concentric burner according to the embodiment of the

present invention;

FIG. 3 is an enlarged sectional view taken along line III-III of FIG. 1; and

FIG. 4 is a sectional view taken along line IV-IV of FIG. 3.

【Mode for Invention】

5 As shown in FIGS. 1 and 2, the concentric burner according to an embodiment of the present invention which is preferably used in a gas stove includes an inner burner 1 and an outer burner 2 that surrounds the inner burner 1. The concentric burner further includes an inner burner mixing pipe 11 and an outer burner mixing pipe 21, with nozzles (not shown) provided such that the nozzles come into contact with upstream ends of the respective mixing pipes 11 and 21,
10 wherein, when fuel gas is jetted from the respective nozzles, primary air is introduced into the inner and outer burners along with the jetted fuel gas, and the fuel gas is mixed with the primary air in the respective mixing pipes 11 and 21 so as to form mixed gas.

 The mixing pipes 11 and 21 are integrated with each other in downstream ends thereof. Here, the integrated part of the mixing pipes 11 and 21 is formed as a double-ply tub structure
15 having an inner tub part 11a that forms the downstream end of the inner burner mixing pipe 11 and opens upward, and an outer tub part 21a that forms the downstream end of the outer burner mixing pipe 21 and opens upward.

 Further, the concentric burner includes an inner burner body 12 that is combined with the

upper end of the inner tub part 11a, and a ring-shaped outer burner body 22 that surrounds the inner burner body 12. Here, the outer burner body 22 is combined with the upper end of the outer tub part 21a, and is integrated with the inner burner body 12 into a single body with the interposition of a plurality of radial channels 22a that guide mixed gas from the outer burner
5 mixing pipe 21 to the outer burner body 22.

An inner burner cap 13 is seated on the inner burner body 12, and constitutes the inner burner 1 together with both the inner burner mixing pipe 11 and the inner burner body 12. In the side wall of the inner burner cap 13, a plurality of small-sized and large-sized inner burner flame ports 14 are formed in radial directions, wherein the inner burner flame ports 14 are spaced apart
10 from each other at predetermined intervals in a circumferential direction of the inner burner cap 13. Further, a mixed gas chamber is defined between the inner burner body 12 and the inner burner cap 13 such that mixed gas supplied from the inner burner mixing pipe 11 can be discharged from the mixed gas chamber of the inner burner through the inner burner flame ports 14.

Further, a ring-shaped outer burner cap 23 is seated on the outer burner body 22, and
15 constitutes the outer burner 2 together with both the outer burner mixing pipe 21 and the outer burner body 22. The outer burner cap 23 has a side wall 23a that is seated on the side wall 22b of the outer burner body 22, with a plurality of small-sized and large-sized outer burner flame ports 24 formed in the side wall 23a in radial directions. Here, the outer burner flame ports 24 are

spaced apart from each other at predetermined intervals in a circumferential direction of the outer burner cap 23. Further, a mixed gas chamber is defined between the channels 22a, the outer burner body 22 and the outer burner cap 23 such that mixed gas supplied from the outer burner mixing pipe 21 can be discharged from the mixed gas chamber of the outer burner 2 through the outer burner flame ports 24.

In addition, a cylindrical engagement part 23b is formed around the inner circumference of the outer burner cap 23. The engagement part 23b is engaged with an inside wall 22c of the outer burner body 22 which is formed around the inner circumference of the outer burner body 22, so the position of the outer burner cap 23 relative to the outer burner body 22 can be determined.

The concentric burner further includes an ignition plug 3 that faces the outer burner cap 23, and a thermocouple 4 that faces the inner burner cap 13 and functions as a flame detector. The outer burner 2 is ignited by the ignition plug 3 and flame is transferred from the outer burner 2 to the inner burner 1, and the thermocouple 4 detects the flame transfer from the outer burner 2 to the inner burner 1.

Further, to transfer flame between the inner burner 1 and the outer burner 2, three flame transfer ports 25 are formed in the top wall 23c of the outer burner cap 23 at predetermined locations on the inner circumferential surface such that the three flame transfer ports 25 are close to each other in a circumferential direction, and a flame transfer slit 26 extends radially outward from

a middle one of the three flame transfer ports 25. Therefore, flame can be primarily transferred from the outer burner flame ports 24 to the flame transfer slit 26, and can be secondarily transferred from the flame transfer slit 26 to the inner burner flame ports 14 through the flame transfer ports 25. When the operation mode of the concentric burner is changed from a mode in which only the inner burner 1 is used to another mode in which both the inner burner 1 and the outer burner 2 are used, flame is transferred from the inner burner flame ports 14 to the flame transfer slit 26 through the flame transfer ports 25 and is transferred from the flame transfer slit 26 to the outer burner flame ports 24.

As shown in FIG. 3, the outside end 26a of the flame transfer slit 26 is open in the outer circumferential surface of the side wall 23a of the outer burner cap 23. Here, the flame transfer ports 25 are configured such that the ports 25 are inclined inward and downward in radial directions so as to guide the flame to the inner burner cap 13.

Here, since the entire length of the flame transfer slit 26 passes over the mixed gas chamber of the outer burner 2, an excessive amount of mixed gas may be discharged from a radial directional middle portion of the flame transfer slit 26, and an insufficient amount of mixed gas may be discharged from the inside or outside end of the flame transfer slit 26. Here, even when an insufficient amount of mixed gas is discharged from the inside end of the flame transfer slit 26, no big problem is generated in the concentric burner because the flame can be efficiently transferred

to the inner burner flame ports 14 by the flame transfer ports 25. However, when an insufficient amount of mixed gas is discharged from the outside end 26a of the flame transfer slit 26, the size of the flame produced from the outside end 26a of the flame transfer slit 26 is reduced, and the burner may fail to efficiently transfer flame between the flame transfer slit 26 and the outer burner flame
5 ports 24. Accordingly, the flame transfer performance of the concentric burner may be reduced.

Accordingly, to solve the above-mentioned problems, this embodiment is configured such that the radial directional middle portion of the flame transfer slit 26 is formed as a flame transfer groove portion 26b that is closed at the bottom facing the mixed gas chamber of the outer burner 2, as shown in FIGS. 3 and 4. Further, a protrusion 27 is formed on the lower surface of the top wall
10 23c of the outer burner cap 23 by protruding downward from a portion corresponding to the flame transfer groove portion 26b.

Further, a depression 28 is formed in the inner circumferential surface of the side wall 23a of the outer burner cap 23 by being depressed outward in a radial direction at a location corresponding to the protrusion 27. The radial outside end of the protrusion 27 is placed in the
15 depression 28 such that opposite circumferential gaps 28a and a radial gap 28b is defined between the protrusion 27 and the depression 28. Further, the outside end 26a of the flame transfer slit 26 is configured such that the outside end 26a communicates with the radial gap 28b. Further, a bevel part 29 is formed in a predetermined portion of the outside edge of the top wall 23c of the outer

burner cap 23 such that the bevel part 29 is inclined outward and downward in the radial direction at a location at which the outside part of the flame transfer slit 26 is formed.

Here, the flame transfer groove portion 26b is configured such that the bottom of the flame transfer groove portion 26b is depressed into the protrusion 27 to a depth so that the bottom of the flame transfer groove portion 26b is placed below the lower surface of the top wall 23c with the exception of the protrusion 27. Further, both a small-sized middle flame port 24a and large-sized opposite flame ports 24b as parts of the outer burner flame ports 24 are formed in the side wall 23a having the depression 28. Here, the small-sized middle flame port 24a is placed below the outside end 26a of the flame transfer slit 26, and the large-sized opposite flame ports 24b are placed in opposite sides of the outside end 26a of the flame transfer slit 26. Further, the radial directional middle portion of the depression 28 is further depressed outward in a radial direction, thereby forming a depression 28c. The outside end 26a of the flame transfer slit 26 is configured such that the outside end 26a extends outward from the depression 28c in the radial direction.

In the present invention having the above-mentioned construction, the flame transfer groove portion 26b that is formed in the radial directional middle portion of the flame transfer slit 26 does not directly communicate with the mixed gas chamber of the outer burner 2, so the amount of mixed gas discharged from the middle portion of the flame transfer slit 26 is reduced, and the amount of mixed gas discharged from the outside end 26a of the flame transfer slit 26 is increased.

Further, the current of mixed gas that flows along the lower surface of the top wall 23c of the outer burner cap 23 is divided into radial inside and outside currents by the protrusion 27, so mixed gas can be discharged from the outside end 26a of the flame transfer slit 26, with a directional component added to the mixed gas and causing the mixed gas to be radially directed outward. The
5 above-mentioned discharge of the mixed gas from the outside end 26a of the flame transfer slit 26 with the directional component cooperates with the increase in the amount of mixed gas discharged from the outside end 26a, so the size of the flame produced from the outside end 26a is increased and the flame transfer performance of the concentric burner is improved.

Further, in the embodiment of the present invention, mixed gas flows radially outward
10 from the opposite circumferential gaps 28a that are defined between the depression 28 and the protrusion 27 to the radial gap 28b that is defined between the depression 28 and the protrusion 27. Accordingly, the directional component that causes the mixed gas to be radially directed outward is effectively added to the mixed gas discharged from the outside end 26a of the flame transfer slit 26 which communicates with the radial gap 28b, so the function of transferring the flame between the
15 flame transfer slit 26 and the flame ports 24a and 24b, which are formed in the side wall 23a at locations around the depression 28, can be efficiently improved.

In the present invention, mixed gas that has passed through vertical gaps between the side wall 22b of the outer burner body 22 and the outside end of the protrusion 27 is partially

discharged from the outside end 26a of the flame transfer slit 26. However, most of the mixed gas that has passed through the vertical gaps is discharged from the flame ports 24a and 24b, but the amount of the mixed gas that is discharged from the outside end 26a of the flame transfer slit 26 after passing through the vertical gaps is only a small amount. Most of the mixed gas that is discharged from the outside end 26a of the flame transfer slit 26 is the mixed gas that has passed through the opposite circumferential gaps 28a between the depression 28 and the protrusion 27. Accordingly, the amount of mixed gas discharged from the outside end 26a of the flame transfer slit 26 can be effectively controlled by controlling the width of the gaps 28a. Therefore, the present invention can prevent combustion error, such as lifting of flames or yellow flames, caused by an excessive increase in the amount of discharged mixed gas.

Further, in the present invention, the bottom of the flame transfer groove portion 26b is placed below the lower surface of the top wall 23c with the exception of the protrusion 27, so mixed gas can be introduced into the flame transfer groove portion 26b through opposite ends of the flame transfer groove portion 26b. Accordingly, the amount of mixed gas discharged from the flame transfer groove portion 26b is not excessively reduced, but a small-sized flame is continuously produced from the flame transfer groove portion 26b, so the present invention can prevent a flame transfer error from being generated around the middle portion of the flame transfer slit 26 due to a sudden extinguishment.

Further, the bevel part 29 is formed in the outside edge of the upper surface of the top wall 23c of the outer burner cap 23, so mixed gas can be jetted radially outward while being inclined from a portion of the flame transfer slit 26 which is open to the bevel part 29. Accordingly, the present invention can improve the flame transfer performance at a location between the middle
5 portion of the flame transfer slit 26 at which the mixed gas is jetted upward and the outside end 26a of the flame transfer slit 26 at which the mixed gas is jetted radially outward.

Further, as shown in FIG. 5, a wide flame port section 26a may be formed in a part of the outside end 26a of the flame transfer slit 26 by enlarging the circumferential width of the outside end 26a. In this case, a large amount of mixed gas is jetted from the wide flame port section 26a,
10 so the flame can be more efficiently transferred between the outside end 26a of the flame transfer slit 26 and the outer burner flame ports 24. Further, although the wide flame port section 26a shown in FIG. 5 is configured to form a round hole shape, the wide flame port section 26a' may be altered to form another shape, for example, an angled hole shape, instead of the round hole shape.

Although a preferred embodiment of the present invention has been described with
15 reference to the accompanying drawings, the present invention is not limited to the embodiment. For example, in the embodiment, the flame ports 24a and 24b for promoting the flame transfer are formed in the outer burner cap 23 such that the flame ports 24a and 24b can be joined to the depression 28 of the side wall 23a of the outer burner cap 23. However, when the circumferential

widths of the protrusion 27 and the depression 28 are reduced, flame can be effectively transferred between the flame transfer slit 26 and the outer burner flame ports 24 that are formed in the side wall 23a at locations around the depression 28, so the flame ports 24a and 24b may be removed from the burner of the present invention. In this case, the protrusion 27 may be configured such

5 that the radial outside end of the protrusion 27 can be seated on the side wall 22b of the outer burner body 22. Further, the protrusion 27 or the depression 28 may be removed from the burner of the present invention. However, in an effort to improve the flame transfer performance of the burner, it is preferred that both the protrusion 27 and the depression 28 be formed in the burner in the same manner as that described for the embodiment.

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Description of Reference Characters

1: inner burner	12: inner burner body	
13: inner burner cap	14: inner burner flame port	2: outer burner
	22: outer burner body	
15 23: outer burner cap	23a: side wall	
23c: top wall	24: outer burner flame port	
26: flame transfer slit		
26a: outside end of flame transfer slit		

26b: flame transfer groove portion

27: protrusion

28: depression

28a: circumferential gap

28b: radial gap

29: bevel part.

CLAIMS

1. A concentric burner, comprising:

an inner burner having: an inner burner body, an inner burner cap seated on the inner
5 burner body and forming a mixed gas chamber between the inner burner cap and the inner
burner body, and a plurality of inner burner flame ports formed in a side wall of the inner
burner cap in such a way that the inner burner flame ports are spaced apart from each other in a
circumferential direction of the inner burner cap;

an outer burner having: a ring-shaped outer burner body, a ring-shaped outer burner
10 cap seated on the outer burner body and forming a mixed gas chamber between the outer
burner cap and the outer burner body, and a plurality of outer burner flame ports formed in a
side wall of the outer burner cap in such a way that the outer burner flame ports are spaced
apart from each other in a circumferential direction of the outer burner cap; and

a flame transfer slit formed in a top wall of the outer burner cap in such a way that the
15 flame transfer slit extends radially outward from an inner circumference of the top wall of the
outer burner cap, and an outside end of the flame transfer slit opens in an outer circumferential
surface of the side wall of the outer burner cap, wherein

a radial directional middle portion of the flame transfer slit is formed as a flame

transfer groove portion that is closed at a bottom facing the mixed gas chamber of the outer burner.

2. The concentric burner as set forth in claim 1, wherein

a protrusion is formed in a lower surface of the top wall of the outer burner cap by protruding downward from a portion corresponding to the flame transfer groove portion.

3. The concentric burner as set forth in claim 2, wherein

a depression is formed in an inner circumferential surface of the side wall of the outer burner cap by being depressed outward in a radial direction at a location corresponding to the protrusion, wherein a radial outside end of the protrusion is placed in the depression such that opposite circumferential gaps and a radial gap are defined between the protrusion and the depression, and the outside end of the flame transfer slit is configured to communicate with the radial gap.

4. The concentric burner as set forth in claim 2 or 3, wherein

the flame transfer groove portion is configured such that the bottom of the flame transfer groove portion is depressed into the protrusion to a depth so that the bottom of the flame transfer groove portion is placed below the lower surface of the top wall with the exception of the protrusion.

5. The concentric burner as set forth in any one of claims 1 to 4, wherein

a bevel part is formed in a predetermined portion of an outside edge of the top wall of the outer burner cap such that the bevel part is inclined outward and downward in the radial direction at a location at which an outside part of the flame transfer slit is formed.